

A New Fire Station for Harmonville Fire Company – Plymouth Valley Station

Volume 1 of 2

Plymouth Township
Plymouth Meeting, PA 19462

March 6th, 2025

Project Number: 2587.00

Specifications
Divisions 0-12, 31, 32

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INVITATION TO BID

Plymouth Township will receive sealed bids online via the PennBid Program for A NEW FIRE STATION FOR HARMONVILLE FIRE COMPANY – PLYMOUTH VALLEY STATION until 10:00 a.m., prevailing local time, on April 10th, 2025, at which time they will be opened and the results will be publicly displayed on PennBid soon thereafter.

Bidding Documents will be available at no cost at <https://pennbid.bonfirehub.com> starting March 6th at 2:00pm.

There will be a mandatory Pre-bid meeting at the project site, 904 Germantown Pike, Plymouth Meeting, PA 19462 at March 18th at 9:30am.

Each bid must be accompanied by a certified check or bid bond payable to the order of **PLYMOUTH TOWNSHIP** executed by the bidder and acceptable surety, in an amount equal to ten (10%) percent of the base bid amount.

PLYMOUTH TOWNSHIP hereby reserves the right to reject any or all bids submitted, or any portion thereof, and also reserves the right to waive any informalities or irregularities in bids received, when, within the sole discretions of the Township, such rejection or waiver is in the best interests of the Township.

PLYMOUTH TOWNSHIP
Matt West, Township Manager

END OF DOCUMENT AVD

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SCOPE OF WORK

A New Fire Station for Harmonville Fire Company – Plymouth Valley Station project shall be a multi-prime project to include all work as specified in the contract documents. The project schedule will be as outlined in the bidding documents.

This project will have four separate prime contracts, General Construction, Mechanical Construction, Plumbing Construction and Electrical Construction. The scope of work for the four prime contracts shall be as required by the Contract Documents including, but not limited to, the information set forth in Division 01 Section “Multiple Contract Summary”.

The project includes but is not limited to the demolition of the existing fire company building, the construction of the new documented fire company building and all associated site work.

PROJECT SPECIFIC BID INSTRUCTIONS

It is the intent to describe a Complete Project which the Contractor undertakes to, (in full compliance with these drawings, specification and contract) provide the New Fire Station for Harmonville Fire Company – Plymouth Valley Station project as specified on the Bid Form. The Contractor shall furnish all materials, equipment, tools, labor and work incident thereto, complete in place, unless otherwise provided and shall be responsible for the complete supervision, performance and completion of all work in accordance with the drawings, specifications, special provisions and Contract. Should any construction or condition be anticipated on the project, which is not covered by these specifications, bidder shall promptly notify Owner and Architect in accordance with the requirements for the submission of questions as indicated in the Instructions to Bidders.

END OF DOCUMENT SOW

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INSTRUCTIONS TO BIDDERS

1. Defined Terms - Owner and Township shall mean the Home Rule Municipality of Plymouth Township, Montgomery County, Pennsylvania.
2. Qualifications of Bidders - To demonstrate his qualifications for the Project, each Bidder must submit written evidence of the financial data, previous experience and evidence of authority to conduct business in the jurisdiction where the Project is located, in the Statement of Bidders Qualifications.
3. Examination of Contract Documents and Site:
 - A. Before submitting this Bid, each Bidder must (1) examine the Contract Documents thoroughly, (2) visit the site to familiarize himself with local conditions that may in any manner affect performance of the work and (3) carefully correlate his observations with the requirements of the Contract Documents.
 - B. Reference is made to the Specifications for the identification of those surveys and investigation reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the Engineer in preparing the Drawings and Specifications. Owner will make copies of such surveys and reports available to any Bidder requesting them. Before submitting his Bid each Bidder will, at his own expense, make such additional surveys and investigations as he may deem necessary to determine his Bid price for performance of the work within the terms of the Contract Documents.
 - C. The submission of a Bid will constitute an incontrovertible representation by the Bidder that he has complied with every requirement of these instructions.
4. A mandatory pre-bid meeting will be held at the time and location indicated in the Invitation to Bid.
5. Site Inspection – The site will be available for visits as part of the mandatory pre-bid meeting.
 - A. Additional site visits may be scheduled only with prior arrangement by contacting:

Richard Carbo, Plymouth Township Building & Grounds Director
(610) 313-8684
6. Interpretations and Pre-Bid Substitutions
 - A. Interpretations - All questions about the meaning or intent of the Contract Documents shall be submitted online via the “Ask a Question” feature in the PennBid Program. Replies will be issued by Addendum via the PennBid Program to all plan holders who have registered with and downloaded project documents from PennBid. Questions received less than seven days prior to the date for opening of bids will not be answered. Only questions answered by

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formal written addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

- B. Pre-Bid Substitutions –All substitution requests shall be submitted online via the “Ask a Question” feature in the PennBid Program. Substitution requests received less than seven days prior to the date for opening of bids will not be considered.
- 1) All substitution requests must include a completed CSI Form 13.1A as provided in Section 006300A. Substitution requests received without a completed CSI Form 13.1A will be rejected without review.
 - 2) No substitutions will be considered if received after the Contract award except where specifically provided for in the Contract Documents.
 - 3) The drawings and specifications establish the standard of function, appearance and quality to be met by any proposed substitution.
 - 4) The burden of proof of the merit of the proposed substitution request is upon the proposer. Substitution requests shall include the following supporting documentation:
 - a) Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - b) List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - c) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - d) Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e) Samples, where applicable or requested.
 - f) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - g) Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - h) Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - i) Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 - 5) The Architect's decision of approval or disapproval of proposed substitution shall be final. If the Architect approves a proposed substitution prior to receipt of Bids,

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such approval will be set forth in an Addendum. Bidders shall not rely upon approvals in any other manner. Use product specified if substitution is not included by Addendum.

- 6) Only substitution requests received from prime bidders registered on the list of planholders on PennBid will be considered. Substitution requests received from vendors or manufacturers will be returned without review.
7. Bid Security - The amount and type of Bid Security is stated in the Invitation to Bid. The required security must be in the form of a certified or bank cashier's check made payable to Owner or a bid bond issued by a surety licensed to conduct business in the state where the Project is located and named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Department. The Bid Security of the successful Bidder will be retained until he has executed the Agreement and furnished the required Contract Security, where upon it will be returned; if he fails to execute and deliver the Agreement and furnish the required Contract Security within 15 days of the Notice of Award, Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid Security of any Bidder whom Owner believes to have a reasonable chance of receiving the Award may be retained by Owner until the earlier of the seventh day after the executed Agreement is delivered by Owner to Contractor and the required Contract Security is furnished or the sixty-first day after the Bid opening. Bid Security of other Bidders will be returned within seven days of the Bid opening.
8. Contract Time - The number of days of the completion of work (the Contract time) is set forth in the Contract Documents and will be included in the executed Agreement. Any provisions for liquidated damages are set forth in the Contract Documents.
9. Subcontractors, etc.:
 - A. If the General Conditions, Supplemental Conditions or Specifications require the identity of certain Subcontractors and other persons and organizations to be submitted to Owner in advance of the Notice of Award, the apparent low Bidder, and any other bidder so requested, will within fourteen (14) days after the Notice of Intent to Award submit to Owner a list of all subcontractors and other persons and organizations (including those who are to furnish the principal items of material and equipment) proposed for those portions of the work as to which such identification is so required. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification for each such subcontractor, person and organization if required by Owner. If Owner after due investigation has reasonable objection to any proposed subcontractor, other person or organization, he may before giving the Notice of Award request the apparent low Bidder to submit an acceptable substitute without an increase in his Bid price. If the apparent low Bidder declines to make any such substitution, he will not thereby sacrifice his Bid security. Any subcontractor, other person or organization so listed and to whom Owner does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner.

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- 1) The Subcontractors List shall be furnished on the form provided in the bidding documents. Subcontractors list shall be accompanied by an executed Contractor Responsibility Certification Form for each subcontractor in accordance with the requirements of Plymouth Township Ordinance #1646, together with the supporting documentation described in paragraph 2 hereof, no later than fourteen (14) days after issuance of the Notice of Intent to Award.
 - B. After issuance of the Notice of Award, Contractor may only make adjustments to the Subcontractors List with the Owner's written consent.
 - C. Contractor shall not be required to employ any subcontractor, other person or organization against whom he has reasonable objection.
10. Bid Form:
- A. The Bid Form is available online at no cost via the PennBid program.
 - B. The Bid Form is included with the Bidding Documents for Reference. Bidders shall complete the electronic bid form within PennBid ("Prepare Your Submission" tab), inclusive of all pricing items and required supporting documents as identified.
 - C. Bids by corporations must be executed in the corporate name by the president or vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
 - D. Bids by partnerships must be executed in the partnership name and signed by a partner, his title must appear under his signature and the official address of the partnership must be shown below the signature.
 - E. All names must be typed or printed below the signature.
 - F. The Bid shall contain an Acknowledgment of Receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).
11. Submission of Bids - Bids shall be submitted online via the PennBid Program at the time indicated in the Invitation to Bid.
- A. Should the PennBid program not be available online at the time and date established for the receipt of bids in the Invitation to Bid, An Addendum will be issued extending the bid period. Bidders are encouraged to allow sufficient time to input all information required for the submission of a bid within the PennBid program prior to the date and time bids are due.
12. Modification and Withdrawal of Bids - Bids may be withdrawn, altered or otherwise modified within PennBid at any time prior to the due date and time listed in the Invitation to Bid.

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13. Opening of Bids - Bids will be opened as indicated in the Invitation to Bid.
14. Bids to Remain Open - All Bids shall remain open for sixty days after the day of the Bid opening, but Owner may, in his sole discretion, release any Bid and return the Bid security prior to that date.
15. Award of Contract:
 - A. Owner reserves the right to reject any and all bids and waive any and all informalities, and the right to disregard all nonconforming or conditional Bids or counter proposals.
 - B. In evaluating Bids, Owner shall consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and alternates and unit prices if requested in the Bid Forms. He may consider the qualifications and experience of subcontractors and other persons and organization (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identify of subcontractors and other persons and organizations must be submitted as specified in the Supplemental Conditions or Specifications. He may conduct such investigations as he deems necessary to establish the responsibility, qualifications and financial ability of the Bidders, proposed subcontractor and other persons and organizations to do the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.
 - C. If a Contract is to be awarded, it will be awarded to the lowest responsible Bidder whose evaluation by Owner indicates to Owner that the Award will be in the best interest of the Project.
 - D. If the Contract is to be awarded Owner will give the apparent successful Bidder a Notice of Award within sixty days after the day of the Bid opening.
 - E. Simultaneously with delivery of the executed counterparts of the Agreement to Owner, Contractor shall deliver to the Owner the required Contract Security.
16. Fees, Permits and Taxes
 - A. Bidders are advised to contact the Tax Office of the Township to determine what fees, permits or taxes may be applicable on this project. The Township will not waive such costs, except as specifically noted below.
 - B. The Township will obtain the general construction, mechanical, plumbing and electrical building permits, including payment of any applicable fees. Any other permits must be obtained by and paid for by the prime contractor responsible for the scope of work covered by the permit.

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- C. PennBid Fees: Each Bidder that is awarded a Prime Contract shall be responsible for payment of a fee to PennBid in the amount of one-third of one percent (1/3%) of the contract amount for the applicable Prime Contract. This fee shall be capped at a maximum fee of Five Thousand Dollars (\$5,000.00) per Prime Contract. PennBid will invoice each Bidder awarded a Prime Contract for the amount of the fee and the Bidder shall be responsible to remit payment to PennBid directly.
17. Equal Opportunity Employer
- A. The contractor must ensure that employees and applicants for employment are not discriminated against because of their race, color, religion, sex or national origin.
18. The following executed Contract Documents must be submitted with the Bid:
- a. Statement of Bidders Qualifications
 - b. Bid Form (Completed electronically in PennBid)
 - c. Bid Bond or Certified Check
 - d. Agreement of Surety
 - e. Non-Collusion Affidavit
19. Original Notarized Documents
- A. The apparent low bidder shall deliver one original hard copy of the documents identified in Sub-paragraphs 16.a,c,d,and e above to the Township within 7 days after the Notice of Intent to Award.
20. TAXES
- A. Bidder, as Contractor shall be responsible for and shall pay all applicable sales, use, excise or other taxes required by law on all materials, tools, apparatus, equipment, fixtures, services, incidentals or otherwise which may be purchased or used in connection with the Work or portions thereof. The Bid shall be made in accordance with such laws and shall include all applicable taxes in the Bid amount.
- Notwithstanding the foregoing, however, Owner is exempt (excluded) from sales and/or use tax in Pennsylvania on certain transactions. Prime Contractor and all subcontractors shall bid and shall purchase as exempt (excluded) from Pennsylvania sales and/or use tax all tangible personal property within the definition of 'building machinery and equipment' as that term is defined in Act No. 45-1998 (72 P.S. § 7201 et seq.). Refer to the General Conditions for complete requirements.
21. PREVAILING WAGE REQUIREMENTS
- a. This project shall meet all requirements of the Commonwealth of Pennsylvania, Department of Labor and Industry Prevailing Minimum Wage section. Requirements and wage rate schedules relative to the prevailing minimum wage determination for this project are included in the project manual for review.

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- b. Questions of concerns about published prevailing wage rates shall be directed to the Commonwealth of Pennsylvania, Department of Labor and Industry Prevailing Minimum Wage section.

22. ALTERNATES

- a. All requested alternates as defined in Division 01 shall be bid. Alternates will be included on the bid form as part of the PennBid submission. Methods for bidding Alternates are as specified in Division 01. The Owner shall have the right to accept Alternates in any order of combination and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.
- b. Bid prices for alternates not included in Contract at time of execution shall be held by Contractor for a period of no less than ninety (90) days thereafter. During this time and at the discretion of the Owner, any of these alternates may be incorporated into the Contract by Change Order.

23. UNIT PRICES

- a. Provide unit prices filled-in on Bid Form in accordance with requirements specified in Division 01. No unit costs (other than those required by Allowances) shall be included in the Base Bid. Unit costs will be used for adjustment of the Contract Sum if any are required. The Owner reserves the right to reject any unit prices bid.

24. ALLOWANCES

- a. Include all allowances listed on the Bid Form and project drawings and specifications in the base bid price. Do not adjust allowances for any alternates unless specifically listed in the alternate.

END OF DOCUMENT INS

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STATEMENT OF BIDDERS QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on a separate attached sheet. The Bidder may submit any additional information he desires.

- 1) Name of Bidder _____
- 2) Permanent main office address _____
- 3) When was it organized? _____
- 4) If a corporation, where incorporated? _____
- 5) How many years have you been engaged in improvement work of this type under your present firm or trade name?

- 6) Contract on hand: (Schedule these showing gross amount of each contract, the appropriate anticipated dates of completion and provide Owner contact information for each.)

- 7) General character of work performed by you _____

- 8) Have you ever failed to complete any work awarded to you? If so, where and why? Please provide name, address and phone number.

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- 9) Have you ever defaulted on a contract? If so, where and why? Please provide name, address and phone number. _____

- 10) List the more important contracts in Pennsylvania recently completed by you (past five years), stating the approximate gross cost for each and the month and year completed (provide at least three projects of similar type and scope). Please provide Owner's name, address and phone number. _____

- 11) List any projects completed within the last two years for which you have not been paid in full. Present reasons for non-payment. Please provide name, address and phone number. _____

- 12) List your major equipment available for this Contract. _____

- 13) Experience in improvement work similar in importance to this Project. _____

- 14) Background and experience of the principal member of your organization including the officers. Provide resumes for expected project Manager and Superintendent. _____

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

- 15) Give bank references and address:

- 16) A detailed financial statement must be furnished by low bidder after opening of bids.

- 17) Will you, upon request, furnish any other information that may be required by the municipality? _____

The undersigned hereby authorizes and requests and person, firm or corporation to furnish any information requested by the municipality in verification of the recitals comprising this Statement of Bidder's Qualifications.

This _____ Day of _____, 20____.

Name of Bidder

By:

Title:

COMMONWEALTH OF PENNSYLVANIA:

COUNTY OF _____ : SS

_____ being duly sworn, deposes and says that he is

_____ of _____
(Name of Bidders Organization)

and that the answers to the foregoing questions and all statements therein contained are true and

correct. Subscribed and sworn before me this _____ Day of _____, 20____.

Notary Public

My Commission Expires:

BID FORM
GENERAL CONSTRUCTION CONTRACT

Note: It is not necessary to fill out this form. All information is contained in the on-line form on Penn Bid.

Project Identification: A New Fire Station for Harmonville Fire Company –
Plymouth Valley Station

Note: The Bid Form included with the Bidding Documents is for reference only. Bidders shall complete the electronic Bid Form within PennBid (“Prepare Your Submission” tab), inclusive of all pricing items and required supporting documents as identified.

This bid is submitted To: Plymouth Township
700 Belvoir Road
Plymouth Meeting, PA 19462
Attn.: Mr. Richard Carbo

Article 1: The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

Article 2: BIDDER accepts all of the terms and conditions of the Notice to Bidder and Instruction to Bidders, including without limitation of those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for sixty (60) days after the day of Bid Opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen (15) days after the date of OWNER'S Notice of Award.

Article 3: In submitting the Bid, BIDDER represents, as more fully set forth in the Agreement, that:

(a) BIDDER has examined copies of all the Contract Documents and the following Addenda receipt of all is hereby acknowledged: (List Addenda by Addendum Number and Date).

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

- (b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, work, site, locality, and all local conditions, Laws, and Regulations that in any manner may affect cost, progress, performance or finishing of the Work.
- (c) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Prices, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.
- (d) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- (e) BIDDER has given ARCHITECT written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ARCHITECT is acceptable to BIDDER.
- (f) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, associates, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.
- (g) BIDDER hereby agrees to supply all manpower, equipment and materials to professionally provide for the Scope of Work as outlined in the Contract Documents.
- (h) Bidder is hereby notified that the work shall be on the identified in the Scope of Work as outlined in the Contract Documents.

Article 4: The Bidder proposes and agrees to complete the work for the following prices:

Dollars
TOTAL BASE BID PRICE IN NUMBERS

Dollars
TOTAL BASE BID PRICE IN WORDS

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Article 5: Alternates.

- (a) The Bidder agrees that the Owner shall have the right to accept or reject any or all of the following alternates, which acceptance or rejection shall enter into the determination of the low bidder.
- (b) The Bidder agrees that the Contract Time shall not be increased on account of the acceptance of any one or combination of alternates unless specifically stated in such Alternate descriptions.
- (c) The Bidder agrees that the Owner shall have the right to accept an alternate that is higher in price than the base bid or other alternate.
- (d) Alternates Prices shall include the cost of furnishing, installing all materials, labor, tools, equipment and other incidentals necessary to complete the work in accordance with the design intent, manufacturers' recommendations, building codes and the project specifications.
- (e) Do not adjust material or quantity allowances under any alternate bid items.
- (f) Strike out the inappropriate modifier ("Add" or "Deduct") below so that the correct one remains. If there is no change in contract sum enter "NC" in the appropriate fields.
- (g) The Bidder proposes and agrees to complete the additional alternate work for the following prices:

ALTERNATE #1: Second Floor Fit-out:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #2: Concrete Aprons:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #3: Exterior Balcony and Stair:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #4: Curb and Sidewalk:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #5: Finish Flooring:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #6: Appliances:

Add / Deduct _____ Dollars (\$ _____)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

ALTERNATE #7: Post & Rail Wood Fence:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #8: New Gas Service:

Add / Deduct _____ Dollars (\$ _____)

Article 6: Allowances.

- (a) The Bidder certifies that the following quantity allowances have been included in the Base bid.
- (b) Unused allowances shall be returned to the Owner using the remaining quantities and their respective unit prices. Unit price will govern for quantities exceeding the following allowances.
- (c) The scope of an alternate shall not modify and shall be in addition to any of the Base Bid specified quantity allowances and costs. Do not adjust project quantity allowances based on an alternate whether accepted or rejected.

ALLOWANCE G-1: Bulk Rock Excavation:

Qty Units x Unit Price "G-1" = _____ Dollars (\$ _____)

ALLOWANCE G-2: Trench Rock Removal:

Qty Units x Unit Price "G-2" = _____ Dollars (\$ _____)

ALLOWANCE G-3: Authorized Soil Exchange:

Qty Units x Unit Price "G-3" = _____ Dollars (\$ _____)

ALLOWANCE G-4: Authorized Soil Removal:

Qty Units x Unit Price "G-4" = _____ Dollars (\$ _____)

ALLOWANCE G-5: Import and Place 2A Stone:

Qty Units x Unit Price "G-5" = _____ Dollars (\$ _____)

ALLOWANCE G-6: Compacted Backfill:

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Qty Units x Unit Price “G-6” = _____ Dollars (\$ _____)

ALLOWANCE G-7: Lean Concrete Fill:

Qty Units x Unit Price “G-7” = _____ Dollars (\$ _____)

ALLOWANCE G-8: Asphalt Paving:

Qty Units x Unit Price “G-8” = _____ Dollars (\$ _____)

ALLOWANCE G-9: Miscellaneous Structural Steel:

Qty Units x Unit Price “G-9” = _____ Dollars (\$ _____)

ALLOWANCE G-10: Additional Room Signs:

Qty Units x Unit Price “G-10” = _____ Dollars (\$ _____)

ALLOWANCE G-11: General Laborer:

Qty Units x Unit Price “G-11” = _____ Dollars (\$ _____)

ALLOWANCE G-12: Journeyman Painter Class 2 Labor:

Qty Units x Unit Price “G-12” = _____ Dollars (\$ _____)

Article 7: Unit Prices.

- (a) OWNER shall make adjustments to the Contract based on the actual field conditions encountered using the Unit Prices included with the proposal.
- (b) The BIDDER agrees that OWNER reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owners opinion, the nature or quantity of the Work encountered is such that the unit price cost no longer applies to the Work.
- (c) The responsiveness of the Bid and if the Bid is responsible, may be determined by the Owner on the basis of the Unit Prices proposed by the bidder. Unit Prices shall be consistent with verifiable average costs for the work to be performed. Bidder agrees that a proposal may be rejected if the Unit Prices submitted are inconsistent with the average cost.

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

(d) Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidentals necessary to complete the specified operation.

UNIT PRICE G-1:	Bulk Rock Excavation	Per Cubic Yard
		Dollars (\$_____)
UNIT PRICE G-2:	Trench Rock Removal	Per Cubic Yard
		Dollars (\$_____)
UNIT PRICE G-3:	Authorized Soil Exchange	Per Cubic Yard
		Dollars (\$_____)
UNIT PRICE G-4:	Authorized Soil Removal	Per Cubic Yard
		Dollars (\$_____)
UNIT PRICE G-5:	Import and Place 2A Stone	Per Cubic Yard
		Dollars (\$_____)
UNIT PRICE G-6:	Compacted Backfill	Per Cubic Yard
		Dollars (\$_____)
UNIT PRICE G-7:	Lean Concrete Fill	Per Cubic Yard
		Dollars (\$_____)
UNIT PRICE G-8:	Asphalt Paving	Per Square Feet
		Dollars (\$_____)
UNIT PRICE G-9:	Miscellaneous Structural Steel	Per Pound
		Dollars (\$_____)
UNIT PRICE G-10:	Additional Room Signs	Per Sign
		Dollars (\$_____)
UNIT PRICE G-11:	General Laborer	Per Man-Hour
		Dollars (\$_____)
UNIT PRICE G-12:	Journeyman Painter Class 2 Labor	Per Man-Hour

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Dollars (\$_____)

- Article 6: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by Plymouth Township Board of Supervisors to determine the actual Scope of Work by selection of any or all parts of Work as listed above.
- Article 7: The BIDDER agrees the above sum shall include, but not be limited to, all labor, materials, power, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds required for each part.
- Article 8: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by the OWNER to reject any or all Bids. It is further understood and agreed by the undersigned that any qualifying statements or conditions made by him to the above Bid is originally published, as well as any interlineation, erasures, omission or entered working obscure as to its meaning, may cause the bid to be declared irregular and may be cause for rejection of the Bid.
- Article 9: If awarded a Contract under this Bid, the undersigned agrees to start work on the site within fifteen (15) days after the receipt from the Owner of a written "Notice to Proceed."
- Article 10: The BIDDER accepts the provisions of the Agreement as to liquidate damages in the event of failure to complete the Work on time.
- Article 11: The following documents are attached to and made a condition of this Bid:
- ☐ Statement of Bidder's Qualifications
 - ☐ Bid Form
 - ☐ Bid Bond or Certified Check valued at 10% of base bid value
 - ☐ Agreement of Surety
 - ☐ Non-Collusion Affidavit

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

IF BIDDER IS:

An Individual

By _____ (SEAL)

doing business as

Business address: _____

Phone No.: _____ Date: _____

A Partnership

By _____ (SEAL)

(Firm Name)

(General Partner)

Business address: _____

Phone No.: _____ Date: _____

(Signature)

A Corporation

By _____

(Corporate Name)

(State of Incorporation)

(Title)

(Signature)

(Corporate Seal)

Attest _____

(Secretary)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Business address: _____

Phone No.: _____ Date: _____

A Joint Venture

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above)

END OF DOCUMENT

BID FORM
PLUMBING CONTRACT

Note: It is not necessary to fill out this form. All information is contained in the on-line form on Penn Bid.

Project Identification: A New Fire Station for Harmonville Fire Company – Plymouth Valley Station

Note: The Bid Form included with the Bidding Documents is for reference only. Bidders shall complete the electronic Bid Form within PennBid (“Prepare Your Submission” tab), inclusive of all pricing items and required supporting documents as identified.

This bid is submitted To: Plymouth Township
 700 Belvoir Road
 Plymouth Meeting, PA 19462
 Attn.: Mr. Richard Carbo

Article 1: The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

Article 2: BIDDER accepts all of the terms and conditions of the Notice to Bidder and Instruction to Bidders, including without limitation of those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for sixty (60) days after the day of Bid Opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen (15) days after the date of OWNER'S Notice of Award.

Article 3: In submitting the Bid, BIDDER represents, as more fully set forth in the Agreement, that:

(a) BIDDER has examined copies of all the Contract Documents and the following Addenda receipt of all is hereby acknowledged: (List Addenda by Addendum Number and Date).

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

- (b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, work, site, locality, and all local conditions, Laws, and Regulations that in any manner may affect cost, progress, performance or finishing of the Work.
- (c) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Prices, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.
- (d) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- (e) BIDDER has given ARCHITECT written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ARCHITECT is acceptable to BIDDER.
- (f) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, associates, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.
- (g) BIDDER hereby agrees to supply all manpower, equipment and materials to professionally provide for the Scope of Work as outlined in the Contract Documents.
- (h) Bidder is hereby notified that the work shall be on the identified in the Scope of Work as outlines in the Contract Documents.

Article 4: The Bidder proposes and agrees to complete the work for the following prices:

_____ Dollars
TOTAL BASE BID PRICE IN NUMBERS

_____ Dollars
TOTAL BASE BID PRICE IN WORDS

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Article 5: Alternates.

- (a) The Bidder agrees that the Owner shall have the right to accept or reject any or all of the following alternates, which acceptance or rejection shall enter into the determination of the low bidder.
- (b) The Bidder agrees that the Contract Time shall not be increased on account of the acceptance of any one or combination of alternates unless specifically stated in such Alternate descriptions.
- (c) The Bidder agrees that the Owner shall have the right to accept an alternate that is higher in price than the base bid or other alternate.
- (d) Alternates Prices shall include the cost of furnishing, installing all materials, labor, tools, equipment and other incidentals necessary to complete the work in accordance with the design intent, manufacturers' recommendations, building codes and the project specifications.
- (e) Do not adjust material or quantity allowances under any alternate bid items.
- (f) Strike out the inappropriate modifier ("Add" or "Deduct") below so that the correct one remains. If there is no change in contract sum enter "NC" in the appropriate fields.
- (g) The Bidder proposes and agrees to complete the additional alternate work for the following prices:

ALTERNATE #1: Second Floor Fit-out:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #2: Concrete Aprons:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #3: Exterior Balcony and Stair:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #4: Curb and Sidewalk:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #5: Finish Flooring:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #6: Appliances:

Add / Deduct _____ Dollars (\$ _____)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

ALTERNATE #7: Post & Rail Wood Fence:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #8: New Gas Service:

Add / Deduct _____ Dollars (\$ _____)

Article 6: Allowances.

- (a) The Bidder certifies that the following quantity allowances have been included in the Base bid.
- (b) Unused allowances shall be returned to the Owner using the remaining quantities and their respective unit prices. Unit price will govern for quantities exceeding the following allowances.
- (c) The scope of an alternate shall not modify and shall be in addition to any of the Base Bid specified quantity allowances and costs. Do not adjust project quantity allowances based on an alternate whether accepted or rejected.

ALLOWANCE P-1: 1" Domestic Water Pipe:

Qty Units x Unit Price "P-1" = _____ Dollars (\$ _____)

ALLOWANCE P-2: Additional 1" Ball Valve:

Qty Units x Unit Price "P-2" = _____ Dollars (\$ _____)

ALLOWANCE P-3: Compressed Air Pipe:

Qty Units x Unit Price "P-3" = _____ Dollars (\$ _____)

ALLOWANCE P-4: Gas Piping:

Qty Units x Unit Price "P-4" = _____ Dollars (\$ _____)

ALLOWANCE P-5: Journeyman Plumber Labor:

Qty Units x Unit Price "P-5" = _____ Dollars (\$ _____)

Article 7: Unit Prices.

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

- (a) OWNER shall make adjustments to the Contract based on the actual field conditions encountered using the Unit Prices included with the proposal.
- (b) The BIDDER agrees that OWNER reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owners opinion, the nature or quantity of the Work encountered is such that the unit price cost no longer applies to the Work.
- (c) The responsiveness of the Bid and if the Bid is responsible, may be determined by the Owner on the basis of the Unit Prices proposed by the bidder. Unit Prices shall be consistent with verifiable average costs for the work to be performed. Bidder agrees that a proposal may be rejected if the Unit Prices submitted are inconsistent with the average cost.
- (d) Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidentals necessary to complete the specified operation.

UNIT PRICE P-1:	1/2" Domestic Water Pipe	Per Linear Foot
		Dollars (\$_____)
UNIT PRICE P-2:	Additional 1" Ball Valve	Per Assembly
		Dollars (\$_____)
UNIT PRICE P-3:	Compressed Air Pipe	Per Linear Foot
		Dollars (\$_____)
UNIT PRICE P-4:	Gas Piping	Per Linear Foot
		Dollars (\$_____)
UNIT PRICE P-5:	Journeyman Plumber Labor	Per Man-hour
		Dollars (\$_____)

Article 6: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by Plymouth Township Board of Supervisors to determine the actual Scope of Work by selection of any or all parts of Work as listed above.

Article 7: The BIDDER agrees the above sum shall include, but not be limited to, all labor, materials, power, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds required for each part.

Article 8: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by the OWNER to reject any or all Bids. It is further understood and agreed by the undersigned that any qualifying statements or conditions made

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

by him to the above Bid is originally published, as well as any interlineation, erasures, omission or entered working obscure as to its meaning, may cause the bid to be declared irregular and may be cause for rejection of the Bid.

Article 9: If awarded a Contract under this Bid, the undersigned agrees to start work on the site within fifteen (15) days after the receipt from the Owner of a written "Notice to Proceed."

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Article 11: The following documents are attached to and made a condition of this Bid:

- ☐ Statement of Bidder's Qualifications
- ☐ Bid Form
- ☐ Bid Bond or Certified Check valued at 10% of Bid value
- ☐ Agreement of Surety
- ☐ Non-Collusion Affidavit
- ☐ Responsible Contractor Determination

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

IF BIDDER IS:

An Individual

By _____ (SEAL)

doing business as

Business address: _____

Phone No.: _____ Date: _____

A Partnership

By _____ (SEAL)

(Firm Name)

(General Partner)

Business address: _____

Phone No.: _____ Date: _____

(Signature)

A Corporation

By _____

(Corporate Name)

(State of Incorporation)

(Title)

(Signature)

(Corporate Seal)

Attest _____

(Secretary)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Business address: _____

Phone No.: _____ Date: _____

A Joint Venture

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above)

END OF DOCUMENT

BID FORM
MECHANICAL CONTRACT

Note: It is not necessary to fill out this form. All information is contained in the on-line form on Penn Bid.

Project Identification: A New Fire Station for Harmonville Fire Company –
Plymouth Valley Station

Note: The Bid Form included with the Bidding Documents is for reference only. Bidders shall complete the electronic Bid Form within PennBid (“Prepare Your Submission” tab), inclusive of all pricing items and required supporting documents as identified.

This bid is submitted To: Plymouth Township
700 Belvoir Road
Plymouth Meeting, PA 19462
Attn.: Mr. Richard Carbo

Article 1: The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

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A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

- (b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, work, site, locality, and all local conditions, Laws, and Regulations that in any manner may affect cost, progress, performance or finishing of the Work.
- (c) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Prices, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.
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TOTAL BASE BID PRICE IN NUMBERS

_____ Dollars
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A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

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Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #3: Exterior Balcony and Stair:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #4: Curb and Sidewalk:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #5: Finish Flooring:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #6: Appliances:

Add / Deduct _____ Dollars (\$ _____)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

ALTERNATE #7: Post & Rail Wood Fence:

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- (a) The Bidder certifies that the following quantity allowances have been included in the Base bid.
- (b) Unused allowances shall be returned to the Owner using the remaining quantities and their respective unit prices. Unit price will govern for quantities exceeding the following allowances.
- (c) The scope of an alternate shall not modify and shall be in addition to any of the Base Bid specified quantity allowances and costs. Do not adjust project quantity allowances based on an alternate whether accepted or rejected.

ALLOWANCE H-1: Sheet Metal:

Qty Units x Unit Price "H-1" = _____ Dollars (\$ _____)

ALLOWANCE H-2: Automatic Temperature Controls:

Qty Units x Unit Price "H-2" = _____ Dollars (\$ _____)

ALLOWANCE H-3: Diffusers:

Qty Units x Unit Price "H-3" = _____ Dollars (\$ _____)

ALLOWANCE H-4: Fire Dampers:

Qty Units x Unit Price "H-4" = _____ Dollars (\$ _____)

ALLOWANCE H-5: Additional Copper Pipe:

Qty Units x Unit Price "H-5" = _____ Dollars (\$ _____)

ALLOWANCE H-6: Journeyman Sheet Metal Worker Labor:

Qty Units x Unit Price "H-6" = _____ Dollars (\$ _____)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

ALLOWANCE H-7: Journeyman Pipefitter Labor:

Qty Units x Unit Price "H-7" = _____ Dollars (\$ _____)

Article 7: Unit Prices.

- (a) OWNER shall make adjustments to the Contract based on the actual field conditions encountered using the Unit Prices included with the proposal.
- (b) The BIDDER agrees that OWNER reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owners opinion, the nature or quantity of the Work encountered is such that the unit price cost no longer applies to the Work.
- (c) The responsiveness of the Bid and if the Bid is responsible, may be determined by the Owner on the basis of the Unit Prices proposed by the bidder. Unit Prices shall be consistent with verifiable average costs for the work to be performed. Bidder agrees that a proposal may be rejected if the Unit Prices submitted are inconsistent with the average cost.
- (d) Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidentals necessary to complete the specified operation.

UNIT PRICE H-1: Sheet Metal Per Pound

Dollars (\$ _____)

UNIT PRICE H-2: Automatic Temperature Controls Per Unit

Dollars (\$ _____)

UNIT PRICE H-3: Diffusers Per Unit

Dollars (\$ _____)

UNIT PRICE H-4: Fire Dampers Per Unit

Dollars (\$ _____)

UNIT PRICE H-5: Additional Copper Pipe Per Lineal Foot

Dollars (\$ _____)

UNIT PRICE H-6: Journeyman Sheet Metal Worker Labor Per Man-hour

Dollars (\$ _____)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

UNIT PRICE H-7: Journeyman Pipefitter Labor

Per Man-hour

Dollars (\$ _____)

Article 6: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by Plymouth Township Board of Supervisors to determine the actual Scope of Work by selection of any or all parts of Work as listed above.

Article 7: The BIDDER agrees the above sum shall include, but not be limited to, all labor, materials, power, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds required for each part.

Article 8: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by the OWNER to reject any or all Bids. It is further understood and agreed by the undersigned that any qualifying statements or conditions made by him to the above Bid is originally published, as well as any interlineation, erasures, omission or entered working obscure as to its meaning, may cause the bid to be declared irregular and may be cause for rejection of the Bid.

Article 9: If awarded a Contract under this Bid, the undersigned agrees to start work on the site within fifteen (15) days after the receipt from the Owner of a written "Notice to Proceed."

Article 10: The BIDDER accepts the provisions of the Agreement as to liquidate damages in the event of failure to complete the Work on time.

Article 11: The following documents are attached to and made a condition of this Bid:

- ☐ Statement of Bidder's Qualifications
- ☐ Bid Form
- ☐ Bid Bond or Certified Check valued at 10% of Bid value
- ☐ Agreement of Surety
- ☐ Non-Collusion Affidavit

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

IF BIDDER IS:

An Individual

By _____ (SEAL)

doing business as

Business address: _____

Phone No.: _____ Date: _____

A Partnership

By _____ (SEAL)

(Firm Name)

(General Partner)

Business address: _____

Phone No.: _____ Date: _____

(Signature)

A Corporation

By _____

(Corporate Name)

(State of Incorporation)

(Title)

(Signature)

(Corporate Seal)

Attest _____

(Secretary)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Business address: _____

Phone No.: _____ Date: _____

A Joint Venture

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above)

END OF DOCUMENT

BID FORM
ELECTRICAL CONTRACT

Note: It is not necessary to fill out this form. All information is contained in the on-line form on Penn Bid.

Project Identification: A New Fire Station for Harmonville Fire Company –
Plymouth Valley Station

Note: The Bid Form included with the Bidding Documents is for reference only. Bidders shall complete the electronic Bid Form within PennBid (“Prepare Your Submission” tab), inclusive of all pricing items and required supporting documents as identified.

This bid is submitted To: Plymouth Township
 700 Belvoir Road
 Plymouth Meeting, PA 19462
 Attn.: Mr. Richard Carbo

Article 1: The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

Article 2: BIDDER accepts all of the terms and conditions of the Notice to Bidder and Instruction to Bidders, including without limitation of those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for sixty (60) days after the day of Bid Opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen (15) days after the date of OWNER'S Notice of Award.

Article 3: In submitting the Bid, BIDDER represents, as more fully set forth in the Agreement, that:

- (a) BIDDER has examined copies of all the Contract Documents and the following Addenda receipt of all is hereby acknowledged: (List Addenda by Addendum Number and Date).

A New Fire Station for
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- (b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, work, site, locality, and all local conditions, Laws, and Regulations that in any manner may affect cost, progress, performance or finishing of the Work.
- (c) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Prices, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.
- (d) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- (e) BIDDER has given ARCHITECT written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ARCHITECT is acceptable to BIDDER.
- (f) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, associates, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.
- (g) BIDDER hereby agrees to supply all manpower, equipment and materials to professionally provide for the Scope of Work as outlined in the Contract Documents.
- (h) Bidder is hereby notified that the work shall be on the identified in the Scope of Work as outlines in the Contract Documents.

Article 4: The Bidder proposes and agrees to complete the work for the following prices:

_____ Dollars
TOTAL BASE BID PRICE IN NUMBERS

_____ Dollars
TOTAL BASE BID PRICE IN WORDS

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Article 5: Alternates.

- (a) The Bidder agrees that the Owner shall have the right to accept or reject any or all of the following alternates, which acceptance or rejection shall enter into the determination of the low bidder.
- (b) The Bidder agrees that the Contract Time shall not be increased on account of the acceptance of any one or combination of alternates unless specifically stated in such Alternate descriptions.
- (c) The Bidder agrees that the Owner shall have the right to accept an alternate that is higher in price than the base bid or other alternate.
- (d) Alternates Prices shall include the cost of furnishing, installing all materials, labor, tools, equipment and other incidentals necessary to complete the work in accordance with the design intent, manufacturers' recommendations, building codes and the project specifications.
- (e) Do not adjust material or quantity allowances under any alternate bid items.
- (f) Strike out the inappropriate modifier ("Add" or "Deduct") below so that the correct one remains. If there is no change in contract sum enter "NC" in the appropriate fields.
- (g) The Bidder proposes and agrees to complete the additional alternate work for the following prices:

ALTERNATE #1: Second Floor Fit-out:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #2: Concrete Aprons:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #3: Exterior Balcony and Stair:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #4: Curb and Sidewalk:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #5: Finish Flooring:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #6: Appliances:

Add / Deduct _____ Dollars (\$ _____)

A New Fire Station for
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ALTERNATE #7: Post & Rail Wood Fence:

Add / Deduct _____ Dollars (\$ _____)

ALTERNATE #8: New Gas Service:

Add / Deduct _____ Dollars (\$ _____)

Article 6: Allowances.

- (a) The Bidder certifies that the following quantity allowances have been included in the Base bid.
- (b) Unused allowances shall be returned to the Owner using the remaining quantities and their respective unit prices. Unit price will govern for quantities exceeding the following allowances.
- (c) The scope of an alternate shall not modify and shall be in addition to any of the Base Bid specified quantity allowances and costs. Do not adjust project quantity allowances based on an alternate whether accepted or rejected.

ALLOWANCE E-1: Conduit:

Qty Units x Unit Price "E-1" = _____ Dollars (\$ _____)

ALLOWANCE E-2: Wire:

Qty Units x Unit Price "E-2" = _____ Dollars (\$ _____)

ALLOWANCE E-3: Cable:

Qty Units x Unit Price "E-3" = _____ Dollars (\$ _____)

ALLOWANCE E-4: Disconnect Switches:

Qty Units x Unit Price "E-4" = _____ Dollars (\$ _____)

ALLOWANCE E-5: Receptacles:

Qty Units x Unit Price "E-5" = _____ Dollars (\$ _____)

ALLOWANCE E-6: Data Jacks:

Qty Units x Unit Price "E-6" = _____ Dollars (\$ _____)

A New Fire Station for
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ALLOWANCE E-7: Exit Signs & Wiring:

Qty Units x Unit Price "E-7" = _____ Dollars (\$ _____)

ALLOWANCE E-8: Smoke Detectors:

Qty Units x Unit Price "E-8" = _____ Dollars (\$ _____)

ALLOWANCE E-9: Journeyman Electrician Labor:

Qty Units x Unit Price "E-9" = _____ Dollars (\$ _____)

Article 7: Unit Prices.

- (a) OWNER shall make adjustments to the Contract based on the actual field conditions encountered using the Unit Prices included with the proposal.
- (b) The BIDDER agrees that OWNER reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owners opinion, the nature or quantity of the Work encountered is such that the unit price cost no longer applies to the Work.
- (c) The responsiveness of the Bid and if the Bid is responsible, may be determined by the Owner on the basis of the Unit Prices proposed by the bidder. Unit Prices shall be consistent with verifiable average costs for the work to be performed. Bidder agrees that a proposal may be rejected if the Unit Prices submitted are inconsistent with the average cost.
- (d) Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidentals necessary to complete the specified operation.

UNIT PRICE E-1: Conduit Per Linear Foot

Dollars (\$ _____)

UNIT PRICE E-2: Wire Per Linear Foot

Dollars (\$ _____)

UNIT PRICE E-3: Cable Per Linear Foot

Dollars (\$ _____)

UNIT PRICE E-4: Disconnect Switches Per Unit

Dollars (\$ _____)

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UNIT PRICE E-5:	Receptacles	Per Unit
		Dollars (\$_____)
UNIT PRICE E-6:	Data Jacks	Per Unit
		Dollars (\$_____)
UNIT PRICE E-7:	Exit Sign & Wiring	Per Assembly
		Dollars (\$_____)
UNIT PRICE E-8:	Smoke Detectors	Per Unit
		Dollars (\$_____)
UNIT PRICE E-9:	Journeyman Electrician Labor	Per Man-hour
		Dollars (\$_____)

- Article 6: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by Plymouth Township Board of Supervisors to determine the actual Scope of Work by selection of any or all parts of Work as listed above.
- Article 7: The BIDDER agrees the above sum shall include, but not be limited to, all labor, materials, power, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds required for each part.
- Article 8: In submitting this Bid, it is understood and agreed by the undersigned that the right is reserved by the OWNER to reject any or all Bids. It is further understood and agreed by the undersigned that any qualifying statements or conditions made by him to the above Bid is originally published, as well as any interlineation, erasures, omission or entered working obscure as to its meaning, may cause the bid to be declared irregular and may be cause for rejection of the Bid.
- Article 9: If awarded a Contract under this Bid, the undersigned agrees to start work on the site within fifteen (15) days after the receipt from the Owner of a written "Notice to Proceed."
- Article 10: The BIDDER accepts the provisions of the Agreement as to liquidate damages in the event of failure to complete the Work on time.
- Article 11: The following documents are attached to and made a condition of this Bid:
- ☐ Statement of Bidder's Qualifications
 - ☐ Bid Form

A New Fire Station for
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- ☐ Bid Bond or Certified Check valued at 10% of Bid value
- ☐ Agreement of Surety
- ☐ Non-Collusion Affidavit

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

IF BIDDER IS:

An Individual

By _____ (SEAL)

doing business as

Business address: _____

Phone No.: _____ Date: _____

A Partnership

By _____ (SEAL)

(Firm Name)

(General Partner)

Business address: _____

Phone No.: _____ Date: _____

(Signature)

A Corporation

By _____

(Corporate Name)

(State of Incorporation)

(Title)

(Signature)

(Corporate Seal)

Attest _____

(Secretary)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

Business address: _____

Phone No.: _____ Date: _____

A Joint Venture

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

By _____

(Name)

(Address)

(Signature)

Phone No.: _____ Date: _____

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above)

END OF DOCUMENT

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ as Principal, and _____ as Surety, are hereby held and firmly bound unto _____ as OWNER in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns. Signed, this _____ Day of _____, 20____.

The Condition of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a Contract in writing, for the

NOW, THEREFORE,

- A. If said BID shall be rejected, or
- B. If said BID shall be accepted and the Principal shall execute and deliver a Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated. The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)

Principal

SURETY

BY:

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located. The bonds must be executed by a surety company that is rated A by A.M. Best & Co. There will be no exceptions.

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

DOCUMENT AG - AGREEMENT OF SURETY

KNOW ALL MEN BY THESE PRESENTS, that we, _____ ,
as Surety, a corporation existing under the laws of the State of _____, and authorized
to transact business in the Commonwealth of Pennsylvania hereby agrees intending to be legally bound
hereby, to execute and deliver to **Plymouth Township**, within the time limit specified in the Contract
Documents, the Performance Bond and Payment Bond in the forms included in the Contract Documents
each in an amount of 100% of the Contract Sum, in favor of the **Plymouth Township**, as required for the
faithful performance and proper fulfillment of the _____ contract for the
Harmonville Fire Company – Plymouth Valley Station Project, located in **904 Germantown Pike,**
Plymouth Meeting, PA 19462, on behalf of _____
(hereinafter called the Bidder) provided that the above contract be awarded to the bidder within ninety (90)
days after the date of opening of the bids or otherwise as set forth in the Bidding Instructions and Invitation
to Bidders.

Surety further agrees that should the Surety, after notification of intent to make such award, omit or refuse to
execute the required bonds and agreement, then the Surety shall pay to **Plymouth Township**, hereinafter
called the Obligee, any difference between the total amount specified in said bidder's proposal for the
required work and the amount of which said Obligee may procure the same work, if the latter amount be in
excess of the former, plus any advertising, architectural, legal and other expenses incurred by Obligee;
provided, however, that the obligations of Surety hereunder shall not exceed the amount of bid security
provided by the Bidder together with interest.

Dated: _____, 20_____
(CORPORATE SURETY)

WITNESS OR ATTEST:

By: _____
Attorney-in-Fact*

NAME: _____
(Please Type)

*Attach an appropriate Power of Attorney, dated as of the same date as this Agreement, evidencing the
authority of the Attorney-in-Fact to act on behalf of the corporation.

END OF DOCUMENT AG

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

NON-COLLUSION AFFIDAVIT

Contract/Bid No. _____

State of _____ :
County of _____ : SS

I state that I am _____ of _____
(Title) (Name of Firm)

and that I am authorized to make this affidavit on behalf of my firm and its owners, directors, and officers.
I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

1. The price(s) and amount of this bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder or potential bidder.
2. Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder and they will not be disclosed before bid opening.
3. No attempt has been made or will be made to induce any firm or person to refrain from bidding on this Contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.
4. The bid of my firm is made in good faith and not pursuant to any agreement or discussion with or inducement from, any firm or person to submit a complementary or other noncompetitive bid.
5. _____, its affiliates, subsidiaries, officers, directors,
(Name of my firm)
and employees are not currently under investigation by any governmental agency and have not in the last four years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

A New Fire Station for
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I state that _____ understands
(Name of my firm)
and acknowledges that the above representations are material and important, and will be relied on
by _____ of the true
(Name of Public Entity)
Facts relating to the submission of bids for this Contract.

(Name of Company Position)

SWORN TO AND SUBSCRIBED
BEFORE ME THIS
DAY OF _____, 20__.

Notary Public

My Commission Expires:

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address Contractor)

a _____,

(Corporation, Partnership, or Principal)

hereinafter called Corporation, Partnership or Principal and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name and Address of Owner)

hereinafter called Owner, in the penal sum of _____ Dollars,
\$(_____), in lawful money of the United States of America, for the payment of which sum well and
truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain
contract with the Owner, dated the _____ day of _____, 20____, a copy of which is hereto attached and
made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings,
covenants, terms, conditions, and agreements of said contract during the original term thereof, and any
extensions thereof which may be granted the OWNER, with or without notice to the Surety and during the
one year guarantee period, and if he shall satisfy all claims

and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from
all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the
OWNER all outlay and expense which the OWNER may incur in making good any default, then this
obligation shall be void; otherwise to remain in full force and effect.

A New Fire Station for
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PROVIDED FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in ____ counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST:

Principal

_____ By _____ (s)
(Principal Secretary)
(SEAL)

_____ By _____

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR IS Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located. The bonds must be executed by a surety company that is rated A by A.M. Best & Co. There will be no exceptions.

Surety

ATTEST: _____ By: _____

Attorney-in-Fact

Witness as to Surety

(Address)

(Address)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, (Corporation, Partnership or Individual)
hereinafter called Principal, and

(Name of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name and Address of Owner)

hereinafter called OWNER, in the penal sum of _____ Dollars, \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by the presents.

THE CONDITION OF THE OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of ____ 20____, a copy of which is hereto attached and made a part hereof for the construction of:

NOW THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in ____ counterparts, each one of which shall be deemed an original, this the ____ Day of ____ 20____.

ATTEST:

Principal

(Principal) Secretary

(SEAL)

By _____ (s)

(Address)

Witness as to Principal

(Address)

Surety

ATTEST: By _____

Attorney-in-Fact

Witness as to Surety

(Address)

(Address)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

NOTE: Date of BOND must not be prior to date of Contract. If Contractor is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located. The bonds must be executed by a surety company that is rated A by A.M. Best & Co. There will be no exceptions.

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CONTRACTOR'S AFFIDAVIT

STATE OF:

COUNTY OF:

Before me, the undersigned, a _____ In and for said
(Notary Public, Justice of the Peace or Alderman)

County & State, personally appeared _____
, (Individual, Partner, or duly authorized representative of Corp. Contractor)

who being duly sworn according to law, deposes and says that all labor, material and outstanding
claims and indebtedness of whatever nature arising out of the performance of the CONTRACT of the
(Owner) _____ with (Contractor) _____

have been paid in full. _____
, (Individual, Partner, or duly authorized representative of Corp. Contractor)

SWORN TO AND SUBSCRIBED

BEFORE ME THIS _____ DAY

OF _____, 20

Notary Public

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

IN WITNESS WHEREOF, the PRINCIPAL AND SURETY have executed this instrument under their several seals this _____ day of _____, 20____, the name and corporate seal of each signed by its proper officers, pursuant to authority of its governing body.

In presence of:

_____ (SEAL)

(Individual or Partnership Principal)

(Address)

Witness:

Attest:

(Corp. Principal)

(Business Address)

_____ By

(Affix Corporate Seal)

(Corporate Surety)

(Business Address)

By

(Affix Corporate Seal)

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A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

CONTRACTOR'S RELEASE

KNOW ALL MEN BY THESE PRESENTS THAT: _____

(Contractor)

of _____ County and State of _____ does hereby acknowledge that he has
received this day of and from the _____

(Owner)

The sum of ONE DOLLAR (\$1.00) and other valuable consideration in full satisfaction and payment of
all sums of money owing payable and belonging to _____

(Contractor)

by any means whatsoever, for on account of a certain agreement hereinafter called the CONTRACT,
between and said _____ and _____

(Owner)

(Contractor)

Dated

NOW, THEREFORE, the said _____ (for myself, my heirs, executors and

(Contractor)

administrators) (for itself, its successors and assigns) do by these presents remise, release, quit, claim and

forever discharge the said _____ its successors and assigns, of
and from all claims and demands arising from or in connection with the said CONTRACT dated
and of and from all, and all manner of actions, cause or causes of money, accounts, reckonings, bonds, bill,
specialties, covenants, contracts, agreements, promises, variances, damages, judgments, extends, executions,
claims and demand, whatsoever in law or equity/or otherwise which against the said

its successors _____

(Owner)

and assigns, ever had, now have, or which (I, my heirs, executors, or administrators) (it/its
successors and assigns) herein after can, shall or may have, for upon or by reason of any matter,
cause or thing whatsoever, from the beginning of the world to the date of these presents.

IN WITNESS WHEREOF _____ has caused these presents to be

(Contractor)

executed the _____ Day of _____, 20____.

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Signed, Sealed and Delivered in the presence of:

_____(SEAL)

(Individual)

_____(SEAL)

(Partnership Contractor)

By _____(SEAL)

(Partner)

Attest: _____(SEAL)

(President or Vice-President)

By _____

(Secretary)

(CORPORATE SEAL)

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MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, the undersigned _____

(here inset the name or legal title and address of Contractor)

as PRINCIPAL, AND _____

(here insert the legal title of Surety)

a corporation organized and existing under the laws of the State of _____ as SURETY are held and firmly bound unto

(here inset name or legal title and address of Owner) as OBLIGEE, in full and just several sums of DOLLARS (_____) for maintenance, lawful money of the United States of America, to be paid to the said OBLIGEE, or its attorney, successors or assigns, to the payment of which sums well and truly to be made, the said PRINCIPAL AND SURETY bind themselves, their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents:

WHEREAS, said PRINCIPAL has entered into a certain CONTRACT with said OBLIGEE, dated _____, 20__, (hereinafter called the CONTRACT) for

which CONTRACT and the CONTRACT DOCUMENTS for said WORK shall be deemed a part hereof as fully as if set forth herein.

NOW, THEREFORE, the joint and several conditions of this BOND are such:

That if the above bonded PRINCIPAL shall remedy without cost to the said OBLIGEE any defects which may develop during a period of one year from _____, the day of completion and acceptance of the WORK performed under said CONTRACT, provided such defects in the judgement of the obligee, or its successors having jurisdiction in the premises, are caused by defective or inferior material this part of this obligation shall be void, otherwise, it shall be and remain in full force and effect.

The PRINCIPAL and the SURETY agree that any alteration, changes or additions to the CONTRACT DOCUMENTS, and/or alterations, changes or additions to the WORK to be performed under the CONTRACT in accordance with the CONTRACT DOCUMENTS, and/or any alterations, changes or additions to the CONTRACT, and/or any given by the OBLIGEE of any extensions of time for the performance of the CONTRACT in accordance with the CONTRACT DOCUMENTS and/or any act of forbearance of either the PRINCIPAL or the OBLIGEE toward the other with respect to the CONTRACT DOCUMENTS and the CONTRACT and/or the reduction of any percentage to be retained by the OBLIGEE as permitted by the CONTRACT DOCUMENTS and by the CONTRACT, shall not release, in

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any manner whatsoever, the PRINCIPAL and the SURETY, or either of them, or their heirs, executors, administrators, successors and assigns, from liability under this BOND; and the SURETY, for value received does waive notice of any such alterations, changes, additions, extensions of time, acts of forbearance and/or reduction of retained percentage.

The bonds must be executed by a surety company that is rated A by A.M. Best & Co. There will be no exceptions.

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INSURANCE REQUIREMENTS

1.1 INDEMNIFICATION

The Contractor shall, at all times, indemnify and save harmless the Owner of and from all claims of whatsoever nature, including (without limitation) claims which may be made by any of the employees of the Contractor or by any employees of any Subcontractor to whom the Contractor may have let the performance of any part of the work embraced by the Contract, and the Contractor will appear for and defend the Owner against any and all such claims.

2.1 CONTRACTOR'S INSURANCE REQUIREMENTS

Without limiting Contractor's indemnification, it is agreed that Contractor shall maintain, in force, at all times during the performance of this Agreement the policy or policies of insurance indicated in Article 11 of AIA Document A201-2017 General Conditions of the Contract for Construction.

3.1 CONTRACTOR'S POLICY LANGUAGE REQUIREMENTS

Each insurance policy required by this Contract shall contain the following clauses:

“This insurance shall not be canceled or modified except upon written notice having been received by the Owner and the Engineer by certified mail at least 30 days prior to any such modification or cancellation.”

“The policy's coverage shall not be invalidated nor shall the coverage of this policy be reduced should any insured waive or should any insured already have waived, in writing prior to a loss, any or all right of recovery or defense against any person, corporation or other entity, including any other insured under this policy, for any loss covered by this policy.”

Each insurance policy required by this Contract, excepting policies for worker's compensation/employer's liability shall contain the following clauses:

“The Owner and Engineer, their officials, employees and volunteers, and the Commonwealth of Pennsylvania are added as additional insured as respects, operations and activities of, or on behalf of the named insured, performed under Contract with the Owner.”

“It is agreed that insurance maintained by Owner and Engineer shall apply in excess of and not contribute with insurance provided by this policy.”

4.1 CONTRACTOR'S CONFIRMATION OF INSURANCE COVERAGE

Prior to commencement of any work under this Contract, the Contractor shall deliver to the Contract Administrator (an employee of the Engineer) insurance certificates confirming the existence of the insurance required by this Contract.

Also, the Contractor agrees to provide to the Owner, within 30 days of the execution date of this Contract, endorsements to the required policies which add to these policies the applicable clauses referenced above. Such endorsements shall be signed by an authorized representative of the

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insurance company and shall include the signatories company affiliation and title. Should it be deemed necessary by the Owner or Engineer, it shall be the Contractor's responsibility to see that the Owner receives documentation (acceptable to Owner) which sustains that the individual signing said endorsements is indeed authorized to do so by the insurance company. Also, the Owner has the right to demand and to receive, in a reasonable time period, copies of any insurance policies required under this Agreement.

If the Contractor fails to maintain the aforementioned insurance or secure an maintain the aforementioned endorsement, the Owner may (at its option) obtain such insurance and deduct and retain the amount of the premiums for such insurance from any sums due under the Agreement. However, procuring of said insurance by the Owner is an alternate to other remedies the Owner may have and is not the exclusive remedy for failure of the Contractor to maintain said insurance or secure said endorsement. In addition to any other remedies the Owner may have upon Contractor's failure to provide and maintain any insurance or policy endorsements to the extent and within the time herein required, the Owner shall have the right to order Contractor to stop work hereunder and/or withhold any payment(s) which became due to the Contractor hereunder until Contractor demonstrates compliance with the requirements hereof; and/or terminate this Agreement.

Nothing herein contained shall be construed as limiting in any way the extent to which Contractor may be held responsible for payments of damages to persons or property resulting from Contractor's or its Subcontractor's performance of the work covered under this Agreement.

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CONTRACTOR'S INSURANCE

1.1 GENERAL

- A. The Contractor shall purchase and maintain for the entire life of the project, including time extension, until final acceptance by the Owner such insurance as will protect him from claims under worker's compensation laws, disability benefit laws or other similar employee benefit laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees and from claims for injury to or destruction of tangible property and claims insured by usual comprehensive general liability coverage, including the Broad Form General Liability endorsement. This includes loss of use resulting therefrom, any or all of which may arise out of Contractor's operations under the Contract Documents, whether such operations be by him or by any Subcontract or anyone directly or indirectly employed by any of them or for whose acts any of them may be legally liable. This insurance shall be written for not less than any limits of liability specified and incorporated as part of the Contract Document or as required by law, whichever is greater; and shall include the types of insurance listed in the Insurance Requirements.
- B. Each policy of insurance shall provide, by special endorsement or otherwise, the following:
 - 1. Subrogation Clause
 - a. The policy's coverage shall not be invalidated nor shall the coverage of this policy be reduced should any insured waive or should any insured already have waived in writing prior to a loss any or all right of recovery or defense against any person, corporation or other entity, including any other insured under this policy, for any loss covered by this policy.
 - 2. Notice
 - a. The policy's coverage may not be cancelled or modified except upon written notice having been received by the _____ and the Engineer by certified mail, return receipt requested, at least 30 days prior to any such modification or cancellation.

2.1 TYPES OF INSURANCE

- A. General Liability including:
 - 1. Comprehensive Form
 - 2. Premises/Operations
 - 3. Underground Explosion and Collapse Hazard
 - 4. Products/Completed Operations
 - 5. Contractual
 - 6. Independent Contractors
 - 7. Broad Form Property Damage
 - 8. Personal Injury

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B. Automobile Liability including:

1. Any Auto
2. Hired Autos
3. Non-owned Autos

3.1 EXCESS LIABILITY

A. Umbrella Form

4.1 WORKER'S COMPENSATION AND EMPLOYERS' LIABILITY

5.1 BUILDER'S RISK –**TO BE PURCHASED BY OWNER**

- A. The Contractor shall purchase and maintain "All Risks" coverage, including flood and earthquake damage, fire, physical loss, theft, vandalism, malice mischief, collapse, water damage and other such perils in an extended coverage. The limits of liability for this insurance shall never be less than the Contract amount, including changes orders thereto. This coverage shall commence ten days after the issuance of the notice of award and shall be maintained by the Contractor for the full duration of the Contract until the Owner has made final payment or notified the Contractor that all or portions of the project have been insured by the Owner. At no time, until final payment, shall the Contractor allow the sum of the Owner supplied insurance be less than the actual Contract amount. This coverage should also include automatic permission to occupy and shall cover the insurable interest of the Owner _____, Engineer, Contractor and subcontractor in the Work.

tract until the Owner has made final payment or notified the Contractor that all or portions of the project have been insured by the Owner. At no time, until final payment, shall the Contractor allow the sum of the Owner supplied insurance be less than the actual Contract amount. This coverage should also include automatic permission to occupy and shall cover the insurable interest of the Owner _____, Engineer, Contractor and subcontractor in the Work.

- B. The Owner and Contractor waive all rights against each other for damage caused by fire or other perils to the extent payment is actually made under insurance provided under this Paragraph, except such rights as they may have to the _____ proceeds of such insurance held by the Owner and Engineer. The Contractor shall require similar waivers by Subcontractors in accordance with General Conditions.

6.1 REQUIREMENTS FOR CERTIFICATES

- A. With the Execution of the Contract Documents, the Contractor shall provide the Contract Administrator (an employee of the Engineer so designated in writing) with certificates of such insurance, acceptable to the Owner and Engineer. These certificates shall contain a provision that the coverage afforded under the policies will not be canceled or materially changed until at less 30 days prior written notice has been given to the Owner and Engineer.

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The Contract shall be required to replace any expired or canceled policies in like amount and coverage to the satisfaction of the Owner and Engineer.
anceled policies in like amount and coverage to the satisfaction of the Owner and Engineer.

- B. If the Contractor fails to take out and maintain for the life of the Project the insurance required hereby or to replace any such expired or cancelled policy, the Owner may take out and maintain such insurance with such company as it deems satisfactory as approved by the Engineer. Any amounts expended by the Owner in payment of premiums for such insurance shall be deducted by the Owner from the amount due to Contractor for the Work covered by this Contract.

7.1 DECLARATION OF COVERAGE AND LIMITS OF LIABILITY

A. General Liability

1. Each Occurrence

- | | |
|---|----------|
| a. Bodily Injury: | \$ _____ |
| b. Property Damage: | \$ _____ |
| c. Bodily Injury and
Property Damage Combined: | \$ _____ |

2. Aggregate

- | | |
|---|----------|
| a. Bodily Injury: | \$ _____ |
| b. Property Damage: | \$ _____ |
| c. Bodily Injury and
Property Damage Combined
(Single Limit): | \$ _____ |
| d. Personal Injury: | \$ _____ |

3. Automobile Liability

a. Each Occurrence

- | | |
|--|----------|
| 1. Bodily Injury: | |
| (a) Per Person: | \$ _____ |
| (b) Per Accident: | \$ _____ |
| 2. Property Damage: | \$ _____ |
| 3. Bodily Injury &
Property Damage
Combined: | \$ _____ |

4. Excess Liability

a. Each Occurrence

- | | |
|--|----------|
| 1. Bodily Injury &
Property Damage
Combined: | \$ _____ |
|--|----------|

b. Aggregate

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1. Bodily Injury &
Property Damage
Combined: \$ _____
5. Workers' Compensation
 - a. Statutory \$ _____
6. Employers' Liability
 - a. Each Accident: \$ _____
 - b. Disease-Policy Limit: \$ _____
 - c. Disease-Each Employee: \$ _____
7. Additional Insured
 - a. Plymouth Township
 - b. Appointed Township Engineer
 - c. Architect and its Consultants
 - d. Commonwealth of Pennsylvania

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SPECIAL JOB SITE REQUIREMENTS

1. Offensive Language

Offensive language or yelling will not be tolerated.

2. Time of Work

Construction at the job site cannot begin until 7:00 a.m. and must be terminated by dusk. This work limitation also includes the moving of equipment. No work may take place on Sunday unless approved by the owner.

3. Job Cleanliness

It is the responsibility of the Contractor to make sure that all debris is properly collected and disposed of. Burying of trash, such as lunch bags, soda cans and water cups is not acceptable.

4. Alcohol and Substance Abuse

The use of alcohol and controlled substances on the job site will not be tolerated. Anyone found using alcohol or a controlled substance must be removed from the job site by the Contractor and will not be permitted to return.

5. Dust and Noise

The Contractor will be responsible to control dust from the job site as well as unnecessary noise.

6. Communication

The Contractor must have a representative on-site at all times who communicates in English.

7. Failure of Performance

It is the responsibility of the Contractor to perform the work in accordance with the plans and specifications. Should the Contractor fail to perform any of his obligations in a satisfactory manner, the owner may take it upon themselves to perform certain tasks, such as cleaning up an erosion control problem, placing signs or manpower for maintenance and protection of traffic, etc. The cost of performing this work will be deducted from the amount due to the Contractor.

8. Resident Complaints

The Contractor should not respond to any resident complaints. Any resident complaints must be directed to Plymouth Township.

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DOCUMENT 00 7216 – GENERAL CONDITIONS

1. The following document is hereby made a part of the Contract:
 - A. Conditions of the Contract:
 - 1) AIA A201-2007, General Conditions of the Contract for Construction (55 pages).
 - a) Document includes changes thereto.

END OF DOCUMENT 00 7216

DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

«Harmonville Fire Company – Plymouth Valley Station
«904 Germantown Pike»
«Plymouth Meeting, PA 19462»

THE OWNER:

(Name, legal status and address)

«Plymouth Township»« »
«700 Belvoir Road
Plymouth Meeting, PA 19462»

THE ARCHITECT:

(Name, legal status and address)

«Kelly, Clough, Bucher, and Associates, Inc. »«(DBA KCBA Architects) »
«8 East Broad Street »
«Hatfield, PA 19440 »
«Telephone: 215-368-5806 »

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ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, *Guide for Supplementary Conditions*.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Typographical and spelling errors shall be interpreted by the Architect for their obvious meaning and intent. References throughout the Contract Documents expressed in the singular number shall mean one or more like items as may be required to complete the Work. Likewise, plural references that obviously imply only one item shall mean only one item.

§ 1.2.4 In the case of an inconsistency within or between Contract Documents not clarified by Addendum, the better quality or greater quantity of Work shall be provided in accordance with Architect's interpretation. Such conflict shall be promptly referred to the Architect for interpretation and final decision.

§ 1.2.5 Where the Work is shown in complete detail on only half or portion of a Drawing or there is an indication of continuation, the remainder being shown in outline, the Work drawn out in detail shall be understood to apply to other like portions of the structure.

§ 1.2.6 On all Work of a remodeling nature or installation within the present buildings, it will be the responsibility of the Contractor, by personal inspection, to satisfy himself as to the correctness of any information given which may affect the quantity, size, and quality of materials required for a satisfactorily completed Contract, whether or not such information is indicated on the Drawings or within the Specifications.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to

whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.7.1 The Architect may, with the concurrence of the Owner, furnish to the Contractors versions of Instruments of Service in electronic form. The Contract Documents executed or identified in accordance with Subparagraph 1.2.1 shall prevail in case of an inconsistency with subsequent versions made through manipulatable electronic operations involving computers.

§ 1.7.2 The Contractor shall not transfer or reuse Instruments of Service in electronic or machine-readable form without the prior written consent of the Architect.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If

the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.1.1 The Owner will secure and pay for necessary zoning approvals, site development approvals, highway access approvals, design approvals, and other approvals related to permanent facilities and required precedent to applications for permits for Work at the Project Site.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, easements, right of ways, and utility locations for the site of the Project, and a legal description of the site. The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness after receipt from the Contractor of a written request for such information or services.

§ 2.3.6 The Contractor will be furnished, free of charge, one (1) PDF set of Contract Documents including Drawings, Project Manuals, addenda, and modifications thereof. The Contractor shall pay the actual cost of reproduction for all additional sets or individual prints requested by him. Additional sets will be furnished at the cost of reproduction, postage and handling.

§ 2.2.7 The Owner will provide for special testing and inspections not specifically indicated as by the Contractor in accordance with the requirements of Division 01 Section "Quality Requirements"

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

§ 2.5.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or project schedule, or fails to adequately staff the project with proper management, supervision, materials and Workforce, including its duty to proceed expeditiously with adequate forces so as to achieve substantial completion within the Contract Time, and fails within a seven (7) day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may after such seven (7) day period give the Contractor a second written notice to correct such deficiencies within a three (3) day period. If the Contractor within such three (3) day period after receipt of such second notice fails to commence and continue to correct any deficiencies, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due to the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses, including attorney's fees and costs and compensation for the Architect's additional services made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. Notwithstanding the above, Owner shall not be required to comply the notice provisions hereof, and may proceed to correct deficiencies if Contractor fails within a 24-hour period after receipt of written notice from the Owner to commence and continue correction of such deficiencies where further delay would cause substantial disruption to the project schedule. Owner shall have the further right to carry out Work without any prior notice to Contractor, in an emergency affecting safety of persons or property, and said Work is necessary to prevent threatened damage, injury or loss. Owner's right in this regard shall not relieve Contractor of its obligations and responsibilities under the Contract Documents and shall not give rise to a duty on the part of the Owner to exercise the right for the benefit of the Contractor or any other person or entity.

§ 2.6 OWNER'S REPRESENTATIVE

§ 2.6.1 The Owner reserves the right to employ a qualified person or firm as Owner's Representative or Clerk of the Works, to observe the Work in conjunction with the Architect. Owner's Representative shall have the right to attend job conferences or project meetings and to come to the Project site while the Work is in progress. Owner's Representative shall observe the Work and report any defects or discrepancies in the Work to the Architect. Nothing herein contained shall create any contractual relationship between Owner's Representative and any Contractor, Subcontractor or Sub-subcontractor. Owner's employment of a project representative or Clerk of the Works shall not relieve the Contractor of any of its responsibilities or obligations under the Contract Documents.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents. Where term "Contractor" is modified in any way, such as, without limit, "this Contractor", "General Construction Contractor", "Mechanical Contractor", "Plumbing Contractor", "Electrical Contractor", "separate contractor", the modified term shall be deemed to refer to the trade involved with the Work mentioned, but such meaning does not relieve the Contractor from his responsibility for all Work, whether or not such Work is sublet.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor. Observation of Work by the Architect or by employees of the Architect shall not be interpreted as relieving Contractor from his responsibility for coordination of all Work, his Superintendence of the Work, and his scheduling of the Work.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents. The Contractor shall review the drawings and Work of other separate contracts to determine if that Work affects the Contractor's planned Work.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities. The Contractor shall give the Architect timely notice of any additional design drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work. The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, special requests, additional drawings or instructions from the Architect. If the Contractor proceeds with such Work without obtaining further drawings or instruction, he shall correct Work incorrectly done at his own expense.

§ 3.2.5 Explorations and Reports: Reference is made to the General Requirements and Bidding Documents for identification of those reports of explorations and tests of subsurface conditions at the Project site that have been utilized by Architect in preparation of the Contract Documents. Contractor may rely upon the accuracy of the technical data contained in such reports, but not upon non-technical data, interpretations or opinions contained therein or for the completeness thereof for Contractor's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.3.4, Contractor shall have full responsibility with respect to subsurface conditions at the Project site.

§ 3.2.6 Existing Structures: Reference is made to the Bidding Documents for identification of those drawings of physical conditions in or relating to existing surface structures which are at or contiguous to the Project site that have been utilized by Architect in preparation of the Contract Documents. Contractor may rely upon the accuracy of the technical data contained in such drawings, but not for the completeness thereof for Contractor's purposes. Except as indicated in the immediately preceding sentence and in subparagraph 4.3.4, Contractor shall have full responsibility with respect to physical conditions in or relating to such natures.

§ 3.2.7 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for the Architect to evaluate and respond to the Contractor's requests for information, where such information was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

§ 3.2.8 The Contractor shall be liable to the Owner and/or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents or from differences between field measurements or conditions and the Contract Documents, if the Contractor knowingly fails to report such error, inconsistency, omission or difference to the Architect, or where the Contractor fails to carefully study and compare the Contract Documents relative to that portion of the Work for which the Contractor is responsible, such that, had Contractor done so, Contractor would have discovered such error, inconsistency or omission and reported same to Architect.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 Where the Contract Documents refer to particular construction, means, methods, techniques, sequences or procedures or indicate or imply that such are to be used in the Work, such mention is intended only to indicate that the operations of the Contractor shall be such as to produce at least the quality of Work implied by the operations described, but the actual determination of whether the described operations may be safely and suitably employed on the Work shall be the responsibility of the Contractor, who shall notify the Architect in writing of the actual means, methods, techniques, sequences or procedures which will be employed on the Work, if these differ from those mentioned in the Contract Documents. All loss, damage or liability or cost of correcting defective Work arising from techniques, sequences or procedures as referred to, indicated in or implied by the Contract Documents shall be the responsibility of the Contractor, unless the Contractor has given timely notice to the Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and the Contractor has then been instructed in writing to proceed at the Owner's risk.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 Contractor's supervision of Work shall include expediting and coordination of Work of trades. Contractor shall perform all supervising and procuring required to ensure delivery of materials to maintain Work schedules of Subcontractors and progress schedule of project to ensure full completion of Work, to supply equipment or instruments necessary to complete specified test, checks, balancing of system, to furnish operating instructions, etc.

§ 3.3.5 The Contractor, his employees or his Subcontractors shall not install any product or equipment in a manner which is in direct conflict with the manufacturer's recommended requirements. If the manufacturer of the product or equipment has requirements which cannot be met by the specific application indicated, the Contractor shall bring this information to the attention of the Architect. Products or equipment installed contrary to their manufacturer's requirements shall be replaced at no additional cost to the Owner unless specifically authorized in writing by the Architect.

§ 3.3.6 When complex mechanical and electrical installations are involved, Contractor's representatives shall be sufficiently familiar with these trades to provide intelligent and efficient supervision through all phases of Work.

§ 3.3.7 The General Contractor is designated as the Project Coordinator for this Project. The Project Coordinator and other Contractors are responsible for coordination of the Work. The Project Coordinator is responsible for making all coordination decisions not mutually agreed to by all affected Contractors. Disputes between or among the Project Coordinator and one or more other Contractors and disputes in connection with the construction schedule, the furnishing of additional resources to meet the project schedule, job coordination and all aspects of the means and methods of construction shall be submitted promptly to the Project Coordinator for a final construction decision. The Project Coordinator and the affected Contractor or Contractors shall in connection with all submissions for a final construction decision provide actual written notice contemporaneously to the Architect. The final construction decision of the Project Coordinator must, at all times, be consistent with content and intent of the Contract Documents and the latest accepted schedule. The final construction decision of the Project Coordinator will be observed, accepted and fully followed by all Contractors and their Subcontractors on the project, subject only to

commencement of litigation proceedings between Project Coordinator and separate Contractor(s). The progress of the Work in accordance with the final construction decision of the Project Coordinator shall not be delayed pending any such litigation proceedings. The Contractors, including Project Coordinator, shall have no right of action against the Owner or Architect in connection with such suits, and shall not join Owner or Architect in any such suits. To the extent necessary to effectuate the terms and conditions of this subparagraph, the separate contractors are granted third party beneficiary status to this Contract between Owner and Contractor.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 The various materials and products specified in the Contract Documents by name or description are given to establish a standard of quality and of cost for bid purposes. Unless materials or products specified are indicated as "no substitutions" or words to that effect, then it is not the intent to limit bidder, the bid or the evaluation of the bid to any one material or product specified, but rather describe the minimum standard. When proprietary names are used, they shall be followed by the words "or alternatives of the quality necessary to meet the specifications". A bid containing an alternative which does not meet the specifications may be declared non-responsive. A bid containing an alternative may be accepted, but if an award is made to that bidder, the bidder will be required to replace any alternatives which do not meet the specifications. No substitutions may be offered for materials and products specified as "no substitutions" or words to that effect.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 Owner specifically reserves the right to reject any person Owner deems unfit to be permitted on the Owner's property. Upon written notice from Owner, Contractor shall have all such persons removed from the Project.

§ 3.4.5 Standards of quality for the Work is established by description, by reference to trade name, manufacturer's names or by catalog model or figure numbers.

§ 3.4.5.1 Such references require that which is established as standards of quality shall be provided without substitution unless permitted by the Contract Documents.

§ 3.4.5.2 Work specified which becomes unavailable due to strike, loss of plant through fire or flood, bankruptcy, or other unforeseeable cause, shall be substituted equally from another source subject to substitution procedures in the Contract Documents.

§ 3.4.5.2.1 Work covered by paragraph 3.4.5.2 shall not automatically entitle the Contractor to either an increase in Contract Sum or Contract Time. Notwithstanding the same, if the Work covered by 3.4.5.2 results in a savings to Contractor, Owner shall be entitled to a reduction in the Contract Sum. In any event, Work covered by paragraph 3.4.5.2 shall be incorporated into the Project through a properly executed Change Order.

§ 3.4.5.2.2 Items not ordered by the Contractor in a timely manner for incorporation into the Work will not be considered for claims by the Contractor for additional time or costs.

§ 3.4.5.3 Substitute Work offered and approved shall not be a basis for contingent extra charges or additional charges due to changes in related Work, such as rough-in, changes in supporting foundations, and other related Work. The cost of changes in Work by other contracts as a result of substitute Work of this Contract shall be the responsibility of this Contractor and will be deducted by Change Order.

§ 3.4.5.4 The Contractor shall assume full responsibility for substitute Work.

§ 3.4.5.5 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of such substitutions.

§ 3.4.6 Whether indicated or not, all products included in the Work shall be asbestos-free and lead-free. If any suspected asbestos-containing or lead-containing materials are installed, the Owner has the right to have the material in question tested and if proven to contain asbestos or lead exceeding the amounts permitted by law, the Contractor shall remove all material in question and replace it with acceptable material at no additional cost to the Owner.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4. The minimum Warranty period, as defined above shall be one (1) year from date of Substantial Completion. The warranty provided in subparagraph 3.5.1 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

§ 3.6 Taxes

§ 3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor and shall comply with the following:

§ 3.6.1.1 Contractor shall be responsible for and shall pay all applicable sales, use, excise or other taxes required by law on all materials, tools, apparatus, equipment, fixtures, services, incidentals or otherwise which may be purchased or used in connection with the Work or portions thereof. The Contract Sum shall include all applicable taxes.

Notwithstanding the foregoing, however, Owner is exempt (excluded) from sales and/or use tax in Pennsylvania on certain transactions. Contractor and all Subcontractors shall purchase as exempt (excluded) from Pennsylvania sales and/or use tax all tangible personal property within the definition of 'building machinery and equipment' as that term is defined in Act No. 45-1998 (72 P.S. § 7201 et seq.). No charges shall be allowed for such exempt items. It shall be the Contractor's responsibility to determine those items for which an exemption will apply, and the Contractor shall obtain legal or other tax advice to determine how and to what extent an exemption from the taxes apply. In order to facilitate such purchase free of sales and/or use tax in Pennsylvania, and upon certification by Contractor that an item is, in fact, tax exempt, the Owner agrees to execute a tax exemption certificate certification prepared by Contractor or a Subcontractor as may be required by the regulations of the Pennsylvania Department of Revenue.

§ 3.6.1.2 Assignment of Refund Rights.

- .1 Owner shall be entitled to claim refunds of sales and/or use tax paid on these and other purchases of tangible personal property required in connection with the Work. The Contractor and all Subcontractors hereby assign to Owner all rights to any such refund claim and to any resulting refund and hereby appoint the Owner as their Attorney-in-Fact to execute and acknowledge in their respective names and to prosecute such refund claims before administrative agencies and courts in Pennsylvania having jurisdiction over such claims. The Owner or its agent shall have the right to review the books and records of the Contractor and all Subcontractors for the purpose of documenting and substantiating any such refund claim. Contractor and all Subcontractors shall cooperate fully with Owner in pursuing any such refund claim and shall make available to the Owner any applicable documents.

§ 3.6.1.3 Access to Accounting Records.

- .1 The Contractor shall check all materials, equipment and labor entering into the Work, and shall keep such full and detailed accounts as may be necessary for proper financial management under the Contract and the system shall be satisfactory to Owner. The Owner or its representative shall be afforded access to, including the right to photocopy, all the Contractor's records, books, correspondence, instructions,

drawings, receipts, vouchers, memoranda, and similar data relating to the Work, and the Contractor shall preserve all such records for a period of three (3) years, or for such longer period as may be required by the law, after receipt of final payment.

§ 3.6.1.4 Contracts with Subcontractors.

- .1 The Contractor agrees to include the "Access to Accounting Records" and "Assignment of Refund Rights" paragraphs, in full, in any contracts with Subcontractors. The Contractor further agrees that it will not file a claim for refund for any sales and/or use tax which is the subject of the assignment in Subparagraph 3.6.1.2 above. Contractor shall obtain from all Subcontractors similar agreements that they will not file claims for refund for any sales and/or use tax which is the subject of the assignment as noted above.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 The contractors shall secure, and owner will reimburse at no mark-up or pay directly, all permits, and inspections required for construction. The contractors shall secure and pay for all necessary administrative costs, insurance, business privilege licenses, certifications, or taxes to apply for the necessary required to perform the work.

§ 3.7.1.1 To the extent Contractor pays any permits, fees, including connection and/or tap-in fees not otherwise properly due, the Owner shall be entitled to any refund relating thereto and the Contractor agrees to assign any and all rights to said refund or refund claim to Owner. The Contractor and all Subcontractors hereby assign to Owner all rights to claim any such refund claim and to any resulting refund and hereby appoint the Owner as their Attorney-in-Fact to execute and acknowledge in their respective names and to prosecute such refund claims before administrative agencies and courts in Pennsylvania having jurisdiction over such claims. The Owner or its agent shall have the right to review the books and records of Contractor and all Subcontractors for the purpose of documenting and substantiating any such refund claim. Contractor and all Subcontractors shall cooperate fully with Owner in pursuing any such refund claim and shall make available to Owner any applicable documents.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 § 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items and materials covered by allowances shall be supplied by the Contractors and in the amounts indicated in Division 01 Section "Quantity Allowances."

§ 3.8.2 Project allowances shall be limited to "Quantity Allowances" in accordance with the Division 01 Section.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent Superintendent and necessary assistants who shall be in regular attendance at the Project site full time during the progress of the Work until the day of Substantial Completion, and for such additional time thereafter as the Architect may determine to be necessary for the expeditious completion of the Work. The Superintendent shall represent the Contractor, and communications given to the Superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection. The Project Superintendent must be approved by the Owner and Architect prior to the start of Work. Within ten (10) days following receipt of Notice to Proceed, the Contractor shall submit a resume of the proposed Superintendent who will be on site full time. The resume shall include at least three (3) recent projects of similar contract scope with the names and telephone numbers of Owner and Architect representatives for each project. The Superintendent shall be on site full time and shall not be changed except with the consent of the Owner and Architect, unless the Superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. In any event, a replacement Superintendent shall be subject to the approval of the Owner and Architect.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed. If during the course of the Project, it is evident that the Superintendent is not competent or is not managing the progress of the Work or is not coordinating the various trades under the Contractor's supervision, then the Architect will document such findings to the Contractor. If within ten (10) days of receiving such notice, no substantial effort or correction of the findings is made, then the Owner, based upon the Architect's request, may require the replacement of the Superintendent with an acceptable Superintendent.

§ 3.9.4 The Contractor may not substitute another job superintendent without prior consent of the Owner. Each Contractor shall maintain a full time qualified Project Superintendent on site at all times. Owner reserves the right to deduct \$400.00 from Contract amount for each day that a qualified Project Superintendent is not on site. The aforesaid deduction shall be in the nature of liquidated damages and not as a penalty as actual damages resulting from Contractor's failure to maintain a full-time qualified Project Superintendent on site at all times are impossible to determine. The Owner also reserves the right to interview and approve the proposed substitute superintendent.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's

construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 When the project is comprised of multiple contracts, the Project Schedule shall be prepared by the Project Coordinator and submitted to the General Construction Contractor for his Work and to all other separate Contractors for their concurrence and the addition of their major items of Work. All schedule and Work items must be in conformance with the Project Schedule requirements listed in the project manual including any phasing or other milestones provided. Project Coordinator shall incorporate the General Construction Contractor's and separate Contractors' items of Work and issue project schedule. Project Schedule shall be issued by the Project Coordinator within 21 days of award of Contract. All other Contractors must provide their major items of Work within 10 days of receipt of the Project Coordinator's schedule. Project Coordinator shall issue final Project Schedule within 14 days of receipt of major Work items from other Contractors. Upon written approval of the schedule by each Contractor, it shall with respect to time, become of the essence of the Contract in regard to Contractor's performance of the Work and any Contractor who does not comply with the schedule may be held in violation of Article 8, Paragraph 8.2, Progress and Completion. The Project Schedule may be changed or revised only with the written consent of all Contractors and the Owner. If the General Construction Contractor or other separate Contractors do not comply with all the above requirements and time lines, the Owner reserves the right to deduct \$500.00 from the Contract amount for each day that Contractor does not comply and Owner may also proceed with enforcing other requirements of the Contract including Article 2.4. The aforesaid deduction shall be in the nature of liquidated damages and not as a penalty as actual damages resulting from Contractor's failure to comply with the above requirements and time lines are impossible to determine.

§ 3.10.5 All Contractors shall be responsible to perform Work to ensure that the Project is completed by the Project Contract Completion Date and any milestone dates established in the Contract Documents are met. Any claims for additional costs associated with completion of the Work within the required Contract time frames will not be considered. Contractors, who feel extra time, in any form such as shift Work, overtime, and premium time, is necessary to meet Contract requirements regardless of trade, should include these costs in their bids. Contractors must recognize that although their Work might not require shift, overtime, or premium time Work for completion within the stipulated time frame, it may be required in order to allow other Contractors to complete within the time frame. Contractors must allow for these overtime requirements and include the costs necessary to allow the other Contractors to complete within the specified time. Failure to recognize the extra costs in his bid shall not relieve the Contractor from utilizing shift, overtime, or premium time Work in performance of his Contract. All costs associated with meeting the timeframes indicated in the construction schedules shall be included in the Contract Sum.

§ 3.10.6 Preparation, review and updating of the Project Schedule shall not result in liability on the part of Owner, Owner's representative (if any), Project Coordinator or Architect, in favor of Contractor for time, cost overruns or schedule changes which are required to maintain project Substantial Completion date and all milestone dates established in the Contract Documents. This provision shall not relieve Project Coordinator of any liability arising under Subparagraph 6.2.3.

§ 3.10.7 GENERAL SCHEDULING REQUIREMENTS

§ 3.10.7.1 The Work under the Contract Documents shall be planned, scheduled, executed, reported and accomplished using sequential and logical activities, in calendar days. The provisions of the General Requirements and the directions of the Project Coordinator are to be followed by all Contractors in scheduling his construction activities. The scheduling services of the Project Coordinator are part of its Contract with the Owner, but nothing herein relieves the obligations of the Contractor and other Contractors to schedule their own construction activities and nothing herein alters the obligation of the Project Coordinator to resolve all supervision, coordination and scheduling issues between and amongst the Contractors.

§ 3.10.7.2 Contractor is responsible for determining the sequence and logic of activities, the time estimates of the detailed construction activities and the means, methods, techniques and procedures to be employed with regard to his portion of the Work. The Construction Schedule shall represent Contractor's best judgment of how he shall prosecute the Work in compliance with the requirements of the Contract Documents. Contractor shall ensure that

the Construction Schedule is current and accurate and is properly and timely monitored, updated and revised as Project conditions and the Contract Documents may require, and as may be directed by Project Coordinator.

§ 3.10.7.3 Contractor shall consult with his major Subcontractors relating to the preparation of his construction plan and Construction Schedule. Major Subcontractors shall receive copies of those portions of Contractor's Construction Schedule which relate to their Work and shall be continually advised of any updates or revisions to the Construction Schedule as the Work progresses. When Contractor submits his Construction Schedule to the Project Coordinator or makes any proposed updates or revisions to such Schedule, it shall be concluded by Owner and Project Coordinator that Contractor has consulted with and has the concurrence of his major Subcontractors. Contractor shall be solely responsible for ensuring that all Subcontractors comply with the requirements of the Construction Schedule for their portions of the Work.

§ 3.10.7.4 Contractor shall provide the basic data as required by Project Coordinator relating to activities, durations and sequences as part of Contractor's draft of the Construction Schedule. This data shall reflect Contractor's actual construction plan for the Project, and shall fully comply with all requirements of the Contract Documents.

§ 3.10.7.5 Contractor agrees that the pre-construction scheduling conference, the provision of drafting and computerization services by the Project Coordinator, and the reasonable exercise of any rights under this Paragraph by Project Coordinator, or Owner shall not be grounds for any claim against Owner, Project Coordinator or any representative of the Owner by Contractor or any of his Subcontractors or Sub-Subcontractors, alleging interference, lack of cooperation, delay, disruption, harassment, negligence or hindrance by Owner or Project Coordinator and Contractor covenants not to sue therefore. This provision shall not relieve Project Coordinator from any liability otherwise arising under Subparagraph 6.2.3.

§ 3.10.7.6 Contractor acknowledges and agrees that his Construction Schedule must be flexible in order to accommodate and allow for his coordination with the construction activities of the other Contractors, and Contractor agrees to mutually cooperate with the other Contractors in this regard.

§ 3.10.7.7 The review by Owner, Architect or Project Coordinator of the Construction Schedule or any other schedule or plan of construction of Contractor, does not constitute an agreement by Owner, Architect or Project Coordinator of any start or finish date in the schedule or specific durations or sequences for activities of the Contractor; further, nothing herein shall be construed as modifying or changing, or excusing the performance of Contractor of required portions of the Work by the Completion Dates as set forth in the Contract Documents.

§ 3.10.7.8 The Completion Dates set forth in the Contract Documents represent only the major items of Work and may include interface dates with the construction activities of the other Contractors or others. Completion Dates are Contract requirements and are of the essence to the Contract Documents and to the coordination of the Work by Contractor. Completion Dates represent the latest allowable completion time for those portions of the Work to which each Completion Date relates. The Completion Dates are not intended to be a complete listing of all Work under the Contract Documents or of all interfaces with Work performed by other Contractors or others. Contractor shall determine the time requirements for all such interfaces and shall be responsible for planning, scheduling and coordinating the Work in order to complete in accordance with those requirements.

§ 3.10.7.9 Review by the Project Coordinator of Contractor's Construction Schedule, or any revisions or updates thereto, are advisory only and shall not relieve Contractor of the responsibility for accomplishing each portion of the Work within each and every applicable Completion Date. Omissions and errors in the approved or accepted Construction Schedule, or any revisions or updates shall not excuse performance which is not in compliance with the Contract Documents. Review by the Project Coordinator does not make Owner, Project Coordinator or Architect liable to Contractor for time or cost overruns flowing from such omissions or errors. This provision shall not relieve Project Coordinator from any liability otherwise arising under Subparagraph 6.2.3.

§ 3.10.8 UPDATING OF CONSTRUCTION SCHEDULE / PROGRESS REPORTS

§ 3.10.8.1 At a minimum of every two months or as requested by Owner or in accordance with the dates specified in the Contract Documents or established by the Project Coordinator, the Project Coordinator shall update the construction schedule. Contractor shall arrange for his Superintendent to meet at the Project site with the Project Coordinator to review Contractor's report of actual progress. Said report shall set forth up-to-date and accurate progress data, shall be based upon Contractor's best judgment and shall be prepared by Contractor in consultation with all Subcontractors.

§ 3.10.8.2 The progress report of Contractor shall show the Work activities, or portions of activities, completed during the reporting period, the actual start and finish dates for these activities, remaining durations and/or estimated dates for completion of Work for activities currently in progress.

§ 3.10.8.3 Project Coordinator shall produce an update Work sheet for Contractor to complete as a part of this process.

§ 3.10.8.4 Contractor shall submit a written report with the updated progress analysis which shall include, but not be limited to, a description of problem areas, current and anticipated delaying factors and their impact, explanations of corrective actions taken or planned, any newly planned activities or changes in sequence, and proposed logic for a recovery schedule, if required, as further described herein. The report shall also include:

- (1) a narrative describing actual Work accomplished during the reporting period;
- (2) a list of major construction equipment used on the Project during the reporting period and any construction equipment idle during the reporting period;
- (3) the total number of personnel by craft actually engaged in the Work during the reporting period, with such total stated separately as to office, supervisory, and field personnel;
- (4) a manpower and equipment forecast for the succeeding thirty (30) days, stating such total as to office, supervisory and field personnel;
- (5) a list of Contractor-supplied materials and equipment, indicating current availability and anticipated Project site delivery dates; and
- (6) changes or additions to Contractor's supervisory personnel, if any, since the preceding progress report.

§ 3.10.8.5 Application for Payment: Except as provided in Subparagraph 3.10.8, Contractor understands and agrees that the submission and acceptance of progress updates and the receipt of progress reports are an integral part and basic element of the Applications for Payment; and that Contractor shall not be entitled to any progress payment under the Contract Documents until Contractor has fully complied with the requirements of this Paragraph 3.10.

§ 3.10.8.6 Contractor shall be solely responsible for expediting the delivery of all materials and equipment to be furnished by or to him so that the progress of construction shall be maintained according to the currently accepted Construction Schedule for the Work. Contractor shall notify Project Coordinator in writing, and in a timely and reasonable manner, whenever Contractor determines or anticipates that the delivery date of any material or equipment to be furnished by Contractor shall be later than the delivery date indicated by the Construction Schedule, or required consistent with the completion requirements of the Contract Documents, subject to schedule updates as herein provided.

§ 3.10.8.7 Contractor shall ensure that off the site work activities do not adversely affect progress in accordance with the Construction Schedule.

§ 3.10.9 Initial Progress Payment. The completed Construction Schedule, including the Schedule of Values, shall be required for each Application for Payment. However, one initial provisional progress payment may be payable in the sole discretion of Architect if he determines Contractor is complying with this Paragraph 3.10 during the development of the Construction Schedule and Schedule of Values as required herein. However, no more than one Application for Payment shall be approved until all of the requirements of this Paragraph 3.10 have been met.

§ 3.10.10 RECOVERY SCHEDULE

§ 3.10.10.1 Should the updated Construction Schedule, at any time during Contractor's performance, show that Contractor is fourteen (14) or more days behind schedule for any Completion Date, Contractor shall prepare a recovery schedule at no cost to Owner (unless Owner is solely responsible for the event or occurrence which has caused the schedule slippage) explaining and displaying how Contractor intends to reschedule his Work in order to regain compliance with the Construction Schedule during the immediate subsequent pay period.

§ 3.10.10.2 If Contractor believes that all of the time can be recovered during the subsequent pay period, Contractor shall be permitted to prepare a recovery schedule as set forth below. However, if Contractor believes it shall take more than thirty (30) days to recover all of the lost time, he shall prepare and submit a request for revision to the

Construction Schedule and comply with all of the requirements of a schedule revision as set forth in this Subparagraph 3.10.10 and Subparagraph 3.10.11.

§ 3.10.10.3 Contractor shall prepare and submit to the Project Coordinator a limited duration recovery schedule, incorporating best available information from Subcontractors and others which shall permit return to Construction Schedule at the earliest possible time. Contractor shall prepare a recovery schedule to the same level of detail as the Construction Schedule for a maximum duration of one month. The recovery schedule shall be prepared in coordination with other Contractors.

§ 3.10.10.4 Within two (2) days after submission by the Contractor of a recovery schedule to Project Coordinator, Contractor and the Project Coordinator shall participate in a conference to review and evaluate the recovery schedule. Within two (2) days of the conference, Contractor shall submit the revisions necessitated by the review for Project Coordinator review and acceptance. Contractor shall use the accepted recovery schedule as his plan for returning to the Construction Schedule.

§ 3.10.10.5 Contractor shall confer continuously with the Project Coordinator to assess the effectiveness of the recovery schedule. As a result of this conference:

§ 3.10.10.6 If Project Coordinator determines Contractor is still behind schedule, Project Coordinator shall direct Contractor to prepare a schedule revision with the assistance of the Project Coordinator and comply with all of the requirements of a schedule revision as stated herein and the other requirements of the Contract Documents; provided, however, that nothing herein shall limit in any way the rights and remedies of Owner and Project Coordinator as provided elsewhere in the Contract Documents; or

§ 3.10.10.7 If Project Coordinator determines Contractor has successfully complied with provisions of the recovery schedule, Project Coordinator shall direct Contractor to return to the use of the accepted Construction Schedule.

§ 3.10.10.8 Nothing herein alters the obligation of Project Coordinator to resolve coordination and scheduling issues in dispute between and amongst Contractors.

§ 3.10.11 SCHEDULE REVISIONS

§ 3.10.11.1 Should Contractor desire to or be otherwise required under the Contract Documents to make modifications or changes in his method of operation, his sequence of Work or the durations of the Work activities in his Construction Schedule, he shall do so in accordance with the requirements of this Paragraph, Division 01 Section "Construction Progress Documentation", and schedules. Revisions to the accepted Construction Schedule must be presented to and reviewed by the Project Coordinator.

§ 3.10.11.2 Contractor shall submit requests for revisions to the Construction Schedule to the Project Coordinator, together with written rationale for revisions and description of logic for rescheduling Work and maintaining the dates for Substantial and Final Completion listed in the Contract Documents. Proposed revisions acceptable shall be incorporated into next update of the Construction Schedule. Separate contractors shall pay Owner for costs incurred by Project Coordinator for preparing the revised schedule.

§ 3.10.11.3 In all instances where a revision to the Construction Schedule will affect the construction activities of other Contractors, prior to the submission by Contractor of his proposed schedule revisions, he shall meet with and gain written acceptance of the Contractors to make the revisions which shall be evidenced by the signatures of said Contractors on the proposed schedule revisions. If accepted, the revisions, shall be binding upon Contractor and all separate Contractors on the Project.

§ 3.10.11.4 If the Project Coordinator or other Contractors do not comply with all the above requirements and time lines, the Owner reserves the right to deduct \$500.00 from the Contract amount for each day that Contractor does not comply. The aforesaid deduction shall be in the nature of liquidated damages and not a penalty as actual damages resulting from Contractor's failure to comply with the above requirements and timelines are impossible to determine. The Owner may also proceed with enforcing other requirements of the Contract Documents including Article 2.4.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's

responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.12.11 The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and 2 resubmittals. The Owner is entitled to obtain reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.14.3 Patching of exposed Work shall only be performed by skilled workers of the required trade.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises clean at all times of dirt, rubbish and debris resulting from the Work and shall remove all rubbish and debris in metal containers at the end of each Working day. The Contractor shall remove all rubbish cartons resulting from the installation of fixtures and equipment. If the premises are not kept clean at all times and if within 24 hours after verbal notice from the Owner the dirt, rubbish, and debris is not cleaned up by Contractor then Owner will arrange for such cleanup at the Contractor's expense. Prior to Substantial Completion of the Work the Contractor shall do the cleaning of the surfaces of all his installations as may be required by the various Specifications to the satisfaction of the Architect.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 In readiness for occupancy of the Owner, the Contractor, when directed by the Architect, shall thoroughly clean all portions of the Work to be occupied and all applicable material and equipment surfaces suitable for occupancy. Cleaning of windows and other glass in the Project is a contractual requirement.

§ 3.15.4 The General Contractor shall make provisions for and be personally responsible for removing all mud and debris from all vehicles and equipment leaving the construction site onto Municipal streets adjoining the Project site and shall remove any mud, debris and litter which may fall upon Municipal streets or adjacent properties. If the same is not removed and properly washed down within 24 hours after verbal notice from the Municipality or the Owner then in that event, said mud, debris and litter shall be removed from the street by the Owner at the Contractor's expense.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, any agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including loss of use resulting therefrom, but only to the extent caused in whole or in part by the negligent act or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations or indemnity which would otherwise exist as to a party or person described in this paragraph 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 In case of termination of employment of the Architect, the Owner shall appoint a successor Architect whose status under the Contract Documents shall be that of the former Architect.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment.

The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor or by defects and deficiencies in the Work.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.7.1 Architect's action on Shop Drawings will result in his making one of five notations on them, namely, NO EXCEPTION TAKEN, REVISE AND RESUBMIT, REJECTED/RESUBMIT, FURNISH AS CORRECTED or FURNISH AS CORRECTED/RESUBMIT. Such notations do not extend the responsibilities of the Architect beyond those described in 4.2.7.

§ 4.2.7.2 Architect's review period on any submittal shall be less than **14** days after receipt of the submittal form the Contractor. For submittals requiring subsequent review by more than one discipline, allow an additional 7 days review period for each subsequent discipline.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith. These provisions do not extend to deny normal discussion, recommendations, explanations, suggestions, approvals, rejections, and similar activity in pursuit of the Work of the project on an oral basis, such as at project meetings and otherwise at the Project site. In such instances the written minutes, correspondence, Shop Drawings Records, Architect's Supplemental Instructions and other written data shall govern over personal claims regarding statements made contrary to the written data. Interpretations of Contract Documents, to be effective for claim purposes or for justification as to proper procedure in performing the Work, must be obtained in writing before such claim is made or such Work begun.

§ 4.2.12.1 Written or graphic interpretations by the Architect will be considered as minor changes in the Work. No claims for additional time or money will be honored due to such interpretation. Any interpretations offered by the Architect that Contractor determines to affect Contract Sum or time shall be returned to the Architect within 5 days and will be treated as a Change Proposal Request. Provide complete substantiation of changes in Contract Time or Contract Sum as required for a Change Proposal Request.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract

Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor as soon as requested after Notice of Intention to Award, shall furnish a completed copy of Division 00 Document "Subcontractors and Major Materials Suppliers List" to the Owner through the Architect. List shall include the name of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. In all cases, this list shall be submitted no less than seven (7) days prior to a Subcontractor starting work. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection. Nothing herein shall obligate the Owner or Architect to conduct an investigation of any Contractor or Subcontractor.

§ 5.2.1.1 Not later than 30 days after the date of the Notice to Proceed, the Contractor shall furnish in writing to the Owner through the Architect the names of persons or entities proposed as manufacturers, fabricators or material suppliers for the products, equipment and systems identified in the Project Specifications and drawings and, where applicable, the name of the installing Subcontractor. **The Owner reserves the right to deduct \$500.00 from Contract amount for each additional day that all information is not furnished. The aforesaid deduction shall be in the nature of liquidated damages and not as a penalty as actual damages resulting from Contractor's failure to furnish the required information is impossible to determine.**

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. There shall be no adjustment in the Contract Sum or Contract Time because of such substitution.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.2 Where Contractor sublets portions of the Work, the entire responsibility for the subdividing of Work rests with the Contractor. The Owner and the Architect are not responsible for the manner of the subdivision of the Work and neither will enter into nor settle disagreements or disputes between Contractor and Subcontractors. The arrangement of Specifications and the manner of graphic illustration of Drawings are for convenience of reference and do not comprise any exacting method of subdividing Work for purposes of subcontracting, except where the Contract Documents require an undivided responsibility for certain Work.

§ 5.3.3 Contractor shall require each Subcontractor to (1) Inspect surfaces and job conditions before beginning Work at Project site, (2) Accept or cite necessary corrections in surfaces and job conditions before beginning Work at

Project site, and (3) Protect his own materials, equipment and Work from damage, injury or loss due to weather or due to Work of the Contractor, other Subcontractors, or other Contractors. The best means of protection shall be supplied, and removed when no longer required.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 Neither the Owner nor the Architect or its Consultants shall be responsible for the coordination of the Contractor's Work. Coordination of the Contractor's Work shall be governed by Division 01 Sections "Multiple Contract Summary" and "Project Management and Coordination."

§ 6.1.3.1 Reference subparagraph 3.3.7.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially

completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 Cost attributed to delays or improperly timed activities or defective construction shall be borne by the parties responsible therefore, excepting however, Owner and Architect who shall not be liable to any Contractor, Subcontractor or Sub-subcontractor for claims or damages of monetary or other nature caused by or arising out of delays contemplated or not contemplated at the signing of the Contract. The sole remedy against the Owner for delays shall be the allowance to a successful claimant of additional time for completion of Work. To the extent necessary to effectuate the terms and conditions of this subparagraph, the separate contractors are granted third party beneficiary status to this Contract between Owner and Contractor.

§ 6.2.4 The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.2.6 The Contractor shall indemnify and hold the Owner harmless from any claims or damages brought by a separate contractor arising out of actions or omissions of the Contractor, its Subcontractors or suppliers in performing their Work under the Contract Documents.

§ 6.2.7 Should the Contractor wrongfully cause damage to the Work or property of any separate contractor, the Contractor shall, upon due notice, promptly attempt to settle with the separate contractor by agreement, or otherwise to resolve the dispute. Such dispute shall not delay the completion of the Work. Work shall be continued by the separate contractor claiming damages at his expense subject to his right to recover damages. If such separate contractor sues the Owner or the Architect on account of any damage alleged to have been caused by the Contractor, the Owner or Architect shall notify the Contractor who shall defend such proceedings at the Contractor's expense, and if any judgment or award against the Owner or Architect arises therefrom the Contractor shall pay or satisfy it and shall reimburse the Owner or Architect for all attorneys' fees and court costs which the Owner, Owner's Representative or Architect has incurred.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4 Matters involving extra Work and changes in the Work are subject to the following provisions:

§ 7.1.4.1 Owner reserves the right to accept or reject Contractor's quotation of cost, and instances of more than one quotation, to accept one or more quotation or reject one or more or all quotations. Contractor may not make a charge of any kind regarding proposed extra Work or proposed changes in the Work that were not accepted.

§ 7.1.4.2 Contractor agrees that quotations for changes in the Work and for extra Work will not include charges

involving penalties or damages for assumed delays in the Work, charges for estimating, cancellation charges on prior rejected Work, and similar amounts which do not relate directly to costs of labor and material and equipment appurtenant to Work involved.

§ 7.1.4.3 Unless Contract Time must be unchanged and is so stated in Architect's Supplemental Instructions, extra time granted to Contractor because of extra Work or changes in the Work shall be final, without penalty regarding the essence of time in the Contract.

§ 7.1.4.4 No charges by Contractor for extra Work or changes in the Work, not claims on account thereof, shall be valid unless duly authorized in the procedure herein described. Written authority to perform extra Work or changes in the Work must be in possession of Contractor before such Work commences in order that Contractor's right to payment on account thereof may be valid.

§ 7.1.4.5 In order to facilitate checking of quotations for adjustments in the Contract Sum, all proposals, except as so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including, labor, materials and subcontracted. Labor and materials shall be itemized in the manner prescribed above. When major cost items are subcontracted, these costs shall be itemized also.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 The allowance for overhead and profit, included in the total cost to the Owner, shall not exceed a combined total of fifteen percent (15%). Overhead and profit shall include costs of premiums or all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work and additional

costs of supervision and field office personnel directly attributable to the change. The Contractor, shall limit its profit and overhead, when combined with that of its Subcontractors and Sub-subcontractors, to a total of fifteen percent (15%) of the value of the related Work. If the Work is paid for using a Contract allowance the cost of insurance and bonds will be deducted from the fifteen percent (15%) allowable for overhead and profit.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

§ 7.4.1 The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

§ 7.4.1.1 Minor changes to the Work shall be affected by meeting memos, or an Architect's Supplemental Instruction.

§ 7.4.1.2 The Work described therein shall be promptly executed in accordance with the Contract Documents. Proceeding with the Work indicates the Contractor's acknowledgment that there will be no change in the Contract Sum or the Contract Time.

§ 7.4.1.3 If it is the conclusion of the Contractor that the Work described therein requires an adjustment of the Contract Sum, or of the Contract Time, the Contractor shall issue a fully itemized proposal within five (5) Working days or shall notify the Architect in writing of the date by which such proposal shall be received. When the Work alters the Contract Time or the Contract Sum, the Work described therein shall not be executed without a Change Order signed by the Architect and Owner. Failure to issue a proposal or written notification to the Architect within the appropriate time shall indicate the Contractor's acknowledgment that there will be no change in the Contract Sum or the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending litigation; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 Notwithstanding anything to the contrary in the Contract Documents, an extension in the Contract Time, to the extent permitted under this paragraph 8.3, shall be the sole remedy of the Contractor against Owner or Architect for (1) delay in the commencement, prosecution or completion of the Work; (2) hindrance or obstruction in the performance of the Work; (3) loss of productivity; or (4) other similar claims (collectively referred to in this subparagraph as delays) whether or not such delays are foreseeable, unless a delay is caused by the acts of the Owner constituting active interference with the Contractor's performance of the Work, and only to the extent that such acts continue after the Contractor furnishes the Owner with written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages against Owner or Architect, in connection with any delay, including, without limitation, consequential damages, lost opportunity cost, impact damages or similar remuneration. The Owner's exercise or failure to exercise any rights or remedies under the Contract Documents (including without limitation, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work), regardless of the extent or frequency thereof, shall not be construed as active interference with the Contractor's performance of the Work.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 The Contractor shall submit to the Architect an itemized application for payment for operations completed in accordance with the Schedule of Values not later than the 25th day of each month for the Work of that month. The Owner shall make payment to the Contractor not later than 10 business days after the second regularly scheduled Plymouth Township Council meeting of the Owner following Architect's receipt of Application of Payment. Reference Division 01 Section "Payment Procedures."

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 Work applicable to the Contract Sum shall be kept separate from Work applicable to Change Orders. The Work of each shall contain a summary and a breakdown as stipulated by the Contract Documents.

§ 9.3.1.4 Contractor expressly waives any right to penalties, interest and attorney's fees pursuant to the prompt payment provisions of the Pennsylvania Commonwealth Procurement Code, 62 Pa. C.S. §3931 et seq.

§ 9.3.2 Payment on account of materials and equipment shall be made subject to the following:

§ 9.3.2.1 Materials Stored On Site. Materials properly stored at the construction site may be included in the Contractor's application for payment, subject to the following conditions: (1) All materials shall be stored in strict compliance with the manufacturer's recommendations in secure, dry, and where appropriate, temperature controlled enclosures; (2) Contractor shall provide property insurance covering materials stored at the construction site to the extent that Owner's property insurance does not provide coverage; (3) Contractor shall provide an accurate inventory of all materials included for payment with each application for payment. Contractor shall maintain the inventory until the materials are installed or otherwise incorporated into the Work; and (4) Payment for materials stored on the construction site shall be limited to the actual, invoiced cost to the Contractor, F.O.B. the construction site. Contractor shall warrant that all suppliers are promptly paid in full for all materials included for payment and that materials are not encumbered by any lien, claim or mortgage that would prevent the Owner from taking full possession of the materials. Contractor shall produce satisfactory evidence of same to Owner.

§ 9.3.2.2 Materials Stored Off Site. Materials stored off the construction site shall not be included for payment in the Contractor's application for payment unless prior approval of the Owner has been obtained. Payment for materials stored off the construction site shall be subject to the conditions in subparagraph 9.3.2.1 and the following additional conditions:

- .1 Contractor shall provide property insurance for the full cost of the materials stored off the construction site;
- .2 Contractor shall provide a bill of sale for the materials granting clear title to the materials to the Owner;
- .3 Contractor shall provide waivers of liens when applicable, encumbrances or claims relating to the bailment of the materials stored off site or as otherwise required by Owner;
- .4 Contractor shall provide Owner all information necessary for the filing of any notices under the Uniform Commercial Code relating to the materials stored off the construction site as may be required by Owner;

- .5 The materials stored off the construction site shall be clearly and conspicuously labeled so as to identify Owner's title to the materials and shall be segregated and not commingled with other materials at the storage location;
- .6 Contractor shall pay all storage costs, shall be responsible for any damage or deterioration of the materials while in storage or in transit to the construction site and shall pay the costs of inspection of the materials in storage by the Owner;
- .7 Contractor shall be responsible for and shall pay all costs of transportation of the materials to the construction site; and
- .8 Neither Owner's payment for materials stored off the construction site nor the transfer of title to Owner shall in any way reduce Contractor's liability for the complete installation and construction relating to said materials, the value of the materials or liability under any performance bond provided for the Project.

§ 9.3.2.3 No separate payment will be made for submittal preparation, unless approved by Architect.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;

- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.
- .8 failure to comply with government statutes, regulations and laws.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner. Contractor and each Subcontractor shall comply with the payment obligations of Section 3933 of the Pennsylvania Commonwealth Procurement Act, 62 Pa.C.S. § 3933.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 To ensure satisfactory completion of the Work under the Contract Documents, the Owner shall withhold retainage from each progress payment in the amount of ten percent (10%) of the amount due the Contractor until fifty percent (50%) of the Work is completed. When fifty percent (50%) of the Work is completed, one-half (½) of the amount retained by Owner shall be returned to Contractor provided the Architect approves the Application for Payment and provided further that the Contractor is making satisfactory progress and there is no specific cause for greater withholding. Thereafter, the Owner shall withhold retainage from each progress payment in the amount of five percent (5%) of the value of the Work completed based on monthly progress payment requests. However, in the event a dispute arises between Owner and a separate contractor, which dispute is based upon increased costs

claimed by the separate contractor occasioned by delays or other actions of the Contractor, additional retainage in the sum of one and a half (1-1/2) times the amount of any possible liability may be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved unless the Contractor furnishes a bond satisfactory to Owner to indemnify Owner against the claim. All money retained by Owner will be withheld from Contractor until Substantial Completion of the Project.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.7.1 If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within ten (10) business days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven (7) days after the date established in the Contract Documents the amount certified by the Architect, then the Contractor may, upon seven (7) additional days written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable cost of shut down and start up.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the entire Work or the Work of a separate Phase (as defined in Division 01 Section "Summary" or on Phasing Drawings) is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected (punch list) along with an application by the Contractor for Certification of Substantial Completion by the Architect. The Contractor shall proceed to promptly complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list of items to be completed or corrected (Punch List) and Application for Certification of Substantial Completion, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete, Architect will conduct said inspection within thirty (30) days of receipt of the application of Contractor for Certification of Substantial Completion. If the Architect's inspection discloses any item, whether included in the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification of the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.3.1 The Architect will perform no more than **two [2]** inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish

responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion or Contract Documents. If it is required, because of Contractor's inability to complete a comprehensive list of items to be completed or corrected as stipulated in subparagraph 9.8.2, the Architect or any of its consultants or representatives shall prepare such punch list(s) and the Contractor will be responsible for professional fees and services of the Architect and/or consultants incurred in this regard. Such costs will be back charged to Contractor and deducted from any existing retainage or subsequent Application for Payment.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.8.6 In no case shall the time established for the completion and correction of items on the list extend beyond sixty (60) days after Certification of Substantial Completion, except for delay beyond the Contractor's control. The Contractor shall pay for all architectural and consultant services incurred thereafter due to the failure of Contractor to complete and / or correct the Work on the list or to submit documentation and items required for final completion and final payment. Payment for additional architectural and consultant services shall be deducted from the Contract amount.

§ 9.8.7 Upon Substantial Completion of the Work or designated portion thereof, application by the Contractor and certification by the Architect, the Owner, shall within forty-five (45) days thereof, make Payment to the Contractor in the full Contract Sum less one and one half (1-1/2) time such amount that is required to complete and / or correct any then remaining items, which amount shall be certified by the Architect.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect. The Contractor shall not withhold Partial Occupancy or Use from the Owner due to failure by the Contractor to complete the Work in accordance with the Contract Documents in the time stipulated in the Agreement and approved Change Orders for extension of time.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation

that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.1.1 The Contractor shall perform and complete his Work according to the Contract Documents without fault or defect of any kind. In absence of more specific directives, and insofar as applicable the Work shall:

- .1 Be completed in a first-class manner;
- .2 Be placed in a thoroughly clean and unmarred condition.
- .3 Be checked out in a step-by-step manner to be certain that all fastenings, controls, valves, safety devices, operating devices and other required appurtenance have been provided in accordance with the Contract Documents.
- .4 Be free of previously condemned or rejected parts be properly restored to the extent thereof; and
- .5 Be balanced for proper operation wherever adjustments for balancing may exist in the Work.

§ 9.10.1.2 The Architect will perform no more than **two [2]** inspections to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

§ 9.10.1.3 The Architect shall make final inspection within thirty (30) days following receipt of the Contractor's request for final inspection and final Application for Payment.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment. or
- .5 Matters arising following such payment which were not within the reasonable contemplation of Owner when payment was made.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11 LIQUIDATED DAMAGES

§ 9.11.1 Actual damages for delay in the time of completion are impossible of determination. Accordingly, each Contractor shall be liable for, and shall pay to the Owner as fixed, agreed and liquidated damages, the sum or sums indicated for each calendar day (Sundays and holidays included) which the actual time of Substantial Completion shall be delayed beyond the time of completion indicated in the Form of Agreement.

§ 9.11.2 In addition, Contractor shall be liable for, and shall pay to Owner as fixed, agreed and liquidated damages, the sum or sums indicated for each calendar day (Sundays and holidays included) which the actual time of Final Completion, including completion or correction of punch list items, shall be delayed beyond the time of completion indicated in Subparagraph 9.11.7 below.

§ 9.11.3 The Owner shall have the right to deduct the total amount of any fixed, agreed and liquidated damages for which the Contractor may be liable from any moneys otherwise due to the Contractor under the Contract, including any retainage held by the Owner.

§ 9.11.4 The surety upon the Performance Bond furnished by the Contractor shall be liable for any fixed, agreed and liquidated damages for which the Contractor may be liable under this paragraph 9.11, to the extent that the Contractor shall not make settlement therefore with the Owner.

§ 9.11.5 The Contractor and the Contractor's Surety shall be liable for and shall pay the Owner the sums hereinafter stipulated as liquidated damages for failure to provide substantially complete Work within time limits indicated in the Form of Agreement and for failure to complete or correct all items on the Comprehensive List of Items to be Completed or Corrected ("Punch List") within the time limit indicated below.

§ 9.11.6 Liquidated damages for failure to meet Substantial Completion for the entire Work shall be calculated at the following rates for each calendar day of delay until the Work is substantially complete.

Contract	Damages
General Construction	Five Hundred Dollars (\$500.00)
Plumbing	Three Hundred Dollars (\$300.00)
Mechanical	Three Hundred Dollars (\$300.00)
Electrical	Three Hundred Dollars (\$300.00)

§ 9.11.7 Liquidated damages for failure to complete or correct "Punch List" items shall be calculated at the following rates indicated in the Form of Agreement for each calendar day of delay beyond thirty (30) calendar days after issuance of the Certificate of Substantial Completion until Work for corrections are complete or resolved to the satisfaction of the Owner.

Contract	Damages
General Construction	Two Hundred Fifty Dollars (\$250.00)
Plumbing	Two Hundred Fifty Dollars (\$250.00)
Mechanical	Two Hundred Fifty Dollars (\$250.00)
Electrical	Two Hundred Fifty Dollars (\$250.00)

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.1.1 Contractor shall provide a written site/project specific safety plan.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;

- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter. The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services and shall comply with all reasonable recommendations of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean and all combustible rubbish shall be promptly removed from the Project site.

10.2.9 The Contractor shall at all times protect excavations, trenches, buildings and materials from rainwater, ground water, back up or leakage of sewers, drainage or other piping, and from water of any other origin and shall remove promptly any accumulation of water. Contractor shall provide and operate all pumps, piping and other equipment necessary to this end.

10.2.10 The Contractor shall remove snow or ice which may result in damage, delay or hazardous conditions.

10.2.11 The Contractor shall take all precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner, whether forming part of the Work, located within those areas of the Project to which the Contractor has access. The Contractor shall have full responsibility for the security of such property of the Owner located in such areas and shall reimburse the Owner for

any such loss, damage or injury, including Owner's deductible on Builder's Risk Insurance except such as may be directly caused by agents or employees of the Owner.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) or other hazardous or toxic substance which has not been rendered harmless, the Contractor shall immediately stop the Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected areas shall not thereafter be resumed, if in fact the material is asbestos or polychlorinated biphenyl (PCB) or other hazardous or toxic substance and has not been rendered harmless except as authorized by any governmental agency having jurisdiction over such matter (e.g. DEP, EPA...) and upon written recommendation of a properly licensed environmental consultant retained by Owner. The Work in the affected areas shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB) or other hazardous or toxic substance, or when it has been rendered harmless and removed, in accordance with any required determination of a governmental agency having jurisdiction over such matters and upon the written recommendation of a properly licensed environmental consultant retained by Owner. The Contract Time shall be extended appropriately. Contractor shall not be entitled to any compensation or recovery of any damages, in connection with any delay, as more fully set forth in Subparagraph 8.3.3.

§ 10.3.2 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Work in the affected area if in fact the material is asbestos or polychlorinated biphenyl (PCB) or other hazardous or toxic substance and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused in whole or in part by negligent acts or omissions of the Owner. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph 10.3.3.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall not commence Work until the Contractor has obtained at the Contractor's own expense all of the insurance as required hereunder and such insurance has been approved by the Owner; nor shall the Contractor allow any Subcontractor to commence work on any subcontract until all insurance required of the Subcontractor has been so obtained and approved by the Contractor. Approval of insurance required of the Contractor will be granted only after submission to the Owner of original certificates of insurance signed by authorized representatives of the insurers or, at the Owner's request, certified copies of the required insurance policies.

§ 11.1.2 Insurance as required hereunder shall be in force throughout the term of the Contract and for two years after final acceptance of the Project by Owner in accordance with 11.3.1.1.iv. Original certificates signed by authorized representatives of the insurers or, at the Owner's request, certified copies of insurance policies, evidencing that the required insurance is in effect, shall be maintained with the Owner throughout the term of the Contract and for two years after final acceptance of the Project by Owner.

§ 11.1.3 The Contractor shall require all Subcontractors to maintain during the term of the Contract commercial general liability insurance, business auto liability insurance, workers compensation and employers liability insurance, and umbrella excess or excess liability insurance to the same extent required of the Contractor in 11.3.1.1, 11.3.1.2, 11.3.1.3 and 11.3.1.4 unless any such requirement is expressly waived or amended by the Owner in writing. The Contractor shall furnish Subcontractors' certificates of insurance to the Owner immediately upon request.

§ 11.1.4 All insurance policies required hereunder shall be endorsed to provide that the policy is not subject to cancellation or non-renewal until sixty (60) days prior written notice has been given to the Owner.

§ 11.1.5 No acceptance and/or approval of any insurance by the Owner shall be construed as relieving or excusing the Contractor or the Contractor's Surety from any liability or obligation imposed upon either or both of them by the provisions of this Contract.

§ 11.1.6 If the Contractor does not meet the insurance requirements of this Contract, the Contractor shall forward a written request to the Owner for a waiver in writing of the insurance requirement(s) not met or approval in writing of alternate insurance coverage, self-insurance, or group self-insurance arrangements. If the Owner denies the request, the Contractor must comply with the insurance requirements as specified in this Contract.

§ 11.1.7 All required insurance coverages must be underwritten by insurers allowed to do business in the Commonwealth of Pennsylvania and acceptable to the Owner. The insurers must also have a policyholders' rating of "A-" or better, and a financial size of "Class VII" or better in the latest evaluation by A. M. Best Company, unless Owner grants specific approval for an exception. The Owner hereby grants specific approval for the acquisition of workers compensation and employers liability insurance from the State Workers' Insurance Fund (SWIF) of Pennsylvania.

§ 11.1.8 Any deductibles or retentions in excess of \$10,000 shall be disclosed by the Contractor, and are subject to Owner's written approval. Any deductible or retention amounts elected by the Contractor or imposed by the Contractor's insurer(s) shall be the sole responsibility of the Contractor.

§ 11.1.9 Any and all return premiums and/or dividends for insurance or coverage directly charged to the Owner by the Contractor in connection with this Contract shall belong to and be payable to the Owner.

§ 11.1.10 If the Owner is damaged by the failure or neglect of the Contractor to purchase and maintain insurance as described and required herein, without so notifying the Owner, then the Contractor shall bear all reasonable costs properly attributable thereto.

§ 11.1.11 The Contractor is further required to ensure that any hazardous waste facility selected for the treatment, storage or disposal of asbestos abated and removed by the Contractor must comply with all applicable state and/or Federal minimum financial responsibility requirements.

§ 11.2 Owner's Liability Insurance

§ 11.2.1 The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance, or solely at the Owner's option, the Owner may self-insure the Owner's liability exposures.

§ 11.3 Contractor's Liability Insurance

§ 11.3.1 The Contractor shall purchase and maintain the following insurance coverages which will insure against claims which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. Insurance shall be written for not less than the limits specified below or required by law, whichever is greater.

§ 11.3.1.1 Commercial general liability insurance or its equivalent for bodily injury, personal injury and property damage including loss of use, with minimum limits of:

- \$1,000,000 each occurrence;
- \$1,000,000 personal and advertising injury;
- \$2,000,000 general aggregate; and
- \$2,000,000 products/completed operations aggregate.

The insurance shall include coverage for all of the following:

- i. General aggregate limit applying on a per project basis;
- ii. Liability arising from premises and operations;
- iii. Liability arising from the actions of independent contractors;
- iv. Liability arising from products and completed operations with such coverage to be maintained for two years after completion of the Work;
- v. Contractual liability including protection for the Contractor from bodily injury and property damage claims arising out of liability assumed under this Contract; and
- vi. Liability arising from the explosion, collapse, or underground (XCU) hazards.

§ 11.3.1.2 Business auto liability insurance or its equivalent with a minimum limit of \$1,000,000 per accident and including coverage for all of the following:

- i. Liability arising out of the ownership, maintenance or use of any auto; and
- ii. Automobile contractual liability.

§ 11.3.1.3 Workers compensation insurance or its equivalent with statutory benefits as required by any state or Federal law, including standard "other states" coverage; employers liability insurance or its equivalent with minimum limits of:

- \$100,000 each accident for bodily injury by accident;
- \$100,000 each employee for bodily injury by disease; and
- \$500,000 policy limit for bodily injury by disease.

§ 11.3.1.4 Umbrella excess liability or excess liability insurance or its equivalent with minimum limits of:

- \$5,000,000 per occurrence;
- \$5,000,000 aggregate for other than products/completed operations and auto liability; and
- \$5,000,000 products/completed operations aggregate

and including all of the following coverages on the applicable schedule of underlying insurance:

- i. Commercial general liability;
- ii. Business auto liability; and
- iii. Employers liability.

§ 11.3.1.5 Contractors pollution liability insurance or its equivalent for bodily injury, property damage, including loss of use, and clean up costs on and off the Project site, with minimum limits of:

- \$1,000,000 each pollution incident; and
- \$2,000,000 annual aggregate.

§ 11.3.1.6 Not Used.

§ 11.3.1.7 Owner and Owner's elected and appointed officials, officers, consultants, agents and employees, the Architect and its consultants, the Construction Manager and the Commonwealth of Pennsylvania § 11.5 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.6 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.1.2 It shall be clearly understood that "Punch List" items and "Maintenance" items are different categories. All items called for by the Contract Documents to be installed, supplied or otherwise incorporated into the Project, but which, at the time of inspection, are found not to be in compliance with the Contract Documents, shall be considered punch list items. All items which, at any time after completion inspection, are found not to be in compliance with the Contract Documents, shall be considered maintenance items to be corrected by the Contractor under the one-year warranty terms of the Contract.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.2.4 This obligation under this Subparagraph 12.2.2 shall survive acceptance of the Work under the Contract and termination of the Contract. Nothing contained in this paragraph shall decrease the liability of Contractor and/or Surety as set forth in the Performance Bond.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.3.1 If the Contractor fails to correct non-conforming Work within a reasonable time, the Owner may correct it in accordance with Paragraph 2.4. If the Contractor does not proceed with correction of such non-conforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and store the salvable materials or equipment at the Contractor's Expense. If the Contractor does not pay costs of such removal and storage within ten days' after written notice, the Owner may upon ten additional days' written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Architect's services and expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments entered thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference due the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.1.1 The Contract shall be governed by the law of the Commonwealth of Pennsylvania.

§ 13.1.2 **DISCRIMINATION PROHIBITED:** According to Section 62 Pa. C.S.A. § 3701, the Contractor agrees that:

§ 13.1.2.1 In the hiring of employees for the performance of Work under this Contract, or any sub-contract, no Contractor, Subcontractor, or any person acting on behalf of the Contractor or Subcontractor shall, by reason of gender, race, creed or color, discriminate against any citizen of this Commonwealth who is qualified and available to perform the Work to which the employment relates.

§ 13.1.2.2 No Contractor, Subcontractor, or any person acting on their behalf, shall in any manner discriminate against or intimidate any employee hired for the performance of Work under this Contract on account of gender, race, creed or color.

§ 13.1.2.3 The Contract may be canceled or terminated by the government agency, and all money due or to become due under the Contract may be forfeited, for violation of the terms or conditions of that portion of the Contract.

§13.1.3 HUMAN RELATIONS ACT

§13.1.3.1 The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 744) (43 P.S. Section 951, et .seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious

creed, ancestry, age, sex, national origin, handicap or disability by employers, employment agencies, labor organizations, Contractors and others. The Contractor shall agree to comply with the provisions of this Act as amended that is made part of this specification. Your attention is directed to the language of the Commonwealth's non-discrimination clause in 16 PA. Code 49.101.

§13.1.4 PROVISION FOR THE USE OF STEEL AND STEEL PRODUCTS MADE IN THE U.S.

§13.1.4.1 In accordance with Act 3 of the 1978 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the Contract, only those produced in the United States as defined therein shall be used or supplied in the performance of the Contract or any Subcontracts there under.

§13.1.4.2 In accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States. Act 144 of 1984 further defines "steel product" to include machinery and equipment. The act also provides clarifications and penalties.

§ 13.1.5 NO CASH ALLOWANCES

§13.1.5.1 Cash allowances are not included in these bid specifications.

§ 13.1.6 RIGHT TO KNOW ACT

§13.1.6.1 Contractor shall comply with all terms and conditions of the Pennsylvania Right to Know Act, Act No. 159 of 1984, 35 P.S. §7301 et. Seq., and its implementing regulations.

§13.1.7 TRADE PRACTICES ACT

§13.1.7.1 In accordance with the Trade Practices Act of July 23, 1968, P.L.686 (71 P.S. § 773:101 et seq.) the Contractor shall not use or permit to be used in the work any aluminum or steel products made in the following countries: Argentina; Brazil; South Korea; and Spain.

§13.1.8 NOT USED

§13.1.9 BLASTING

§13.1.9.1 When blasting has been authorized in writing, comply with the following: All storage, handling and use of explosives for the purpose of excavation shall be performed by the Contractor in strict accordance with Title 25, Chapter 211, of the Pennsylvania Code, as well as any applicable local regulations. Strict control of blasting must be maintained to prevent fly rock, and blasting mats must be used where conditions dictate their use. When blasting within 25 feet of utility lines, such blasting must be performed according to Section 211.52 of Title 25 of the Pennsylvania Code.

§13.1.10 SITE EXCAVATION

§13.1.10.1 Contractor agrees that, not less than three (3) business days or for complex projects, ten business days, prior to beginning excavation or demolition Work as defined in Act 181 of December 2006 of the Commonwealth of Pennsylvania, amending Act 287 of December 10, 1974, he shall contact the One Call System at 811 or 1-800-242-1776 and request the information required by Section 5 of the Act and shall inform each excavator employed at the Project site of the information received with respect to location of underground installations. Contractor shall agree to report immediately to the user of the underground installations and to the Owner and Architect, any break in its lines, or dent, gouge, groove or other damage to such lines, their coating or cathodic protection, made or discovered in the course of the excavation or demolition Work. Contractor shall comply with all other provisions of the Act, as amended including conducting pre-construction meeting when necessary and paying all associated fees.

§13.1.11 PREVENTION OF ENVIRONMENTAL POLLUTION

§13.1.11.1 Section 3301 of the Pennsylvania Commonwealth Procurement Code requires that all Invitations for Bids and requests for proposals for construction projects issued by any governmental agencies shall set forth any provision of Federal and State statutes, rules, and regulations dealing with prevention of environmental pollution and the preservation of public natural resources that affect the Project. In this regard, a Notice of said provisions prepared by the Pennsylvania Department of Environmental Resources under subsection 4.10 of the Code can be viewed at: <http://www.depweb.state.pa.us/oa/cwp/view.asp?a=1365&Q=482058&oaNav=324#410>

Contractor is hereby notified and agrees to comply with the terms of all statutes, rules and regulations enumerated in said Notice. Where any identified environmental statute, rule and/or regulation, has been revised, amended, supplemented, repealed and/or supplanted, Contractor shall comply with such statute, rule and/or regulation as so

modified. Notwithstanding the foregoing, failure to include any applicable environmental statute, rule and/or regulation shall not relieve Contractor of its obligation to comply with same.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.5.1 Progress payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate of 4% per annum, simple interest. Interest on final payment shall be governed by Section 3941 of the Pennsylvania Commonwealth Procurement Act, 62 Pa.C.S. § 3941.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.
- .5 If the Contractor is adjudged bankrupt or files for bankruptcy or creditor protection under the laws of this United States, Contractor shall provide Owner with thirty (30) days' written notice before filing.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and

- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.2.5 In the event the Owner terminates the Contract for cause, and such cause is determined to be valid and justified in addition and without prejudice to all other rights, remedies and relief which the Owner may obtain under this Agreement and pursuant to the law, the Owner shall be entitled to payment by Contractor of all reasonable professional fees, including attorneys' fees, architectural fees, engineering fees, and consulting fees (together with reasonable expenses and disbursements incurred in connection therewith) which the Owner may incur in connection with any legal proceedings or action (including professional fees rendered in anticipation of such proceedings or action). This provision shall create no rights to the Contractor or to any other person or entity for payment of such costs or expenses.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of termination or suspension (pursuant to paragraph 14.3) for the Owner's convenience, the Contractor shall (1) cease operations as directed by the Owner in the Notice, (2) take actions necessary, or that the Owner may direct, for the protection and preservation of the Work, and (3) except for Work directed to be performed prior to the effective date of suspension or termination stated in the Notice, suspend or terminate as the case may be, all existing Subcontracts and purchase orders and enter into no further Subcontracts and purchase orders.

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis in Subparagraph 14.1.3.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The

responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 10 days after occurrence of the event giving rise to such Claim or within 10 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. An additional claim made after the initial claim has been implemented by Change Order will not be considered unless submitted in a timely manner.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of the probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary the extension of time is the sole recourse.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction. No extension of time shall be granted because of seasonal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the Contractor, whether occurring within the time originally scheduled for completion or within the period of any extension granted. Any additional costs of operations or conditions shall be the responsibility of the Contractor.

§ 15.1.7 Waiver of Claims for Consequential Damages

Contractor waives claims against Owner for consequential damages arising out of or relating to this Contract, including, but not limited to, damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation and for loss of profit, except anticipated profit arising directly from the Work.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 Paragraph Deleted.

§ 15.2.9 To the extent any Contractor asserts frivolous claims or asserts claims in bad faith, and the Owner incurs any legal fees, professional fees, expert witness fees, expenses, costs (including, but not limited to, employee cost), the Contractor shall be liable for such fees, expenses or costs and the Contractor shall reimburse the Owner for such legal fees, professional fees, costs and expenses immediately upon demand by the Owner. This provision shall create no right to the Contractor of any other person or entity for payment of such costs or expenses.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to non-binding mediation, but only upon mutual agreement of the Owner and Contractor.

§ 15.3.2 If the Owner and Contractor mutually agree to proceed to non-binding mediation, they shall agree upon a forum for the mediation.

§ 15.3.3 Paragraph Deleted.

§ 15.3.4 Paragraph Deleted.

§ 15.4 Dispute Resolution

§ 15.4.1 If the Owner and Contractor do not mutually agree to proceed to non-binding mediation, or if the parties do not resolve their dispute in non-binding mediation, then the parties agree to have any claims, disputes or other matters in question arising out of or relating to this Agreement, decided by the Court of Common Pleas of Montgomery County, Pennsylvania. The parties hereby submit to the exclusive jurisdiction of said Court and further agree that the venue of said Court shall be proper in all respects. To the extent the Contractor pursues a claim or litigation against the Owner and the Owner prevails, partially or completely, on any or all of its own claims or defenses to the Contractor's claims, leaving the Contractor with less than fifty percent (50%) recovery, the Contractor will be liable for any and all legal fees, professional fees, expert witness fees, costs or expenses of the Owner, as well as the true cost of any of the Owner's employees' time, associated with analyzing any claim, pursuing litigation or defending the claim or litigation and the Contractor shall reimburse the Owner for such legal fees, expert witness fees, professional fees, costs and expenses immediately upon demand by the Owner. This provision shall create no right to the Contractor of any other person or entity for payment of such costs or expenses.

§ 15.4.1.1 Paragraph Deleted.

§ 15.4.2 If the Owner incurs any legal fees, professional fees, or other costs or expenses, pursuing claims or litigation against the Contractor and the Owner prevails on more than 50% of the claims or amounts claimed, then the Contractor shall be responsible to the Owner for the Owner's legal fees, professional fees, expert witness fees, or other costs or expenses incurred as a result of the dispute. Those amounts will be deducted, to the extent available, from any amount due the Contractor. If the amount due the Contractor is not sufficient to cover such cost, the Contractor shall pay the difference to the Owner within seven (7) days of receipt of the Owner's invoice for such legal fees, expert witness fees, professional fees, or other cost or expenses.

§ 15.4.3 Paragraph Deleted.

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SUPPLEMENTAL CONDITIONS

A. Interpretations

No verbal interpretations of the meaning of the Specifications or other contract documents will be made to any bidder. Any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be mailed to all parties of record receiving such Specifications. Failure of any bidder to receive any such addendum shall not relieve the bidder from any obligations under his bid as submitted, nor from any obligations to conform to the requirements herein set forth.

B. Assignment

Neither this contract, nor any portion thereof, may be assigned, sublet or transferred to any person, firm or corporation, except upon the written consent or approval of the Township.

C. Indemnification

The contractor shall indemnify, save harmless, and defend the Township, its officers, agents, servants, and employees from and against any and all suits, actions, legal proceedings, claims and demands, and pay all damages, court costs, expenses and attorney's fees incident thereto and pertaining to any work done in the performance of this contract or omission of the contractor, its officers, agents, servants and employees.

D. Extra Work or Materials

Contractor shall not be entitled to demand or receive payment for any work as “extra work” or “extra materials” unless ordered in writing by the Township, at a price agreed upon in writing by the contractor and the Township prior to its commencement or delivery.

E. Contractor Default

In the event of the failure of the contractor to provide the equipment and do the work required under the contract or to comply with any of the terms of the contract, the Township may upon 48 written hours notice by certified mail, return receipt requested, terminate the contract and proceed as set forth in the specification in the event of such termination at the cost and expense of the contractor. The Township shall have the power to determine, in its sole discretion, that there has been a default or violation by the contractor as to any of the provisions of the contract or any part of the contract documents.

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ation by the contractor as to any of the provisions of the contract or any part of the contract documents.

AA. Prevailing Minimum Wage

Contractor agrees to pay workman employed in the performance of this contract not less than the prevailing minimum wage rates as determined for various crafts or classifications by the applicable government agency, where required by law. No payments shall be made for work until the appropriate Payroll Certification for the period covered in the request for payment have been received and approved by the Township, where required by law.

BB. Contractor Default

In the event of the failure of the Contractor to provide the equipment and do the work required under the Contract or to comply with any of the terms of the Contract, the Township may, upon 48 written hours notice by certified mail, return receipt requested, terminate the Contract and proceed as set forth in the Specifications in the event of such termination, at the cost and expense of the Contractor. The Township shall have the power to determine, in its sole discretion, that there has been a default or violation by the Contractor as to any of the provisions of the Contract or any part of the Contract Documents.

CC. Forbearance Not a Waiver

Any forbearance by the Township in executing any right or remedy under the Contract, or otherwise afforded by applicable law, shall not be a waiver of or preclude the exercise of any such right or remedy by the Township.

DD. Rejection of Materials and Work Received

Payments made under this Contract shall not bind the Township to the acceptance of any materials furnished or work performed.

EE. Liquidated Damages

In addition to any other remedy available to the Township under this Contract under law or at equity, in the event the Contractor shall fail to perform all of the terms of this Contract by the time of completion referred to herein, then and in that event the Contractor agrees to pay the sum indicated in Article 9.11 of AIA Document A201-2017, General Conditions of the Contract for Construction, for each calendar day that the Contractor fails to meet the requirements of Substantial Completion. This payment shall be considered as liquidated damages, and not a penalty. The total liquidated damages shall be deducted from the remaining payment to Contractor under the Contract. If the total liquidated damages is in excess of the amount remaining to be paid to Contractor, the total liquidated damages shall be paid by Contractor to Township within thirty (30) days and any late payment shall be paid together with interest at the rate of one (1 %) percent per month, and all collection costs, attorney fees and court costs incurred by the Township.

FF. Statutory Compliance

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Compliance with each of the following statutes, and any and all rules and regulations adopted thereunder, is required where applicable:

- (1) The Clean Air Act, 42 U.S.C. § 7401, *et seq.*
- (2) The Clean Water Act, 33 U.S.C. § 1251, *et seq.*
- (3) The Resource Conservation and Recovery Act, 42 U.S.C. § 6901, *et seq.*
- (4) The Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601, *et seq.*
- (5) The Toxic Substances Control Act, 15 U.S.C. § 2601, *et seq.*
- (6) The Underground Storage Tank Program, 42 U.S.C. § 6991, *et seq.*
- (7) The Wetlands Program, 33 U.S.C. § 1334.
- (8) “Environmental Amendment” to the Pennsylvania Constitution, Article I, Section 27.
- (9) The Clean Streams Law, 35 P.S. § 691.1, *et seq.*
- (10) The Solid Waste Management Act, 35 P.S. § 6018.101, *et seq.*
- (11) The Air Pollution Control Act, 35 P.S. § 4001, *et seq.*
- (12) The Storage Tank and Spill Prevention Act, 35 P.S. § 6021.101.
- (13) The Hazardous Sites Clean-Up Act, 35 P.S. § 6020.101.
- (14) The Dam Safety and Encroachments Act, 32 P.S. § 693.1, *et seq.*
- (15) The Flood Plain Management Act, 32 P.S. § 679.101, *et seq.*
- (16) The Storm Water Management Act, 32 P.S. § 680.1, *et seq.*
- (17) The Pennsylvania Safe Drinking Water Act, 35 P.S. § 721.1, *et seq.*
- (18) The Sewage Facilities Act, 35 P.S. § 750.1, *et seq.*
- (19) The Pennsylvania Municipal Waste Planning Recycling and Waste Reduction Act, 53 P.S. 4000.101, *et seq.*
- (20) 25 Pennsylvania Code, Chapter 102 (Erosion and Sedimentation Control).
- (21) 25 Pennsylvania Code, Chapters 271 to 285 (Municipal Waste Regulations).
- (22) Land Recycling and Environmental Remediation Standards Act, 35 P.S. § 6026.101, *et seq.*
- (23) Pennsylvania Act 287, as amended by Act 181 of 2006, requiring, among other things, (a) the Pennsylvania One Call System is utilized; (b) a drawing requiring excavation or demolition in a site within a political subdivision to show upon the drawing the approximate location and type of each underground utility line or pipe; and, (c) the contractor serving as an excavator who intends to perform excavation or demolition work on a site within a political subdivision, to ascertain the location and type of utility lines and pipes at each, and to notify the utility companies three (3) working days in advance of performing the excavation or demolition.
- (24) The Pennsylvania Construction Code Act of November 10, 1999 (P.L. 491, No. 45, known as the Pennsylvania Construction Code Act, 35 P.S. § 7210.101 *et seq.*) as implemented by the Department of Labor & Industry regulations, 34 Pa. Code, Chapters 401, 403 and 405.
- (25) Federal Occupational Safety and Health Act of 1970 (O.S.H.A.), which includes regulations to assure safe and healthy working conditions. Compliance includes specific records and reporting. Contractor shall incorporate in contract specifications contractor’s specific responsibility to comply with regulations of the Act and to perform reporting and recording requirements. O.S.H.A. applies to all construction projects however funded, and supercedes any local or state regulations related to safe and healthy working conditions.

GG. Non-Discrimination

In the hiring of employees for the performance of work under this Contract or any subcontract, the Contractor or subcontractor or any person acting on behalf of the Contractor or subcontractor shall not, by reason of gender, race, creed or color, discriminate against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.

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The Contractor, subcontractor and any person on their behalf shall not in any manner discriminate against or intimidate any employee hired for his/her performance of work under this Contract on account of gender, race, creed or color.

The Contract may be canceled or terminated by Plymouth Township and all money due or to become due under the Contract may be forfeited for a violation of the terms or conditions of this portion of the Contract.

HH. Retainage

Plymouth Township shall withhold from the Contractor the sum of ten (10%) percent of the amount due the Contractor, until fifty (50%) percent of the Contract is completed. When the Contract is fifty (50%) percent completed, one-half of the amount retained by Plymouth Township shall be returned to the Contractor, provided that the architect or engineer responsible for supervision approves the application for payment. The application for payment shall not be approved unless the Contractor is making satisfactory progress and there is no specific cause for greater withholding. The sum withheld by Plymouth Township from the Contractor after the contract is fifty (50%) percent completed shall not exceed five (5%) percent of the value of completed work based on monthly progress payment requests. In the event a dispute arises between Plymouth Township and any contractor or prime contractor, which dispute is based upon increased costs claimed by one contractor or prime contractor occasioned by delays or other actions of another contractor or prime contractor, additional retainage in the sum of one and one-half times the amount of any possible liability may be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved unless the contractor causing the additional claim furnishes a bond satisfactory to Plymouth Township to indemnify Plymouth Township against the claim. All money retained by Plymouth Township may be withheld from the contractor until substantial completion of the Contract.

the Contract.
the Contract.

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SUBCONTRACTORS LIST

In the event the Prime Contractor intends to do all of the subcontracted work, his company MUST BE LISTED FOR EACH CATEGORY.

If awarded this contract, we _____
(name of bidder)
will award subcontracts to the following subcontractors.

Where we intend to perform the work with our own forces, our name is listed as subcontractor.

Failure to list subcontractors shall be cause for rejection of your proposal.

<u>Subcontractor/Trade classification</u>	<u>Name & Address</u>	<u>Federal I.D.#</u>
_____	_____	_____
	_____	_____

_____	_____	_____
	_____	_____

_____	_____	_____
	_____	_____

_____	_____	_____
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_____	_____	_____
	_____	_____

_____	_____	_____
	_____	_____

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ as Principal, and _____ as Surety, are hereby held and firmly bound unto _____ as OWNER in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns. Signed, this _____ Day of _____, 20____.

The Condition of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a Contract in writing, for the

NOW, THEREFORE,

- A. If said BID shall be rejected, or
- B. If said BID shall be accepted and the Principal shall execute and deliver a Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated. The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

A New Fire Station for
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IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)

Principal

SURETY

BY:

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located. The bonds must be executed by a surety company that is rated A by A.M. Best & Co. There will be no exceptions.

A New Fire Station for
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DOCUMENT 00 3100 – AVAILABLE PROJECT INFORMATION

1.1 INFORMATION AVAILABLE TO BIDDER

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Information available to bidders consists of the following:
 - 1. Geotechnical Data.
 - 2. Existing Conditions Information.
 - 3. Existing Hazardous Material Information.
 - 4. Flow Test Information.
 - 5. Grant Information and Forms.

1.2 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. A geotechnical investigation report for Project, prepared by David Blackmore and Associates, Inc., dated November 15th, 2024, is available for viewing as appended to this Document.
 - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. The Owner or Architect will not be responsible for interpretations or conclusions drawn from the data. The Owner and Architect are not responsible for the accuracy or completeness of the information given in the soils report.
 - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- D. Phase 1 Environmental Site Assessment including all Appendices for the Project, will be available for viewing as soon as it is available.
- E. Related Requirements:

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1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.

1.3 EXISTING CONDITION INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. Bidder shall determine the adequacy of the attached drawings for use in preparing their Bid for the Work. Bidders should visit the site to familiarize themselves with existing conditions. No claims will be honored for inadequacy of data. Should Bidder determine that additional information is required, the Bidder shall make, prior to bidding, his own exploration, tests, and analyses.
- C. Existing drawings that include information on existing conditions including previous construction at Project site are available for viewing through the Penn Bid website.
- D. Utility survey to locate underground services as prepared by GPRS, dated November 11, 2024, is available for viewing appended to this Project Manual.
- E. Related Requirements:
 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 2. Document 002513 "Prebid Meetings" for site walkthrough.

1.4 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. An existing asbestos report for Project, prepared by Connell/Greene Consulting, Inc., dated October 28th, 2024 is available for viewing as appended to this Document.
 1. Report indicates that no asbestos was found in the samples that were taken.
 2. Contractor is responsible to report any suspected asbestos that may be encountered.
- C. An existing lead report for Project, prepared by Connell/Greene Consulting, Inc, dated October 28th, 2024, is available for viewing as appended to this Document.
 1. Report indicates that no samples contained lead exceeding the prescribed limits.
- D. An existing PCB (Polychlorinate Biphenyl) information report for Project, prepared by Connell/Greene Consulting, Inc., dated October 28th, 2024 is available for viewing as appended to this Document.

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1. PCB's may be present in light ballasts. If light ballasts are not specifically labeled "non-PCB", they should be collected for disposal at an approved facility.

E. Related Requirements:

1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
2. Section 024116 "Structure Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

1.5 FLOW TEST DATA

- A. Attached report from Aqua Pennsylvania, Inc. is attached for contractor reference.

1.6 GRANT INFORMATION AND FORMS

- A. The following documents are included for Contractor reference. These documents are intended to outline Contractor responsibilities as it relates to this Project. It will be the Contractor's responsibility to ensure that all work is done in accordance with the Grant Requirements.
1. Key Compliance Guidelines.
 2. Guidance on Steel Certification Relative to the Redevelopment Assistance Capital Program (RACP).
 3. List of Exempt Machinery and Equipment Steel Products.
 4. Form ST-2.
 5. Form ST-3.
 6. Form ST-4.

END OF DOCUMENT 00 3100

*Providing Innovative Solutions to
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REPORT OF
GEOTECHNICAL EXPLORATION

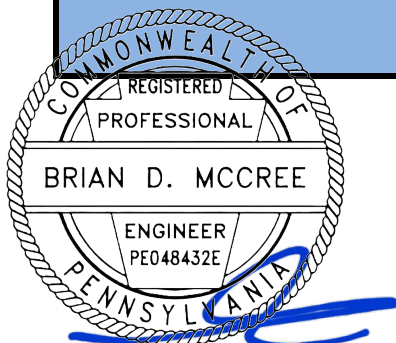
HARMONVILLE FIRE COMPANY
NEW PLYMOUTH VALLEY FIRE STATION
904 GERMANTOWN PIKE
PLYMOUTH MEETING, MONTGOMERY COUNTY, PENNSYLVANIA

PREPARED FOR

KCBA ARCHITECTS
8 E BROAD STREET
HATFIELD, PA 19440

PROJECT 5679G1R1
November 15, 2024

DAVID BLACKMORE AND ASSOCIATES, INC.
3335 WEST RIDGE PIKE
POTTSTOWN, PENNSYLVANIA 19464
(610) 495-6255



Mr. Brian D. McCree, PE
Vice President

A handwritten signature in black ink, appearing to read "AM", written over a horizontal line.

Mr. Angel Matos, EIT
Geotechnical Engineer

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FIGURES AND TABLES

FIGURE I: *SITE LOCATION*

FIGURE II: *GEOLOGY*

FIGURE III: *SOILS*

TABLE I: *LABORATORY TEST RESULTS*

TABLE II: *ROCK ELEVATIONS*

TABLE III: *COMPACTION CRITERIA*

APPENDIX

SOIL PARTICLE SIZE ANALYSIS RESULTS
SOIL PLASTIC AND LIQUID LIMIT TEST RESULTS
TEST BORING LOGS
BORING LOCATION PLAN

EXECUTIVE SUMMARY

Purpose

This exploration was completed to evaluate the subsurface conditions and their effect upon the proposed site development. This exploration focused on the proposed Fire Station located at 904 Germantown Pike in Plymouth Meeting, PA.

Scope

A total of five (5) borings were drilled within the proposed structure area to a maximum depth of 18.33 feet. The test borings were located in the field by DBA personnel using a site aerial photograph indicating the new fire station. The test borings were drilled by our subcontractor, Corcoran Drilling Co. Inc., under the direction of DBA personnel. All test boring logs and a test boring location plan are included in the appendix of this report.

Findings

The results of our exploration indicate the presence of the following subsurface conditions:

- Existing fill soils
- Limited areas of shallow rock

An existing fill deposit (Stratum IF) consists of brown and orange-brown fine sand and silt with some clay, organic silt, and rock fragments with a thickness of 0.50 to 1.33 feet. Below this fill deposit is an orange-brown fine sand and clayey silt (Stratum II). This stratum is soft to medium stiff with SPR values ranging from 5 blow per foot (B/F) to 18 B/F. The average SPR value is 10 B/F. Multi-colored weathered sandstone, with some weathered siltstone and shale (Stratum IV) was encountered at each boring location completed. Dense weathered rock, as shown by augering difficulty, ranges from 8 feet to 12.50 feet below the existing grade at elevations from 222.39 feet to 225.98 feet. Sandstone bedrock was encountered in test borings completed. Depth of sandstone range from 10.87 feet to 18.33 feet below the existing grade at elevations of 216.43 feet to 224.67 feet. See Table IIA – Approximate Bedrock Elevations for more information at each boring location.

Recommendations:

Based on these findings the site conditions are anticipated to be suitable for the support of the proposed construction using a shallow foundation system designed using an allowable bearing capacity of 4 KSF provided the foundations are designed to penetrate the existing fill soils of Stratum IF and bear within the firm portions of Stratum II or III. Some localized undercutting of the soft conditions encountered within the upper portion of Stratum II may be necessary. The exposed foundation subgrade shall be verified by the geotechnical engineer prior to concrete placement. It is anticipated that the existing fill soils of Stratum IF can be adequately densified during the proof roll process described in Section 7.4 SLAB ON GRADE to effectively support the proposed slab on grade.

1. INTRODUCTION

David Blackmore and Associates, Inc. (DBA) has completed the geotechnical exploration of the subject site in accordance with our Proposal 5679G1P1, dated October 11, 2024. This exploration was completed to evaluate the existing subsurface conditions and their effect upon the proposed site development. Specifically, DBA has provided recommendations regarding the following:

- Foundation support of the structure and slabs, including soil bearing pressures, bearing elevations, foundation design recommendations, and anticipated settlement for shallow foundations,
- Depth to material requiring rock excavation methods for removal, if encountered
- Relative elevations of surface and subsurface features,
- Fill and compaction criteria,
- Pavements and floor slabs,
- Lateral earth pressures for retaining walls, and
- General geotechnical related construction procedures.

The following section (2. PROPOSED CONSTRUCTION) summarizes the information available to DBA regarding the proposed site development. This report has been prepared based on the proposed construction. Changes to the proposed construction may require alterations to this report or additional investigative work. DBA should be notified of significant changes to the proposed construction.

2. PROPOSED CONSTRUCTION

The proposed construction consists of a new 9,400 SF fire station which will be constructed on the site of the existing Harmonville Fire Company Plymouth Valley Station. The existing firehouse structure, which abuts the existing Plymouth Community Ambulance Facility, is to be demolished to make way for the construction of the new fire house. This construction includes a reconfigured parking lot and driveway.

3. GEOTECHNICAL EXPLORATION

A total of five (5) borings were drilled within the proposed structure area to a maximum depth of 18.33 feet. Four (4) of the borings were drilled around the perimeter of the existing fire house structure. The remaining boring was completed within the existing fire house structure utilizing a tripod drilling apparatus. The test borings were located in the field by DBA personnel using a site aerial photograph indicating the new fire station. The test borings were drilled by our subcontractor, Corcoran Drilling Co. Inc., under the direction of DBA personnel.

All test boring logs and a test boring location plan are included in the appendix of this report.

4. GEOTECHNICAL BACKGROUND

4.1 SITE DESCRIPTION

The subject site is the existing Harmonville Fire Company Plymouth Valley Station with a physical address of 904 Germantown Pike in Plymouth Meeting. The area for the proposed construction slopes downward in a northwesterly direction from an elevation of approximately 235.43 feet to 232.72 feet.

A photocopy of the USGS Topographical Map, Lansdale Quadrangle, indicating the site is included as Figure I.

4.2 GEOLOGY

Available geological sources indicate the site is underlain by Stockton formation (Trs). This formation is light gray to buff, coarse-grained, arkosic sandstone, which includes red to purplish-red sandstone, shale, and siltstone. It is well bedded; thin to flaggy. Joints have a seamy to platy pattern; moderately developed; highly fractured; very closely spaced; vertical and open. Only slightly resistant to weathering; highly weathered to a moderate depth; overlying mantle is thin.

A photocopy of the USGS Geological Map of the Lansdale Quadrangle, indicating the site is included as Figure II.

4.3 SOILS

Soil records indicate the site soils to be of the following series:

UdB – Urban Land, 0 to 8 percent slopes: This series consists of soils that have been disturbed and/or covered over by urban improvements such as pavement and buildings. Due to the extent of disturbance detailing a typical soil profile is impractical.

A copy of the mapping created using the USDA Natural Resource Conservation Service website, indicating the site is included as Figure III.

5. LABORATORY TESTING

Representative soil samples taken during the field exploration were tested in DBA's laboratory for basic engineering properties. The laboratory testing consisted of classification of soil samples for engineering purposes. The laboratory testing included Particle Size Analysis (ASTM D442), Plastic and Liquid Limits (ASTM D4318), and Natural Moisture Content (ASTM D2216). The Unified Soil Classification System (USCS) was used to assign group symbols and group names to the soils tested.

A summary of the test results is provided in Table I. A photocopy of the particle size analysis results and the plastic and liquid limit analysis results are included in the appendix of this report.

6. SUBSURFACE CONDITIONS

The results of the drilling program revealed a fairly consistent subsurface profile. The following strata, underlain by 5 to 6 inches of asphalt over 5 to 6 inches of modified subbase or 6 inches of concrete(slab) over 9 inches of subbase stone, can describe a typical soil profile.

- Stratum IF:** 0.5' to 1.33' thick; Fill consisting of brown and orange-brown fine sand and silt, some clay, some organic silt, occasional rock fragments. This stratum was encountered in each of the test borings completed.
- Stratum II:** 1.42' to 3.34' thick; Orange-brown fine sand and clayey silt with occasional rock fragments. This stratum is loose to medium with SPR values ranging from 5 blow per foot (B/F) to 18 B/F. The average SPR value is 10 B/F. This stratum was encountered in each of the boring completed.
- Stratum III:** 2.33' to 4.33' thick; Reddish-brown and orange-brown fine, medium, to coarse sand with rock fragments. This stratum is dense to very dense with SPR values ranging from 22 B/F to 32 B/F. The average SPR value for this stratum is 26 B/F. This stratum was encountered in each of the boring completed.
- Stratum IV:** 3.7' to 10.8' thick; Multi-colored weathered sandstone. This stratum is very dense with SPR values ranging from 50 B/F to 100 B/F. The average SPR value for this stratum is 72 B/F. This stratum was encountered in each of the boring completed. Dense weathered rock, as indicated by augering difficulty, ranges from 8 feet to 12.50 feet below the existing grade which corresponds to a dense weathered rock elevation ranging from approximately 222.4 to 226.0 feet. See Table IIA – Approximate Rock Elevations for more information regarding dense weathered rock depth and elevation at each boring location.
- Bedrock:** Sandstone bedrock was encountered at depths ranging from 10.87 feet to 18.33 feet below the existing grade which corresponds to a rock surface elevation ranging from approximately 216.4 to 224.7 feet. See Table IIA – Approximate Rock Elevations for more information regarding bedrock depth and elevation at each boring location.
- Groundwater²:** Groundwater was not encountered in test borings completed.

NOTES:

1. SPR = the Standard Penetration Resistance or number of blows required of a 140-pound hammer dropping 30", to drive a 2" OD split spoon sampler one foot.
2. The groundwater information provided is based on conditions encountered during the drilling program. Seasonal fluctuations in the groundwater table are to be expected.

7. GEOTECHNICAL ANALYSIS AND RECOMMENDATIONS

The results of our exploration indicate the presence of the following subsurface conditions:

- Existing fill soils
- Limited areas of shallow rock

An existing fill deposit (Stratum IF) consists of brown and orange-brown fine sand and silt with some clay, organic silt, and rock fragments with a thickness of 0.50 to 1.33 feet. Beneath this fill deposit is an orange-brown fine sand and clayey silt (Stratum II) that is considered to be loose to medium with SPR values ranging from 5 blow per foot (B/F) to 18 B/F. The average SPR value is 10 B/F.

Multi-colored weathered sandstone, with some weathered siltstone and shale (Stratum IV) was encountered at each boring location completed. Dense weathered rock, as shown by augering difficulty, ranges from 8 feet to 12.50 feet below the existing grade corresponding to a dense weathered rock elevation ranging from approximately 222.4 feet to 226.0 feet. Sandstone bedrock was encountered in each of the test borings completed at depth ranging from 10.87 feet to 18.33 feet below the existing grade which corresponds to a bedrock elevation that ranges from 216.43 feet to 224.67 feet. See Table IIA – Approximate Bedrock Elevations for more information regarding the depth to dense weathered rock and bedrock at each boring location.

Based on these findings the site conditions are anticipated to be suitable for the support of the proposed construction using a shallow foundation system designed using an allowable bearing capacity of 4 KSF provided the foundations are designed to penetrate the existing fill soils of Stratum IF and bear within the firm portions of Stratum II or III. Some localized undercutting of the soft conditions encountered within the upper portion of stratum II may be necessary. The exposed foundation subgrade shall be verified by the geotechnical engineer prior to concrete placement.

7.1 SITE PREPARATION

All deleterious materials including topsoil, root mass, trees and vegetation, asphalt and other materials determined in the field by the Geotechnical Engineer to be unsuitable shall be removed from all structural areas (buildings, pavements, and walkways) prior to placement of *structural fill*. Recycling of the asphalt and underlying stone can be accomplished on site if the asphalt is milled to a maximum 1-inch particle size and the material is used in the upper fill zones of pavement areas only. This fill is not suitable for structural areas.

7.2 FOUNDATIONS

Foundations shall bear on the undisturbed soils of Stratum II, Stratum III, or structural fill. Soft conditions encountered during foundation construction shall be excavated and replaced with structural fill. Refer to Section 7.7, Fill and Compaction Criteria.

Foundations shall be designed for a maximum soil bearing capacity of 4 KSF on Stratum II Stratum III, or structural fill. Foundations shall not bear on the existing fill soils of Stratum IF. If the column loads are to be revised during a re-design of the structure, then the bearing capacity of the soils may have to be subsequently modified. DBA shall be notified of any significant changes in this regard.

Foundation settlements for the bearing capacities provided herein are to be within a tolerance of one-inch total and half-inch differential. It is anticipated that the bulk of this settlement will take place during the construction period. Settlements of this magnitude are within normal construction tolerances. In the event more stringent settlement tolerances are required a reduction of the allowable bearing capacity and/or a change in depth to bearing strata may be required.

To protect against differential settlements, foundations shall not be placed intermittently on soils and boulders. Small boulders encountered within or directly beneath the footing bearing surface shall be removed and replaced with *structural fill*. Larger boulders shall either be fully or partially removed and replaced with *structural fill*. Trench excavation through areas containing boulders may require substantial over-excavation to facilitate boulder removal. Partial removal can be completed by splitting or hammering to a minimum of 12" below the footing bottom elevation. Boulder protrusion into the bottom or side of the proposed footing is not an acceptable condition. Boulders can be dislodged in bulk excavations.

Should foundation excavation encounter hard bedrock, the foundation is to be undercut a minimum of 12 inches. The undercut area is to be backfilled with a *structural fill* or a low strength flowable fill (max 500 psi) "cushioning" layer to limit the potential for differential foundation settlement and the development of stress concentrations caused by rock protrusion.

NOTE: Foundations planned to bear intermittently on strata provided with different bearing capacities shall be designed using the lowest bearing capacity provided to limit potential differential settlements.

Exterior foundations or foundations in unheated areas shall be provided with a minimum of 36" compacted soil cover above the footing bottom for frost protection.

The variable soil conditions noted make it imperative that full-time Quality Control services are provided for all Geotechnical phases of this project.

7.2.1 SEISMIC SITE COEFFICIENT

A review of Section 1613.5.5 of the International Building Code (IBC 2021 edition)/ASCE 7 and the existing soil profile indicates that a site class C

should be used in the design of the proposed structure for seismic load resistance.

7.3 ROCK REMOVAL

Hard sandstone bedrock was encountered in each test boring completed at depths ranging from 10.87 feet to 18.33 feet below the existing grade which corresponds to a bedrock surface elevation ranging from approximately 216.4 feet to 224.7 feet. The depth to dense weathered rock, as indicated by augering difficulty, ranges from 8.0 feet to 12.50 feet below the existing grade which corresponds to a dense weathered rock surface that ranges from approximately 222.4 feet to 226.0 feet. See Table IIA – Approximate Bedrock Elevations for dense weathered rock and bedrock information at each boring location. The hard bedrock encountered is not rippable using hydraulic rippers mounted on a bulldozer. It is expected that the removal of hard bedrock will require the use of hydraulic hammers or explosives (if permitted by local authorities). A monitoring program to record ground vibrations should be developed if changes or utility trenches require blasting. DBA can develop and execute a program, if required and as directed by Client, which may include methods of blasting that increase the amount of shot rock reusable as structural fill.

The Geotechnical Engineer during the excavating process should verify areas and quantities of hard bedrock in the field. Excavation requiring hydraulic rippers or similar is considered rock excavation, however, it is generally less expensive than excavation of hard rock which requires blasting. A clear definition of rock should be included in any bid package.

7.4 SLAB ON-GRADE

The proposed finish floor elevation was not available at the time of preparing this report. However, it is presumed that the new firehouse finished floor will

closely match the elevation of the existing fire house station (approximately 235.5 feet). This elevation compared to the existing topography and assuming an 8-inch building slab section thickness (4 inches of concrete over 4 inches of subbase stone) indicates that cuts and fills in the range of up to 12 inches will be needed to achieve the proposed subgrade elevation.

Prior to the placement of fill the exposed slab subgrade areas shall be proof rolled with a heavy smooth drum roller (minimum 15-ton static weight) to detect the presence of loose or soft zones. This proof rolling operation shall be performed in the proposed fill areas under the supervision of the Geotechnical Engineer. Proof rolling of the subgrade shall also be performed in the cut areas when the required grades have been achieved and immediately prior to pouring the floor slab. It is anticipated that the 0.5 feet to 1.33 feet of existing fill (Stratum IF) can be adequately densified during this proof roll process to support the proposed building slab. However, any loose or soft zones detected during the proof rolling operation shall be repaired to the satisfaction of the Geotechnical Engineer. Such repairs may require undercutting and/or the use of stabilizing procedures such as the use of stabilization fabric and/or coarse graded aggregate.

Based on the soil type encountered, standard penetration testing of the existing slab subgrade, and provided that all structural fill will be placed in accordance with the fill and compaction criteria set forth in Section 7.7, an estimated modulus of subgrade reaction of 150 psi/inch may be used for the design of slab sections. Should an increased modulus of subgrade reaction be required for the proposed design it is recommended that field or laboratory testing be completed to establish specific modulus values.

All slab subgrade areas shall be evaluated by the Geotechnical Engineer prior to pouring the slab so that repair can be completed. It is recommended that the slab be poured under roof during periods of harsh weather.

A smooth drum roller shall be made available to seal the subgrade in the event of predicted precipitation.

7.5 BACKFILL OF FOUNDATION AND UTILITY TRENCHES

All foundation and utility trenches shall be backfilled with *structural fill*, under the supervision of a Geotechnical Engineer (Refer to Section 7.7, Fill and Compaction Criteria).

7.6 PAVEMENTS AND WALKWAYS

Pavement and sidewalk areas shall be prepared in a manner similar to the slab on-grade areas. A minimum of 8 inches of crushed aggregate base shall be used beneath exterior pavements due to the frost heave potential of the subgrade soils. The pavement subgrade shall be graded to drain water from beneath the pavement system to prevent ponding and subsequent pumping of silty subgrade soils.

For pavement design a preliminary estimated California Bearing Ratio (CBR) Value of 5.0 may be used for stabilized subgrade areas consisting of on-site sandy silt (Stratum IF and Stratum II) or Structural fill selected and placed in accordance with Section 7.7 of this report. Should anticipated heavy duty pavement requirements or other project conditions require final site specific CBR values DBA can complete field and/or laboratory CBR testing of proposed subgrade soils at the client's request.

7.7 FILL AND COMPACTION CRITERIA

Fill supporting slabs, pavements, and foundations is considered herein to be structural fill. Structural fill shall be placed on an approved, proofrolled, nonyielding, level subgrade, in lifts not exceeding 8 inches (loose thickness), unless otherwise directed by the Geotechnical Engineer. *Structural fill* shall be maintained nominally at *Optimum Moisture Content* (ASTM D-698) and

uniformly compacted to the percentages of *Maximum Dry Density* (ASTM D-698) provided in Table III - Compaction Criteria.

Suitable structural fill shall consist of clean soils without deleterious inclusions. On-site soils identified as Stratum II and Stratum III are acceptable for use as *structural fill* if given the opportunity to dry and the soils are maintained nominally at *Optimum Moisture Content*. Samples retrieved from the upper 5 feet of the subgrade indicated moisture contents ranging from 8.1 to 16.2 percent. The optimum moisture content for compaction of these soils is estimated to range between 11 and 14 percent. Therefore, some of these soils may require aeration and drying prior to re-use as structural fill, which is best accomplished in the summer months. Specific moisture content test results and associated depths are indicated on the test boring logs in the appendix of this report.

Borrow fill shall be clean well-graded soils with good strength characteristics with a maximum particle size of 3 inches and containing not more than 20% silt/clay (by weight). Samples of on-site or borrow sources of fill shall be submitted to the Geotechnical Engineer for testing at least 1 week before use on site. A minimum of 65 lbs. or two (2) five-gallon buckets is required for testing.

7.8 LATERAL EARTH PRESSURES - RETAINING WALLS

The retaining/loading dock walls of the structure, if proposed, should be designed for an at rest condition (K_o). The foundations and walls must be fully drained to relieve potential hydrostatic pressure. A foundation/wall drainage system is recommended. Soil backfill around the basement walls shall be well compacted and should consist of granular soils to prevent the trapping of water.

Retaining walls outside the structure which are free to rotate should be similarly designed except with an active earth pressure as opposed to K_o condition. Soil parameters used to establish the effective fluid pressures

(excluding hydrostatic loads) and some additional parameters which may be used in the design of a retaining wall system are summarized in the following table:

SOIL PROPERTIES FOR DETERMINATION OF LATERAL LOADS		
Parameter	Stratum IF/II	Stratum III
Angle of Internal Friction, ϕ	30 degrees	34 degrees
Moist unit weight, γ_m	115 pcf	125 pcf
Active Earth Pressure Coefficient, K_a	0.33	0.28
Passive Earth Pressure Coefficient, K_p	3.00	3.54
At Rest Earth Pressure Coefficient, K_o	0.50	0.56
Soil/Mass concrete interface friction Angle, δ	22 degrees	24 degrees

8. QUALITY CONTROL

This report was prepared to provide design criteria for the design team. DBA assumes that Geotechnical and Construction Quality Control Services will be provided in order to implement the recommendations provided herein and to identify unanticipated or changed conditions. The Geotechnical Engineer's representative should review the consistency and texture of the exposed soils with the conditions encountered by this exploration as described herein. Since localized loose and yielding subgrade conditions may be encountered between test locations, provisions for the undercutting and subsequent replacement of these materials should be anticipated in the construction documents. The environmental quality of the subgrade soils was not reviewed as part of this evaluation. All materials generated by grading and excavation shall be managed in accordance with regulatory requirements.

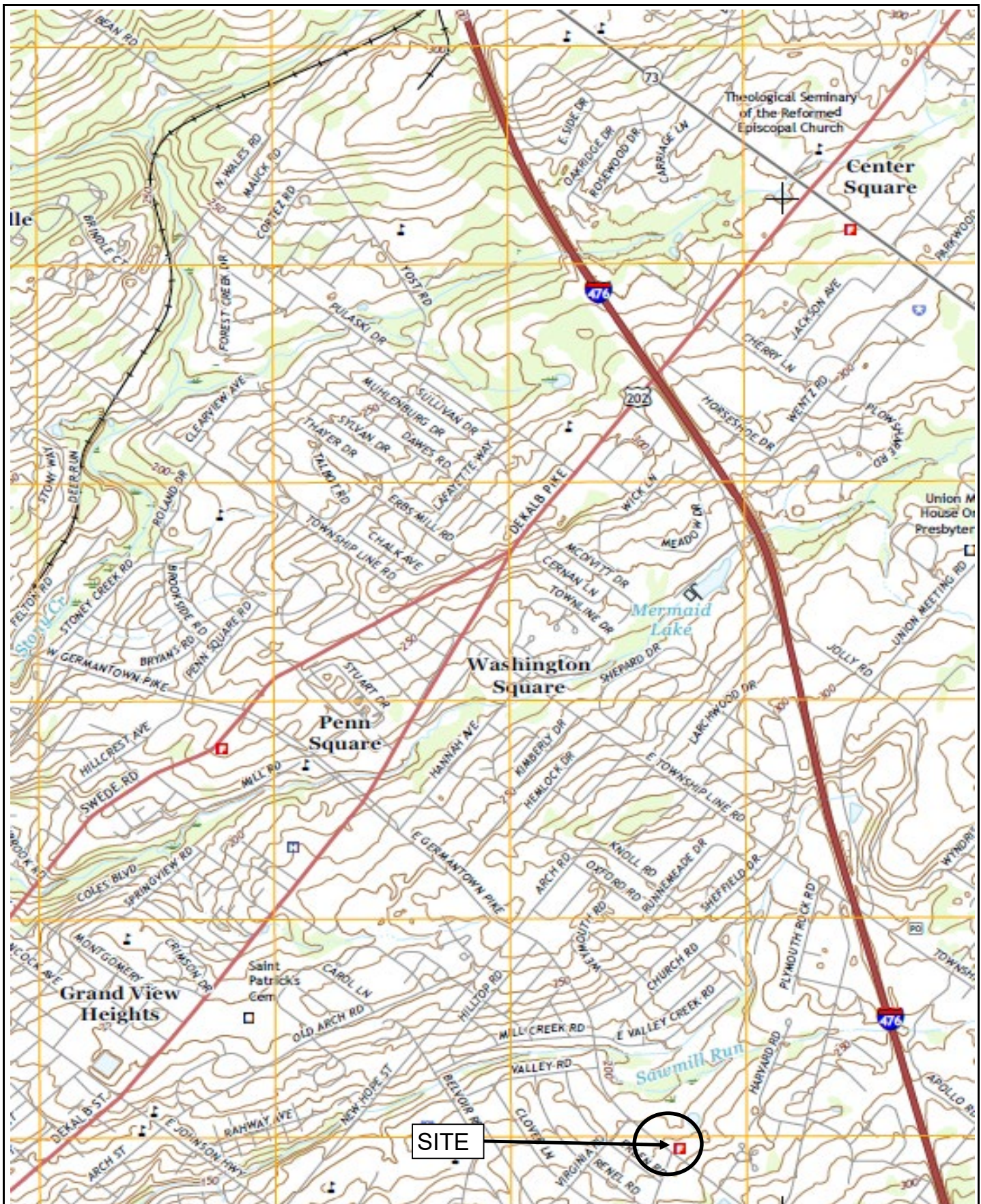
DBA can provide a contract for Geotechnical and Construction Quality Control Services (Special Inspections), as required. A pre-work meeting with the design professionals, contractors, and the Geotechnical Engineer is strongly recommended.

9. LIMITATIONS

Services performed by DBA, including the Geotechnical Exploration, report, and any subsequent construction monitoring have been or will be conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other warranty or guarantee is indicated or intended in this report or any opinion, document or otherwise stated.

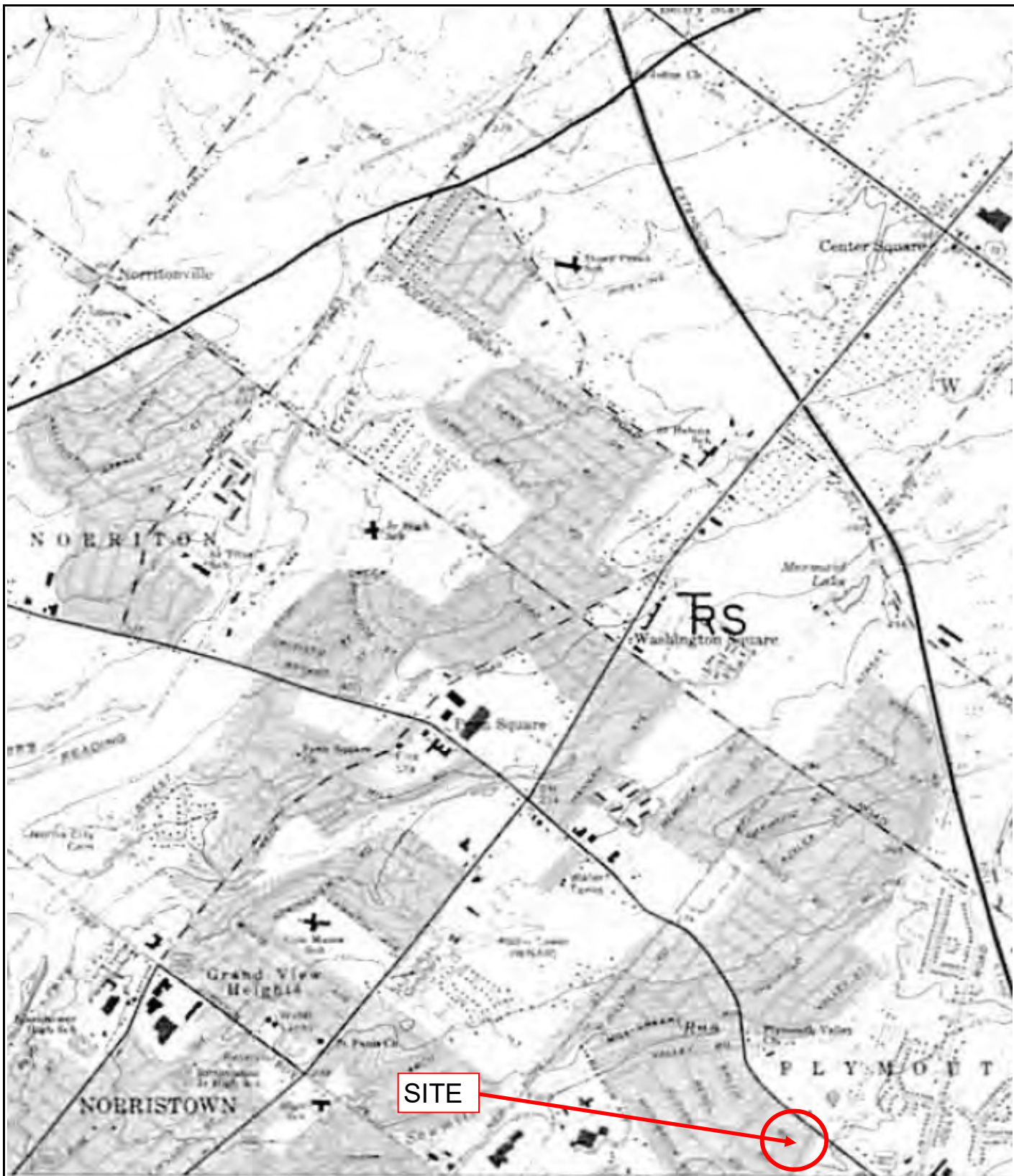
The recommendations included herein are based on the conditions encountered by the test borings performed at the subject site. It is noted that, although soil quality has been inferred from the interpolation of the site sampling data, subsurface conditions beyond the test borings are, in fact, unknown. As a result, these recommendations may require modifications based on the conditions encountered and exposed during construction excavation. Should any conditions encountered during construction differ from those described in the report, this office should be notified immediately to review and possibly modify the recommendations included in this report.

FIGURES AND TABLES



GEOTECHNICAL & ENVIRONMENTAL ENGINEERS
DAVID BLACKMORE & ASSOC., INC.
 3335 West Ridge Pike
 Pottstown, Pennsylvania 19464
 Telephone: (610) 495-6255 FAX: (610) 495-7353

5679G1
Figure I
SITE LOCATION & TOPOGRAPHY
 U.S.G.S. 7.5 Minute Topographic Quadrangle
 Lansdale Quadrangle



KEY

Trs - Stockton formation

GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

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Figure II

SITE GEOLOGY

USGS Geologic Quadrangle Maps of PA

Lansdale Quadrangle



KEY

UgB - Urban Land, 0 to 8 percent slopes

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Project 5679G1

Figure III

Soils

Soil Mapping via USDA Natural Resources Conservation Service

TABLE I
LABORATORY TEST RESULTS

BORING #	B1 B5	B4 B3	B5 B3
SAMPLE #	S3 S4	S2 S2	S1 S1
DEPTH	7'-10'4"	4'-6'	1'-4'
STRATUM	IV	III	II
NMC* (%)	5.6 10.9	8.1 9.7	15.8 16.2

* NMC = Natural Moisture Content

SOIL PARTICLE SIZE DISTRIBUTION

SIEVE #

PERCENT PASSING BY WEIGHT

1"	100	100	100
3/4"	100	93.3	100
3/8"	100	84.0	100
4	98.6	79.6	99.5
10	91.6	74.4	98.5
40	37.8	34.8	80.2
100	22.1	23.4	63.4
200	18.1	19.6	59.6

ATTERBERG LIMIT ANALYSIS

LL*	NV	NV	NV
PL*	NP	NP	NP
PI*	N/A	N/A	N/A

* LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index

USCS CLASSIFICATION

Eng. Class.	SM	SM	ML
Descr.	Silty Sand	Silty sand w/gravel	Sandy Silt

TABLE I (CONT'D)
LABORATORY TEST RESULTS

BORING #	B1	B2	B4
SAMPLE #	S1	S1	S1
DEPTH	2' to 4'	2' to 4'	2' to 4'
STRATUM	I	I	I
NMC* (%)	15.2	13.03	13.96

* NMC = Natural Moisture Content

TABLE IIA
APPROXIMATE ROCK ELEVATIONS

Boring Number	Surface Elevation	Depth to Dense Weathered Rock ¹	Dense Weathered Rock Elevation	Depth to Bedrock ²	Bedrock Elevation
B1	232.72 feet	10.33 feet	222.39 feet	13.25 feet	219.47 feet
B2	234.76 feet	11.00 feet	223.76 feet	18.33 feet	216.43 feet
B3	233.98 feet	8.00 feet	225.98 feet	12.58 feet	221.40 feet
B4	235.43 feet	12.50 feet	222.93 feet	15.50 feet	219.93 feet
B5	235.54 feet	NE	N/A	10.87 feet	224.67 feet

NOTES:

Surface elevations at each boring location were determined in the field using a Tremble 2A Catalyst GPS rover.

¹ As determined by drilling difficulty and Standard Penetration Resistance data.

² As determined by auger refusal.

TABLE IIB
APPROXIMATE BOTTOM OF FILL ELEVATIONS

Boring Number	Surface Elevation	Depth to Bottom of Fill	Bottom of Fill Elevation
B1	232.72 feet	2.33 feet	230.39 feet
B2	234.76 feet	1.58 feet	233.18 feet
B3	233.98 feet	1.50 feet	232.48 feet
B4	235.43 feet	1.67 feet	233.76 feet
B5	235.54 feet	1.75 feet	233.79 feet

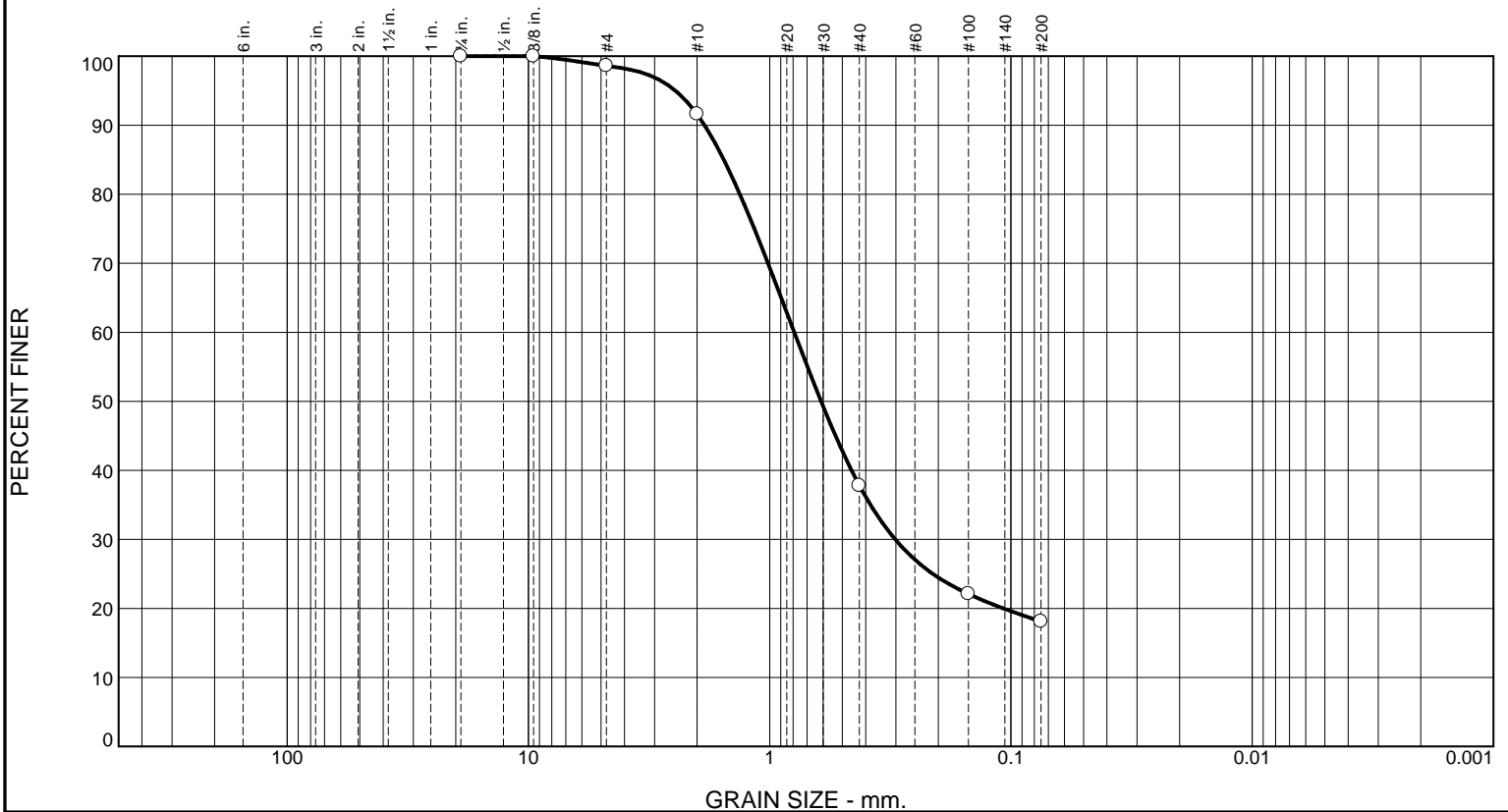
TABLE III
COMPACTION CRITERIA

LOCATION	PERCENT COMPACTION (ASTM-D698)
Foundations	98%
Floor Slabs	98%
Pavements	95%
Berms (non-structural)	93%

APPENDIX

SOIL PARTICLE SIZE ANALYSIS RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	7.0	53.8	19.7	18.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	100.0		
#4	98.6		
#10	91.6		
#40	37.8		
#100	22.1		
#200	18.1		

*(no specification provided)

Material Description Stratum IV: Multi-colored weathered sandstone. (silty sand)		
Atterberg Limits PL= NP LL= NV PI=	Coefficients D ₉₀ = 1.8614 D ₅₀ = 0.6121 D ₁₀ =	D ₈₅ = 1.5494 D ₃₀ = 0.3016 C _u =
Classification USCS= SM AASHTO= A-1-b	Remarks B1/S3 as received moisture content of 5.6%. B5/S4 as received moisture content of 10.9%.	

Source of Sample: B1/B5
Sample Number: S3/S4

Depth: 7'-10'4"

Date: 11/15/2024



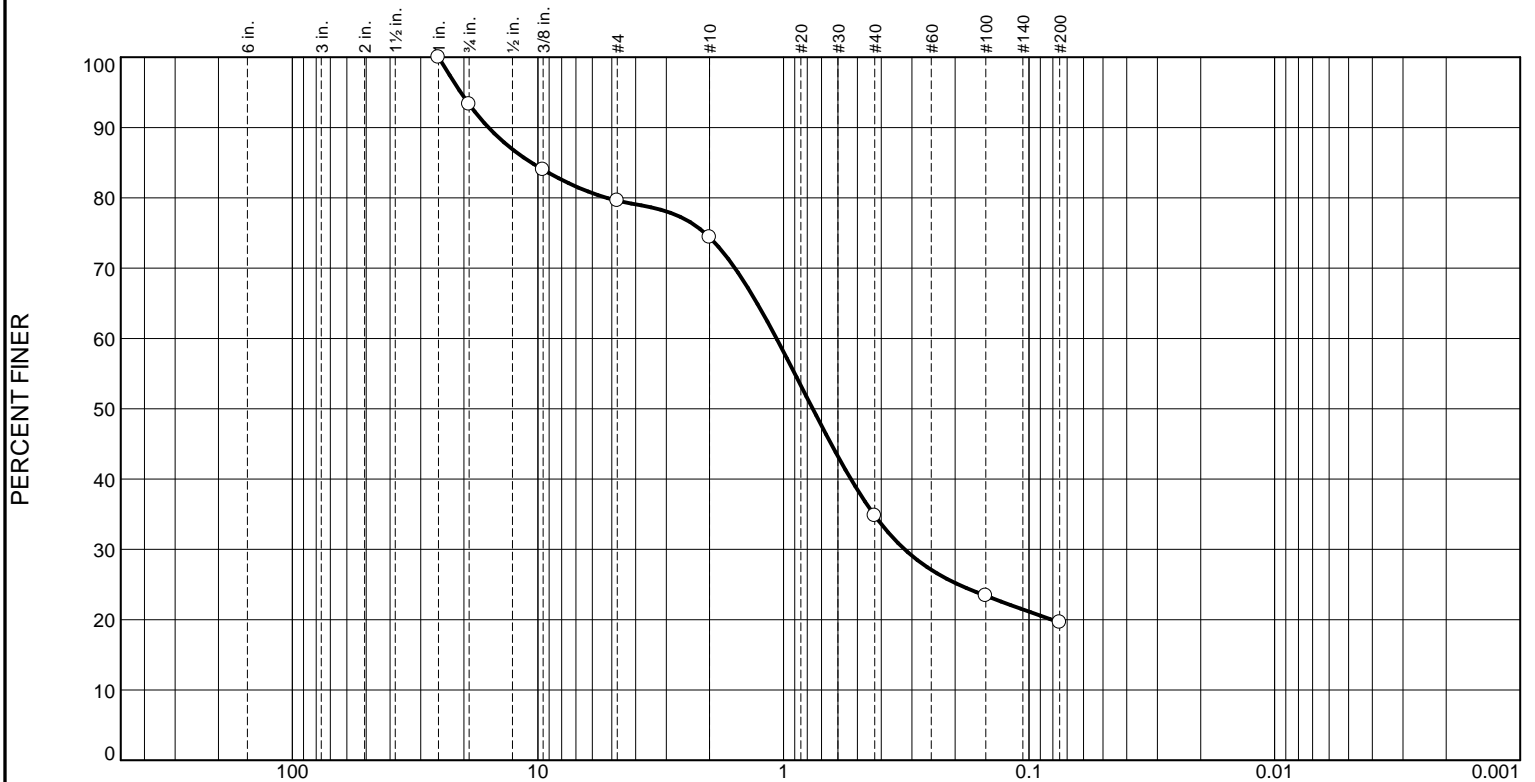
DAVID BLACKMORE & ASSOCIATES, INC.

Client: KCBA Architects
Project: Harmonville Fire House

Project No: 5679G1

Plate

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.7	13.7	5.2	39.6	15.2	19.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	100.0		
.75	93.3		
.375	84.0		
#4	79.6		
#10	74.4		
#40	34.8		
#100	23.4		
#200	19.6		

*(no specification provided)

Source of Sample: B4/B3
Sample Number: S2

Depth: 4'-6'

Date: 11/15/2024

Material Description

Stratum III: Reddish orange to brown fine to coarse sand with silt and frequent quartzite fragments.
(silty sand with gravel)

Atterberg Limits

PL= NP

LL= NV

PI=

Coefficients

D₉₀= 15.8968

D₈₅= 10.6236

D₆₀= 1.0675

D₅₀= 0.7599

D₃₀= 0.3209

D₁₅=

D₁₀=

C_u=

C_c=

Classification

USCS= SM

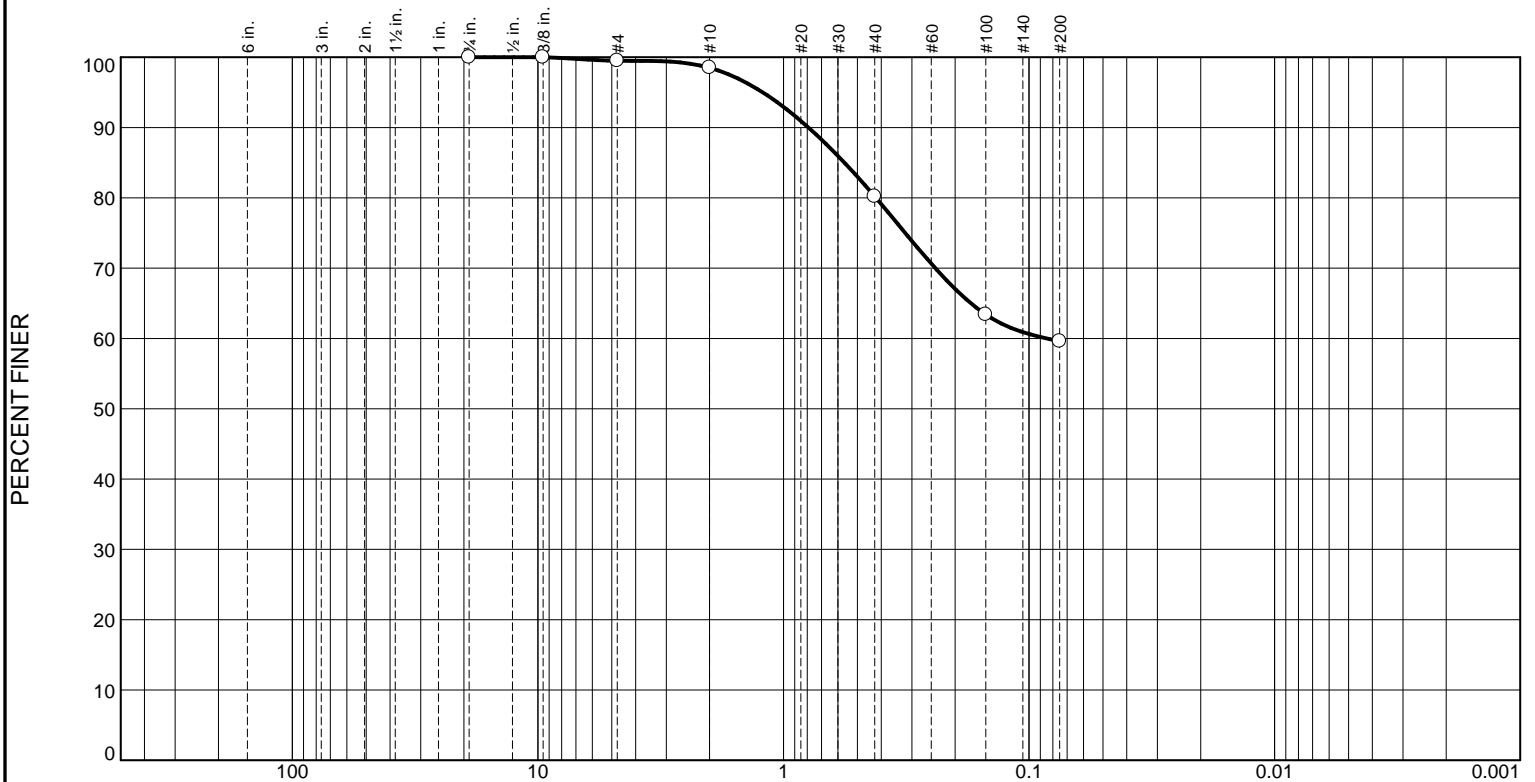
AASHTO= A-1-b

Remarks

B4/S2 as received moisture content of 8.1%.

B3/S2 as received moisture content of 9.7%.

Particle Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.0	18.3	20.6	59.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	100.0		
#4	99.5		
#10	98.5		
#40	80.2		
#100	63.4		
#200	59.6		

*(no specification provided)

Material Description

Stratum II: Orange to brown fine silt with sand and traces of clay. (sandy silt)

Atterberg Limits

PL= NP

LL= NV

PI=

Coefficients

D₉₀= 0.7913

D₈₅= 0.5646

D₆₀= 0.0849

D₅₀=

D₃₀=

D₁₅=

D₁₀=

C_u=

C_c=

Classification

USCS= ML

AASHTO= A-4(0)

Remarks

B5/S1 as received moisture content of 15.8%.

B3/S1 as received moisture content of 16.2%.

Source of Sample: B5/B3
Sample Number: S1

Depth: 1'-4'

Date: 11/15/2024



Client: KCBA Architects
Project: Harmonville Fire House

Project No: 5679G1

Plate

TEST BORING LOGS



DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers

Phone: 610-495-6255 Fax: 610-495-7353
 www.dbaengineering.com

Boring Number: B1

Sheet 1 of 1

Project: Harmonville Fire House
 Location: 904 Germantown Pike
 Twp/City/State: Plymouth Meeting/ Montgomery County/ PA
 Drilling Contractor: Corcoran Drilling Co. Inc.
 X Coordinate (ft): Y Coordinate (ft):
 Drilling Method #1: 6" Solid Auger from 0' to 13.25'
 Drilling Method #2:

Project Number: 5679G1
 Date Drilled: 11/05/2024
 Inspected By: AYM
 Boring Depth: 13.25'
 Ground Surface Elevation (ft msl): 232.72
 Water Level - Immediate (ft bgs): Dry (5 min)
 Water Level - Static (ft bgs): Dry (5 Hrs.)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGY				SAMPLING DATA							
		LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	DEPTH (FT)	ELEVATION (FT)	NUMBER	Water Content				SPT DATA	SPT Value	SPT GRAPH (Blows Per Foot)
							10	20	30	40			
0			Paving (6")										
			Modified stone (6")	1.00	231.72								
			Stratum IF Fill, consisting of orange-brown fine to medium sand with some rock fragments	2.33	230.39								
2.5			Stratum II Orange-brown and brown fine sand and silt with occasional rock fragments			S-1*					2-3-5-7	8	
5			Stratum III Brown and orange brown fine to coarse sand with sandstone fragments	5.67	227.05	S-2*					7-8-10-16	18	
7.5			Stratum IV Multi-colored weathered sandstone	8.00	224.72								
10						S-3					12-20-50/4"	20	
12.5													
13.25				13.25	219.47								
15			Auger refusal										
17.5			Notes: *Moist Hard augering from 10.33' Very hard augering from 12.75'										

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water level. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.



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Geotechnical & Environmental Engineers

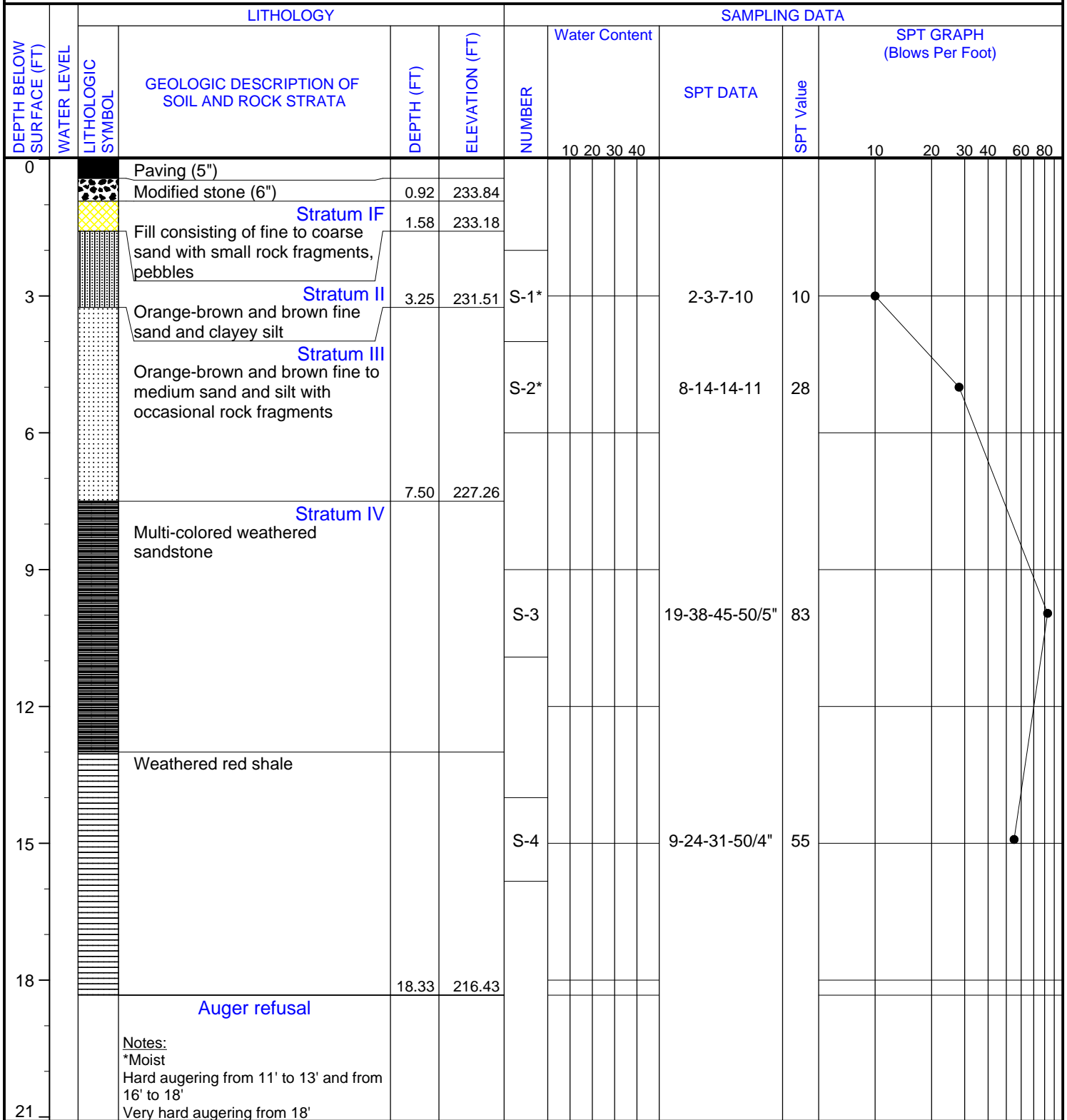
Phone: 610-495-6255 Fax: 610-495-7353
 www.dbaengineering.com

Boring Number: B2

Sheet 1 of 1

Project: Harmonville Fire House
 Location: 904 Germantown Pike
 Twp/City/State: Plymouth Meeting/ Montgomery County/ PA
 Drilling Contractor: Corcoran Drilling Co. Inc.
 X Coordinate (ft): Y Coordinate (ft):
 Drilling Method #1: 6" Solid Auger from 0' to 18.33'
 Drilling Method #2:

Project Number: 5679G1
 Date Drilled: 11/05/2024
 Inspected By: AYM
 Boring Depth: 18.33'
 Ground Surface Elevation (ft msl): 234.76
 Water Level - Immediate (ft bgs): Dry (5 min)
 Water Level - Static (ft bgs): Dry (5 Hrs.)



The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water level. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.



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Geotechnical & Environmental Engineers

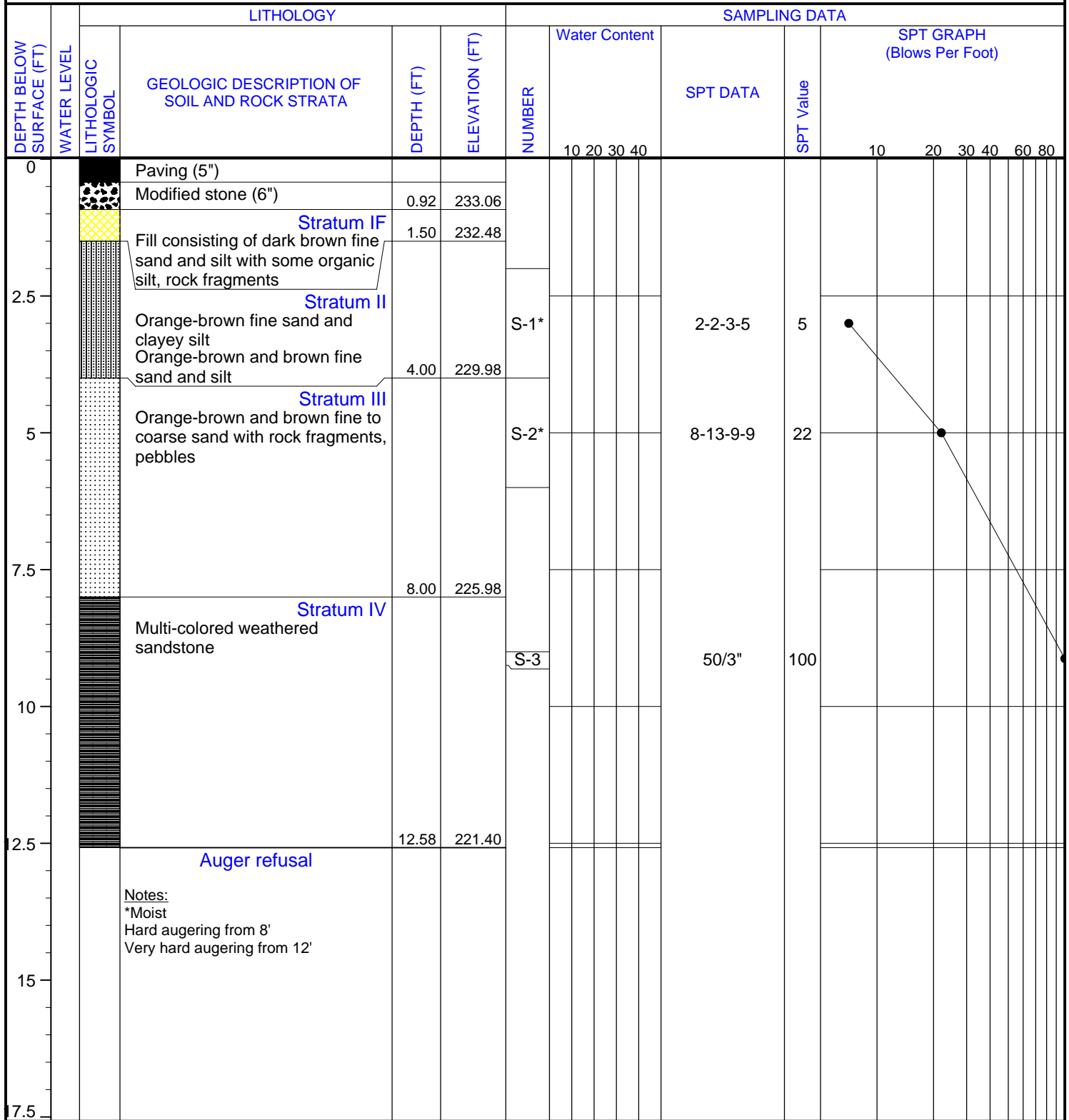
Phone: 610-495-6255 Fax: 610-495-7353
 www.dbaengineering.com

Boring Number: B3

Sheet 1 of 1

Project: Harmonville Fire House
 Location: 904 Germantown Pike
 Twp/City/State: Plymouth Meeting/ Montgomery County/ PA
 Drilling Contractor: Corcoran Drilling Co. Inc.
 X Coordinate (ft): Y Coordinate (ft):
 Drilling Method #1: 6" Solid Auger from 0' to 12.58'
 Drilling Method #2:

Project Number: 5679G1
 Date Drilled: 11/05/2024
 Inspected By: AYM
 Boring Depth: 12.58'
 Ground Surface Elevation (ft msl): 233.98
 Water Level - Immediate (ft bgs): Dry (5 min)
 Water Level - Static (ft bgs): Dry (5 Hrs.)



The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water level. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.



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Geotechnical & Environmental Engineers

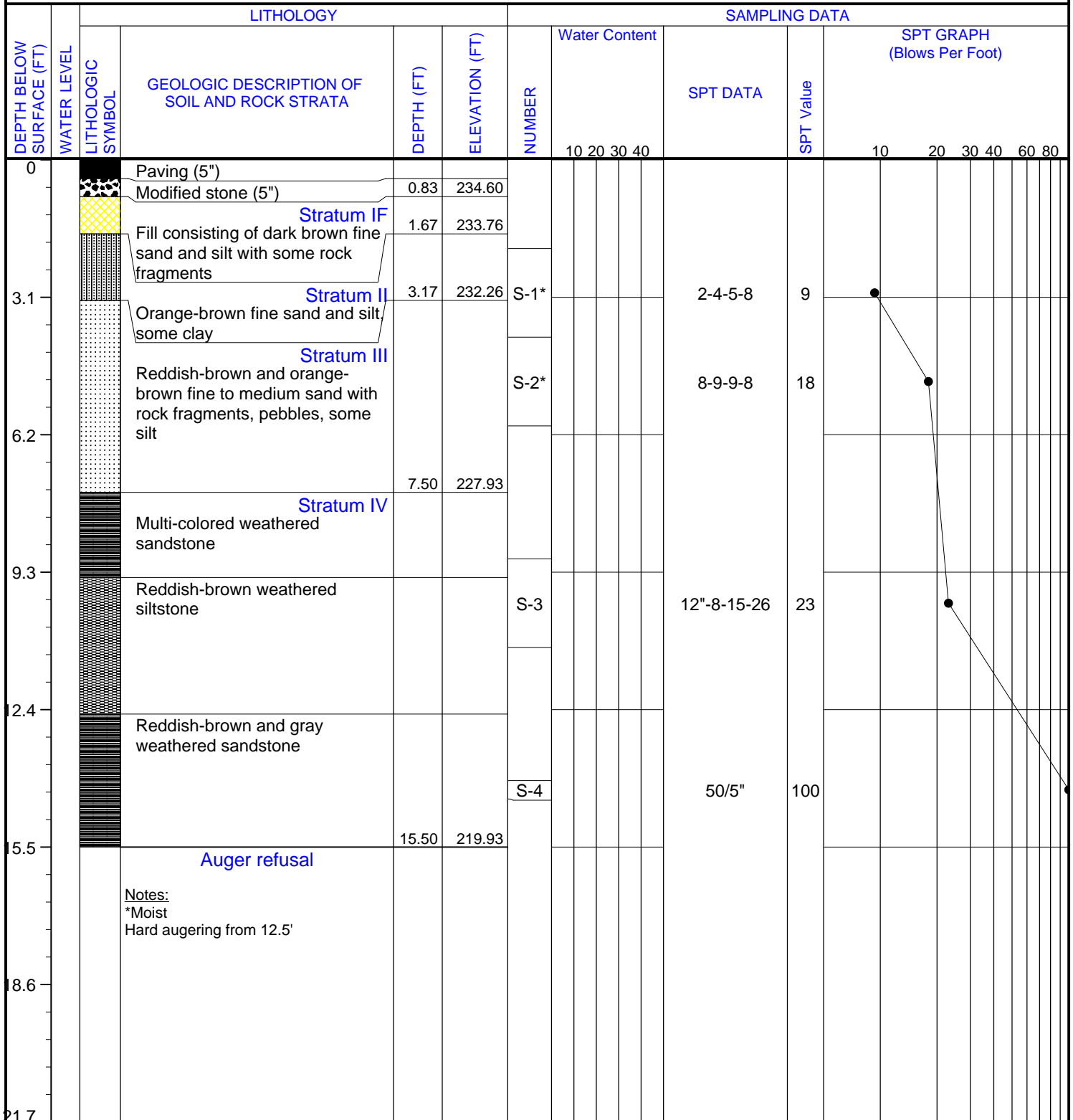
Phone: 610-495-6255 Fax: 610-495-7353
 www.dbaengineering.com

Boring Number: B4

Sheet 1 of 1

Project: Harmonville Fire House
 Location: 904 Germantown Pike
 Twp/City/State: Plymouth Meeting/ Montgomery County/ PA
 Drilling Contractor: Corcoran Drilling Co. Inc.
 X Coordinate (ft): Y Coordinate (ft):
 Drilling Method #1: 6" Solid Auger from 0' to 15.5'
 Drilling Method #2:

Project Number: 5679G1
 Date Drilled: 11/05/2024
 Inspected By: AYM
 Boring Depth: 15.5'
 Ground Surface Elevation (ft msl): 235.43
 Water Level - Immediate (ft bgs): Dry (5 min)
 Water Level - Static (ft bgs): Dry (5 Hrs.)



The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water level. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.



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Geotechnical & Environmental Engineers


Phone: 610-495-6255 Fax: 610-495-7353
 www.dbaengineering.com

Boring Number: B5

Sheet 1 of 1

Project: Harmonville Fire House
 Location: 904 Germantown Pike
 Twp/City/State: Plymouth Meeting/ Montgomery County/ PA
 Drilling Contractor: Corcoran Drilling Co. Inc.
 X Coordinate (ft): Y Coordinate (ft):
 Drilling Method #1: 6" Diamond Bit from 0" to 6"
 Drilling Method #2: Split spoon from 1' to 10.87'

Project Number: 5679G1
 Date Drilled: 11/05/2024
 Inspected By: AYM
 Boring Depth: 10.83'
 Ground Surface Elevation (ft msl): 235.54
 Water Level - Immediate (ft bgs): Dry (5 min)
 Water Level - Static (ft bgs): Dry (5 Hrs.)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGY				SAMPLING DATA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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TEST BORING LOCATION PLAN



Site Borings on Site Aerial Photograph



KEY
Test Boring Location

GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

DAVID BLACKMORE & ASSOC., INC.

3335 West Ridge Pike

Pottstown, Pennsylvania 19464

Telephone: (610) 495-6255 FAX: (610) 495-7353

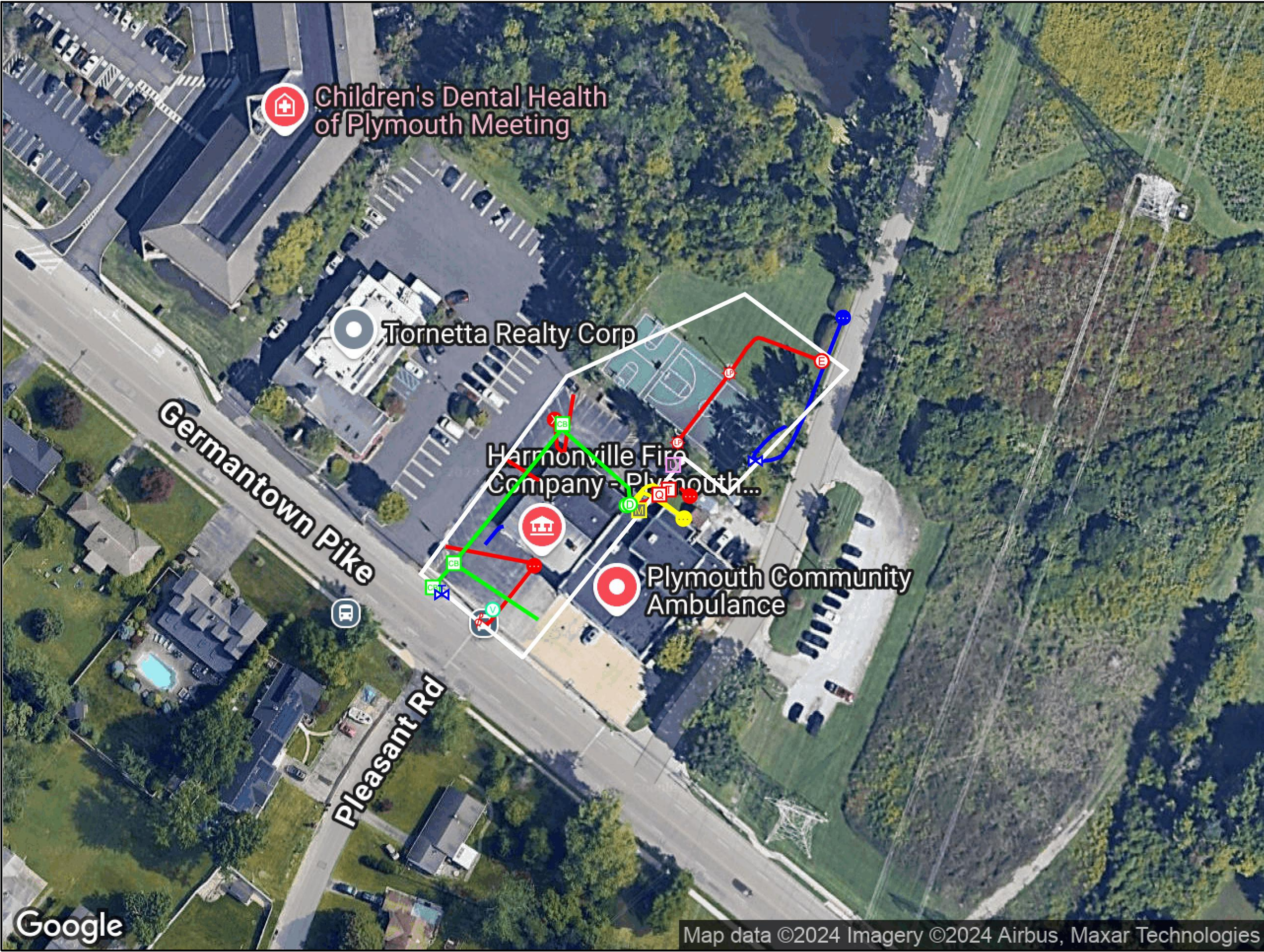
Project 5679G1



TEST BORING LOCATION PLAN

Harmonville Fire Station

904 Germantown Pike

Plymouth Meeting, Montgomery County, PA





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LEGEND

- **ELECTRICAL**
- **FUEL/GAS/OIL**
- **SANITARY**
- **STORM**
- **UNKNOWN**
- **WATER**
- - - - - **SCAN LIMIT**

0' 25' 50' 75' 100'



Know what's below.
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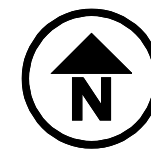
PREPARED FOR:
DAVID BLACKMORE AND ASSOCIATES

LOCATION:

**904 GERMANTOWN PIKE
PLYMOUTH MEETING, PA**

PROJECT MANAGER:
**STEVE LOGUE
STEVE.LOGUE@GPRSINC.COM**

DATE	2024 NOV 11		
DRAWING NO.	1	REV.	0



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LEGEND



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Call before you dig.

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**FOR INFORMATION
ONLY**

GPRS FINDINGS MAP

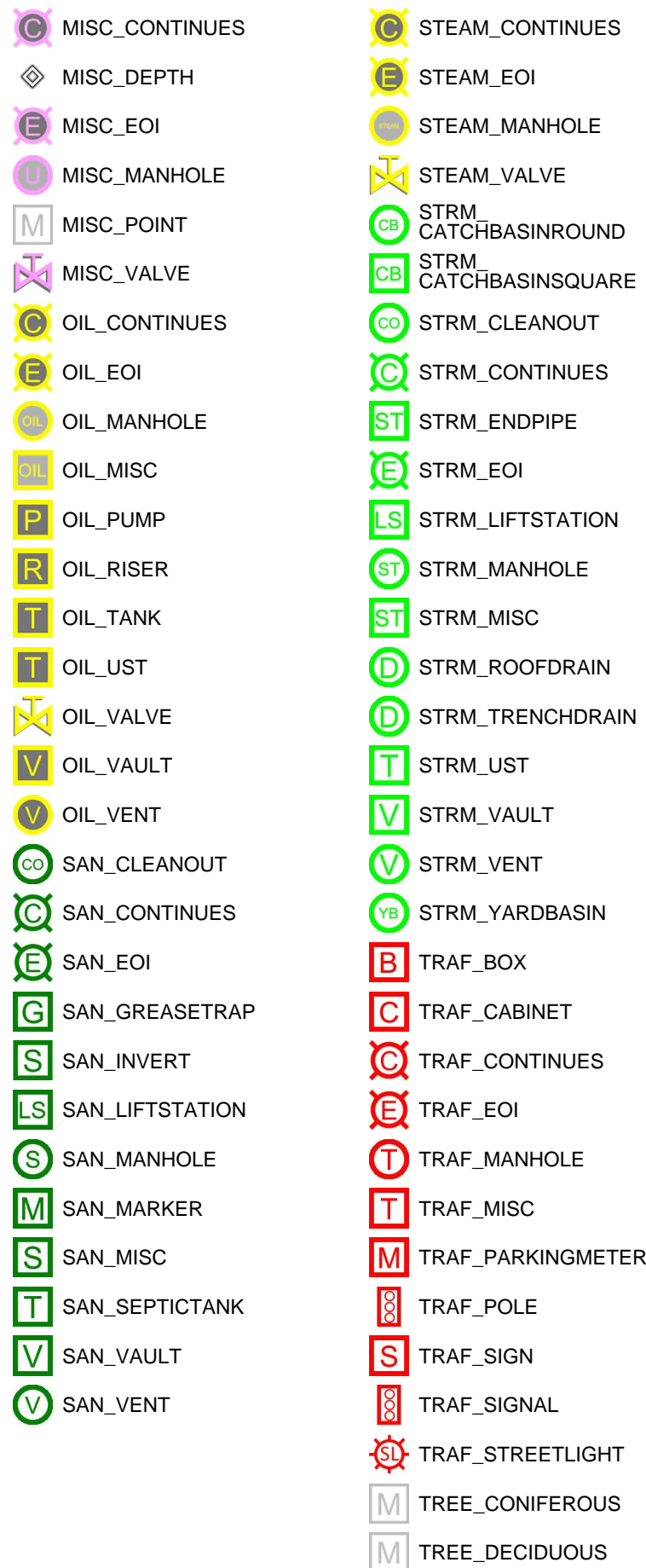
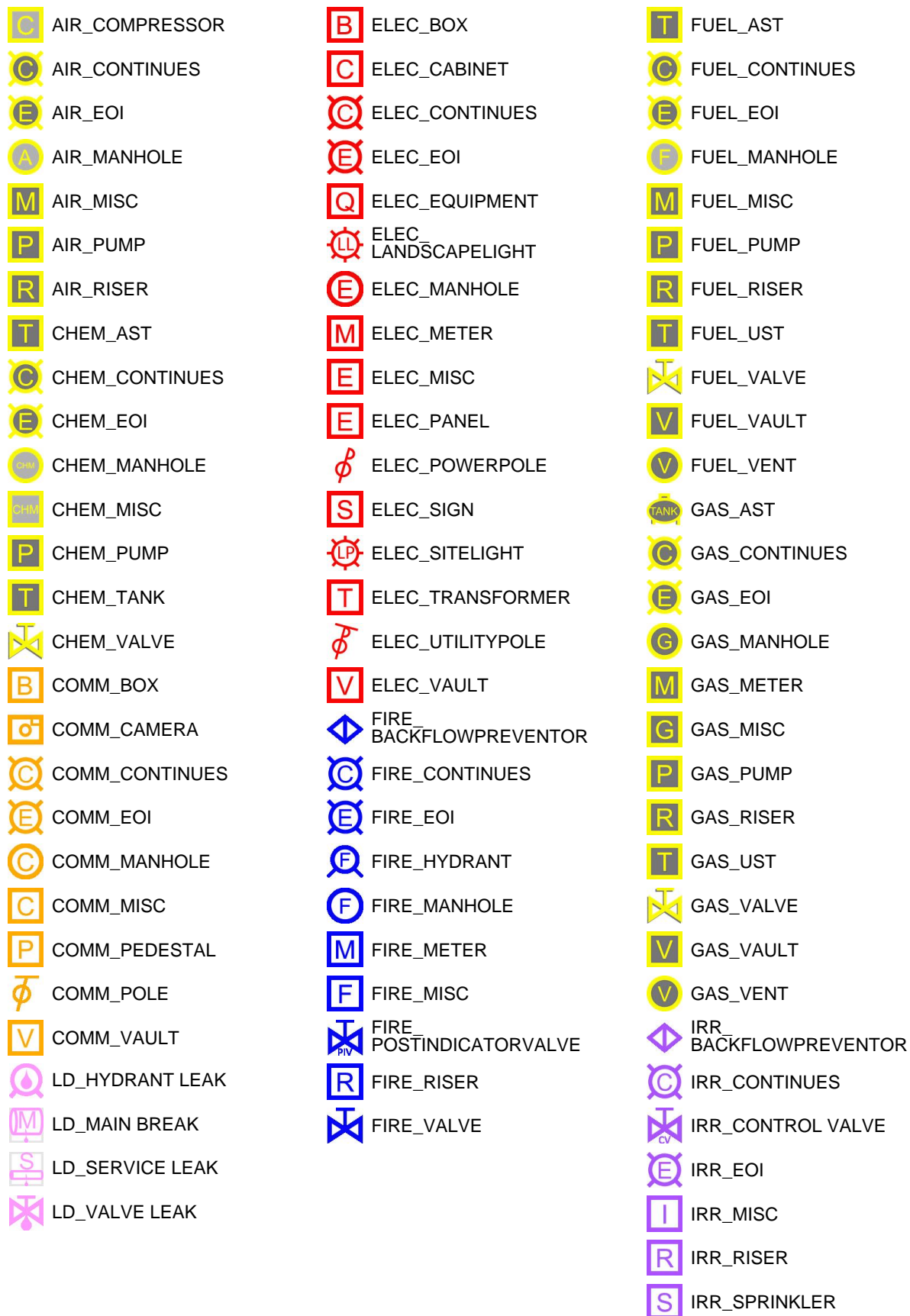
PREPARED FOR:
DAVID BLACKMORE AND ASSOCIAT

LOCATION:

**904 GERMANTOWN PIKE
PLYMOUTH MEETING, PA**

PROJECT MANAGER:
STEVE LOGUE
STEVE.LOGUE@GPRSINC.COM

DATE	2024 NOV 11		
DRAWING NO.	2	REV.	0





HAZARDOUS MATERIAL INSPECTION REPORT

**HARMONVILLE FIRE COMPANY
PLYMOUTH MEETING, PA**

**HARMONVILLE FIRE COMPANY #1
STATION B**

**904 GERMANTOWN PIKE
PLYMOUTH MEETING, PA**

PREPARED FOR: Mr. Jerry Vetter

PREPARED BY: **Connell-Greene Consulting, Inc.**
Downingtown, Pennsylvania
484.432.9363

REPORT DATE: October 28, 2024

PROJECT NUMBER: 1024-01-3694

HAZARDOUS MATERIAL INSPECTION REPORT

**HARMONVILLE FIRE COMPANY
PLYMOUTH MEETING, PA**

**HARMONVILLE FIRE COMPANY #1
STATION B**

**904 GERMANTOWN PIKE
PLYMOUTH MEETING, PA**

**CONNELL-GREENE CONSULTING, INC.
PROJECT #: 1024-01-3694**

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Lead Paint Data Sheet.....	Appendix
Lead Laboratory Analysis Data Sheet.....	Appendix

BUILDING INSPECTOR:

Richard A. Pellissier, PA Insp. # 033725

Date

REPORT PREPARED BY:

Connell-Greene Consulting, Inc.
By: Richard A. Pellissier, President

Date

The information presented in the attached report represents a confidential work product between the Client and Connell-Greene Consulting, Inc. in accordance with the contract documents and or mutual conveyances agreed upon for the performance of said work. Prior approval must be obtained prior to reproduction of this document for any other purpose other than for which it intended.

Inquiries regarding the work performed or findings should reference the assigned Project Number.

EXECUTIVE SUMMARY

In October 2024, Connell-Greene Consulting, Inc. was retained by the Harmonville Fire Company #1 to perform a preliminary Hazardous Material Inspection at Station B located at 904 Germantown Pike in Plymouth Meeting, Pennsylvania. Specifically, this inspection was performed as part of a planned demolition of the subject structure.

Connell-Greene Consulting, Inc.'s inspection was limited to a visual inspection of the subject building to identify the presence of suspect hazardous materials including asbestos, lead-based paint, mercury, PCB's and other hazardous materials that would impact demolition activities. Restrictions and limitations to Connell-Greene Consulting, Inc.'s inspection and services performed as part of this project are detailed in the Restrictions and Limitations Sections of this Report.

Richard A. Pellissier, Connell-Greene Consulting, Inc.'s State of PA Licensed Building Inspector performed this inspection on October 11 and 18, 2024.

INSPECTION RESULTS

Results indicate that the following suspect environmental concerns are present:

Asbestos

Sampling of accessible materials within the building as well as the exterior indicated no asbestos materials.

Inaccessible/hidden materials that may be encountered during demolition activities should be tested as required.

Both the OSHA Asbestos Construction Standard (29 CFR 1926.1101) and EPA Title 15, Chapter 53, Subchapter II, 2642, defines asbestos-containing materials as "any material containing more than 1% asbestos". Sample results reported as <1% or trace are not considered asbestos containing materials under these Standards, but contain asbestos in quantities of <1%.

Lead

A comprehensive lead paint inspection was not performed. However, eight typical components representing the paint present were tested throughout the building. None of the eight samples contained lead based paint (> 0.5% by weight).

Two of the eight samples contained detectable levels of lead but are not considered lead based. Paint sample analysis indicated the presence of lead (<0.5% by weight) on the following surfaces:

Office Bay Area

- Wall, block, light taupe
- Window frame on wall near woman's room, wood, taupe

The remaining six samples were below the analytical detection limit.

The Federal Register, Vol. 61, No. 169, defines Lead-Based Paint as paint or other surface coatings that contain lead equal to or in excess of 1.0 milligram per square centimeter (mg/cm²) or more than 0.5% by weight.

Refrigerant

Verify that any HVAC refrigerant from refrigerators and other equipment has been captured prior to removing/disposing of the equipment.

Mercury

Fluorescent tubes were observed throughout the building. Most tubes are “eco” type tubes that contain reduced amounts of mercury. These tubes may be disposed of as universal waste. However, approval from the selected landfill should be obtained prior to shipment. If tubes are the older, non-eco type bulbs, they should be disposed of properly. Other bulb types such as high-pressure sodium, strobes and halogen that may be present should be collected for proper disposal.

PCB's

PCB's may be present in light ballasts throughout the complex. If ballasts are not explicitly labeled “non-PCB”, they should be collected for disposal at an approved facility.

Miscellaneous/Stored Materials

The following stored materials were observed:

- Oils
- Paints
- Cleaning/maintenance chemicals
- O2 bottles
- Fire extinguishers

General

Further evaluation should be made of suspect materials located during demolition activities. If unknown/unidentified materials are encountered, work in that area should stop and the subject material identified as asbestos/non-asbestos or as hazardous/non-hazardous.

Asbestos containing materials should be abated prior to demolition. A licensed contractor using licensed workers should perform all abatement. All abated materials should be disposed of as asbestos containing waste.

Components with lead based paint should be placed in a waste dumpster for disposal. The waste stream in this dumpster should be tested to determine if it is hazardous waste using the Toxicity Characteristic Leaching Procedure (TCLP) for lead.

Asbestos sample analysis was performed by Polarized Light Microscopy in accordance with EPA Method 600/R-93/116 at EMSL Analytical, Inc. located in Plymouth Meeting, PA (NVLAP #200699-0).

Lead paint sample analysis was performed by Flame AA (SW 846 3050B/7000B) at EMSL Analytical, Inc. located in Indianapolis, IN (LLC-ELLAP 157245).

RESTRICTIONS

Limitations/restrictions to Connell-Greene Consulting, Inc.'s hazmat/asbestos identification survey include:

- No inspection/sampling was performed on electrical equipment or wire wrap.
- No inspection was performed within doors including fire doors.
- No inspection was performed on water heaters and similar equipment.
- No roof cores samples were collected.

APPENDIX

SUSPECT ASBESTOS MATERIAL INVENTORY DATA SHEETS

ASBESTOS LABORATORY ANALYSIS DATA SHEETS

SUSPECT LEAD-BASED PAINT DATA SHEETS

LEAD PAINT LABORATORY ANALYSIS DATA SHEETS

Connell/Greene Consulting, Inc

SUSPECT MATERIAL INVENTORY DATA SHEET

CLIENT: Harmonville Fire Company #1, Station B
LOCATION: 904 Germantown Pike
Plymouth Meeting, PA
PROJECT #: 1024-01-3694
DATE: 10/28/2024

Space/Area	Material Description / Sample Location	Approximate Quantity	Friable (Y/N)	Condition (G/F/P)	Debris (Y/N)	Sample Number	Lab Results ACM (POS/NEG)
Office Bay	Drywall / HVAC room	Throughout	N	G	N	1	NEGATIVE
	Joint compound / HVAC room	Throughout	N	G	N	2	NEGATIVE
	Floor tile, 12x12 cream / HVAC room	Throughout	N	F	N	3	NEGATIVE
	Mastic associated w/ sample #3 / HVAC room	88 s.f.	N	F	N	4	NEGATIVE
	Ceiling tile, dot/fissure (older) / HVAC room	88 s.f.	Y	G	N	5	NEGATIVE
	Floor tile, 12x12 green / custodial closet	9 s.f.	N	G	N	6	NEGATIVE
	Mastic associated w/ sample #6 / custodial closet	9 s.f.	N	G	N	7	NEGATIVE
	Floor tile, 12x12 tan / woman's room	22 s.f.	N	G	N	8	NEGATIVE
	Mastic associated w/ sample #8 / woman's room	22 s.f.	N	G	N	9	NEGATIVE
Main Bay	Textured concrete wall	480 s.f.	N	G	N	10	NEGATIVE
	Ceiling tile, smooth / laundry room	56 s.f.	Y	G	N	11	NEGATIVE

Both the OSHA Asbestos Construction Standard (29 CFR 1926.1101) and EPA Title 15, Chapter 53, Subchapter II, 2642, defines asbestos-containing materials as "any material containing more than 1% asbestos". Sample results reported as <1% or trace are not considered asbestos containing materials under these Standards. **Note: Estimated quantities represent subject material present in entire Space/Area.**

Connell/Greene Consulting, Inc

SUSPECT MATERIAL INVENTORY DATA SHEET

CLIENT: Harmonville Fire Company #1, Station B
LOCATION: 904 Germantown Pike
Plymouth Meeting, PA
PROJECT #: 1024-01-3694
DATE: 10/28/2024

Space/Area	Material Description / Sample Location	Approximate Quantity	Friable (Y/N)	Condition (G/F/P)	Debris (Y/N)	Sample Number	Lab Results ACM (POS/NEG)
Office/Lounge	Floor tile, 12x12 gray / bathroom	70 s.f.	N	G	N	12	NEGATIVE
	Mastic associated w/ sample #12	70 s.f.	N	G	N	13	NEGATIVE
	Floor tile, 12x12 lt. brown / near restroom	836 s.f.	N	G	N	14	NEGATIVE
	Mastic associated w/ sample #14	836 s.f.	N	G	N	15	NEGATIVE
	Ceiling tile, 2x4 dot/fissure / near restroom	1023 s.f.	Y	G	N	16	NEGATIVE
	Drywall / near rear door	Throughout	N	G	N	17	NEGATIVE
	Joint compound / near rear door	Throughout	N	G	N	18	NEGATIVE
	Cove molding, white / kitchen area	98 l.f.	N	G	N	20*	NEGATIVE

* Sample number 19 located in Main Bay/Loft section

Main Bay/Loft	Ceiling tile, 2x4 / loft area	2160 s.f.	Y	F	N	19	NEGATIVE
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Hall to Bays	Cove molding, black	18 l.f.	N	G	N	21	NEGATIVE
	Glue associated w/ sample #21	18 l.f.	N	G	N	22	NEGATIVE

Exterior	Stucco / rear of building	Throughout	N	G	N	23	NEGATIVE
	Roof shingles / side of building	Throughout	N	G	N	24	NEGATIVE

Both the OSHA Asbestos Construction Standard (29 CFR 1926.1101) and EPA Title 15, Chapter 53, Subchapter II, 2642, defines asbestos-containing materials as "any material containing more than 1% asbestos". Sample results reported as <1% or trace are not considered asbestos containing materials under these Standards.

Note: Estimated quantities represent subject material present in entire Space/Area.



EMSL Analytical, Inc.

5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

<http://www.EMSL.com> / plymouthmeetinglab@emsl.com

EMSL Order: 182404716

Customer ID: CONN30

Customer PO: 3694

Project ID:

Attention: Richard A. Pellissier
Connell-Greene Consulting, Inc.
904 Kings Arms Drive
Downingtown, PA 19335

Phone: (484) 432-9363

Fax: (610) 269-1985

Received Date: 10/18/2024 10:35 AM

Analysis Date: 10/22/2024

Collected Date: 10/18/2024

Project: 01-3694

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
1 182404716-0001	HVAC RM - DW	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2 182404716-0002	HVAC RM - JC	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3 182404716-0003	HVAC RM - F/T	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4 182404716-0004	HVAC RM - MASTIC	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
5 182404716-0005	HVAC RM - C/T	Gray Non-Fibrous Homogeneous	78% Cellulose 10% Glass	12% Non-fibrous (Other)	None Detected
6 182404716-0006	GUEST CLOSET - F/T	Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
7 182404716-0007	GUEST CLOSET - MASTIC	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
8 182404716-0008	WOMAN'S RM - F/T	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
9 182404716-0009	WOMAN'S RM - MASTIC	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
10 182404716-0010	MAIN BAY - TEXTURED WALL	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
11 182404716-0011	LAUNDRY - C/T	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
12 182404716-0012	MEN'S RM - F/T	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
13 182404716-0013	MEN'S RM - MASTIC	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
14 182404716-0014	OFFICE - F/T	Pink Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
15 182404716-0015	OFFICE - MASTIC	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
16 182404716-0016	OFFICE - F/T	Gray Non-Fibrous Homogeneous	89% Cellulose	11% Non-fibrous (Other)	None Detected

Initial report from: 10/22/2024 13:04:54



EMSL Analytical, Inc.

5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

<http://www.EMSL.com> / plymouthmeetinglab@emsl.com

EMSL Order: 182404716

Customer ID: CONN30

Customer PO: 3694

Project ID:

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
17 182404716-0017	OFFICE - DW	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
18 182404716-0018	OFFICE - JC	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
19 182404716-0019	MAIN BAY LOFT - C/T	Gray Non-Fibrous Homogeneous	70% Cellulose	30% Non-fibrous (Other)	None Detected
20 182404716-0020	OFFICE - COVE BASE	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
21 182404716-0021	HALL - COVE BASE	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
22 182404716-0022	HALL - COVE BASE	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
23 182404716-0023	EXTERIOR - STUCCO	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
24 182404716-0024	EXTERIOR - ROOF SHINGLE	Black Non-Fibrous Homogeneous	15% Glass	85% Non-fibrous (Other)	None Detected

Analyst(s)

Tahirrah Steele (24)

Kevin Ream, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Plymouth Meeting, PA NVLAP Lab Code 200699-0, Philadelphia ALL-292, VA 3333000315, AIHA LAP, LLC-IHLAP Accredited #178659

Initial report from: 10/22/2024 13:04:54

Connell-Greene Consulting, Inc

LEAD BASED PAINT DATA TABLE

CLIENT: Harmonville Fire Company #1, Station B
LOCATION: 904 Germantown Pike
Plymouth Meeting, PA
PROJECT #: 1024-01-3694
DATE: 10/28/2024

LOCATION	SAMPLE #	COMPONENT	SUBSTRATE	COLOR	LEAD BASED PAINT	LEAD CONTAINING PAINT	% WEIGHT
Main Bay	P1	Wall	Block	Gray	NO	NO	<0.010
Office Bay	P2	Wall	Block	Lt. Taupe	NO	YES	0.011
Office Bay	P3	Window frame	Wood	Taupe	NO	YES	0.015
Woman's room	P4	Wall	Drywall	Pink	NO	NO	<0.011
Men's room	P5	Wall	Drywall	Green	NO	NO	<0.008
Office	P6	Wall	Drywall	Tan	NO	NO	<0.008
Office	P7	Wall	Drywall	Red	NO	NO	<0.018
Office	P8	Door frame	Metal	White	NO	NO	<0.010

**EMSL Analytical, Inc.**

200 Route 130, Cinnaminson, NJ, 08077
Telephone: 856-858-4800 Fax: 856-786-5974
EMSL-CIN-01

EMSL Order ID: 012434420
LIMS Reference ID: AC34420
EMSL Customer ID: CONN30

Attention: Richard A. Pellissier
Connell-Greene Consulting, Inc. [CONN30]
904 Kings Arms Drive
Downingtown, PA 19335
(484) 432-9363
rmpell@comcast.net

Project Name: 01-3694

Customer PO: 3694
EMSL Sales Rep: Gillian Egiazarov
Received: 10/22/2024 09:30
Reported: 10/29/2024 16:21

Analytical Results

Analyte	Results	RL	Weight(g)	Prep Date & Tech	Prep Method	Analysis Date & Analyst	Analytical Method	Q	DF
Client Sample ID: P1/Main Bay - Wall - Grey							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-01		
Lead	<0.010 % wt	0.010 % wt	0.2104	10/23/24 CZX	SW-846 3050B	10/24/24 PMX	SW846-7000B	1	
Sample Comments:									
Client Sample ID: P2/Office Bay - Wall - Taupe							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-02		
Lead	0.011 % wt	0.008 % wt	0.2456	10/23/24 CZX	SW-846 3050B	10/24/24 PMX	SW846-7000B	1	
Sample Comments:									
Client Sample ID: P3/Office Bay - Window frame - Taupe							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-03		
Lead	0.015 % wt	0.010 % wt	0.198	10/23/24 CZX	SW-846 3050B	10/24/24 PMX	SW846-7000B	1	
Sample Comments:									
Client Sample ID: P4/Women'sRm - Wall - Pink							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-04		
Lead	<0.011 % wt	0.011 % wt	0.1889	10/23/24 CZX	SW-846 3050B	10/24/24 PMX	SW846-7000B	1	
Sample Comments:									
Client Sample ID: P5/Mens Rm - Wall - Green							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-05		
Lead	<0.008 % wt	0.008 % wt	0.2491	10/23/24 CZX	SW-846 3050B	10/24/24 PMX	SW846-7000B	1	
Sample Comments:									
Client Sample ID: P6/Office - Wall - Tan							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-06		
Lead	<0.008 % wt	0.008 % wt	0.2924	10/23/24 CZX	SW-846 3050B	10/24/24 PMX	SW846-7000B	1	
Sample Comments:									
Client Sample ID: P7/Office - Wall - Red							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-07		
Lead	<0.018 % wt	0.018 % wt	0.111	10/28/24 LP	SW-846 3050B	10/29/24 BL	SW846-7000B	1	
Sample Comments:									
Client Sample ID: P8/Office - Door Frame - White							Date Sampled: 10/18/24		
Matrix: Chips							LIMS Reference ID: AC34420-08		
Lead	<0.010 % wt	0.010 % wt	0.1936	10/23/24 CZX	SW-846 3050B	10/24/24 PMX	SW846-7000B	1	
Sample Comments:									

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Certified Analyses included in this Report

Analyte	Certifications
SW846-7000B in Chips	
Lead	AIHA LAP

List of Certifications

Code	Description	Number	Expires
NJDEP	New Jersey Department of Environmental Protection	03036	06/30/2025
AIHA LAP	EMSL Analytical, Inc. Cinnaminson, NJ AIHA-LAP, LLC-ELLAP Accredited	100194	01/01/2025
NYSDOH	New York State Department of Health	10872	04/01/2025
California ELAP	California Water Boards	1877	06/30/2025
A2LA	A2LA Environmental Certificate	2845.01	07/31/2026
PADEP	Pennsylvania Department of Environmental Protection	68-00367	11/30/2024
MADEP	Massachusetts Department of Environmental Protection	M-NJ337	06/30/2025
CTDPH	Connecticut Department of Public Health	PH-0270	06/23/2026

Please see the specific Field of Testing (FOT) on www.emsl.com <<http://www.emsl.com>> for a complete listing of parameters for which EMSL is certified.

Notes and Definitions

Item	Definition
Pb3	The QC sample duplicate RPD result for Lead was outside of the method control limits.
(Dig)	For metals analysis, sample was digested.
[2C]	Reported from the second channel in dual column analysis.
DF	Dilution Factor
MDL	Method Detection Limit.
ND	Analyte was NOT DETECTED at or above the detection limit.
NR	Spike/Surrogate showed no recovery.
Q	Qualifier
RL	Reporting Limit For paint chips, the RL is 0.008% by wt. (equiv. to 80 mg/kg, or ppm) based upon a minimum sample weight of 0.25 grams. For soils, the RL is 40 mg/kg (ppm) based upon a minimum sample weight of 0.5 grams. For dust wipes, the RL is 10 µg/wipe; reporting units of µg/sq. ft. are not validated by the lab based upon data provided by non-lab personnel.
Wet	Sample is not dry weight corrected.
Measurement of uncertainty and any applicable definitions of method modifications are available upon request. Per EPA NLLAP policy, sample results are not blank corrected.	

**EMSL Analytical, Inc.**

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Telephone: 856-858-4800 Fax: 856-786-5974
EMSL-CIN-01

EMSL Order ID: 012434420
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Project Name: 01-3694

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EMSL Sales Rep: Gillian Egiazarov
Received: 10/22/2024 09:30
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Owen McKenna Laboratory Manager or other approved signatory

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Analysis following EMSL SOP for the Determination of Environmental Lead by FLAA. The laboratory has a reporting limit of 0.008% by wt., based upon a minimum sample weight of 0.25g submitted to the lab, and is not responsible for any result or reporting limit provided in mg/cm² since it is dependent upon an area value provided by non-lab personnel. A "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty and definitions of modifications are available upon request. Results in this report are not blank corrected unless specified.



Lead Chain of Custody

EMSL Order Number / Lab Use Only

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

PHONE: (800) 220-3675

EMAIL: CinnaminsonLeadLab@emsl.com

AC34420

Customer Information	Customer ID:		Billing Information	Billing ID:	
	Company Name:	Connell-Greene Consulting, Inc.		Company Name:	
	Contact Name:	Richard Pellissier		Billing Contact:	SAME
	Street Address:	904 Kings Arms Drive		Street Address:	
	City, State, Zip:	Downingtown, PA 19335		City, State, Zip:	
	Country:	USA		Country:	
	Phone:	484-432-9363		Phone:	
	Email(s) for Report:	rmpell@comcast.net		Email(s) for Invoice:	

Project Name/No: 01- 3694		Purchase Order: 3694
EMSL LIMS Project ID: (If applicable, EMSL will provide)	US State where samples collected: PA	State of Connecticut (CT) must select project location: <input type="checkbox"/> Commercial (Taxable) <input type="checkbox"/> Residential (Non-Taxable)
Sampled By Name: Rick Pellissier	Sampled By Signature: <i>[Signature]</i>	No. of Samples in Shipment: 8

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 32 Hour ☒ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

Please call ahead for large projects and/or turnaround times 48 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

MATRIX	METHOD	INSTRUMENT	REPORTING LIMIT	SELECTION
CHIPS* <input checked="" type="checkbox"/> % by wt. <input type="checkbox"/> ppm (mg/kg) <input type="checkbox"/> mg/cm ² <small>*Chips reporting limit based on a minimum 0.25g sample weight. Not appropriate for Ceramic Tiles. XRF is recommended.</small>	SW 846-7000B	Flame Atomic Absorption	*Please select reporting limit on left. -0.008% -80 ppm -mg/cm ² - RL is Variable	<input checked="" type="checkbox"/>
	SW 846-6010D*	ICP-OES	*Please select reporting limit on left. -0.0004% -40 ppm -mg/cm ² - RL is Variable	<input type="checkbox"/>
AIR	NIOSH 7082	Flame Atomic Absorption	4µg/filter	<input type="checkbox"/>
	NIOSH 7303M	ICP-OES	1.0µg/filter	<input type="checkbox"/>
	NIOSH 7303M	ICP-MS	0.05µg/filter	<input type="checkbox"/>
WIPE <input type="checkbox"/> ASTM <input type="checkbox"/> NON-ASTM <small>*If no box is checked, non-ASTM Wipe is assumed</small>	SW 846-7000B	Flame Atomic Absorption	10µg/wipe	<input type="checkbox"/>
	SW 846-6010D*	ICP-OES	1.0µg/wipe	<input type="checkbox"/>
TCLP	SW 846-1311 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>
	SW 846-1311 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	<input type="checkbox"/>
SPLP	SW 846-1312 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>
	SW 846-1312 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	<input type="checkbox"/>
TTLIC	22 CCR App. II, 7000B	Flame Atomic Absorption	40mg/kg (ppm)	<input type="checkbox"/>
	22 CCR App. II, SW 846-6010D*	ICP-OES	2mg/kg (ppm)	<input type="checkbox"/>
STLC	22 CCR App. II, 7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>
	22 CCR App. II, SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	<input type="checkbox"/>
Soil	SW 846-7000B	Flame Atomic Absorption	40mg/kg (ppm)	<input type="checkbox"/>
	SW 846-6010D*	ICP-OES	2mg/kg (ppm)	<input type="checkbox"/>
Wastewater	SM 3111B / SW 846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>
Unpreserved <input type="checkbox"/>				<input type="checkbox"/>
Preserved with HNO ₃ <input type="checkbox"/> PH<2	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	<input type="checkbox"/>
Drinking Water	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	<input type="checkbox"/>
Unpreserved <input type="checkbox"/>				<input type="checkbox"/>
Preserved with HNO ₃ <input type="checkbox"/> PH<2	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	<input type="checkbox"/>
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	<input type="checkbox"/>
Other:				<input type="checkbox"/>

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
P1	main bay, wall, grey		10/18/24 9am
P2	office bay, wall, TAPE		
P3	" , window frame "		
P4	woman's Rm, wall, Pick		
P5	men's Rm, wall, green		

Method of Shipment:	Sample Condition Upon Receipt:
Relinquished by: <i>[Signature]</i>	<i>[Signature]</i> 10-22-24 930
Date/Time: 10/18/24 10:30	Received by: <i>[Signature]</i>
Relinquished by:	Date/Time: 10:35am
Date/Time:	10/18/24

Controlled Document C0C-25 Lead R19 08/19/2024

*6010C Available Upon Request

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.



EMSL Order Number / Lab Use Only

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077


PHONE: (800) 220-3675

EMAIL: CinnaminsonLeadLab@emsl.com

A034420

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by: 	Date/Time: 10/16/34 10:30 am	Received by:	Date/Time
Relinquished by:	Date/Time:	Received by:	Date/Time

Controlled Document COC-25 Lead R19 08/19/2024

☐ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.



To: Wayne Doyle,
Cowan Associates

Date: January 31, 2025

Pages: 2, including this cover sheet

From: Helene Blair

Subject: Flow Test Information

COMMENTS:

Attached per your request received January 23, 2025, please find the flow information for 904 Germantown Pk., Plymouth Township.

AQUA PENNSYLVANIA, INC. - FIRE HYDRANT FLOW TEST(S)

TOWN PLYMOUTH TWP. **DATE** 1/29/2025 **OPERATORS** FORMICHELLI - WISER
PLATE J - 12 **TIME** 1:30 PM **WEATHER CONDITIONS** CLOUDY - COOL

FIRE HYD. #	LOCATION	STATIC (PSI)	RESIDUAL (PSI)	NO. OUTLETS	DIAMETER* (INCHES)	PITOT	FLOW ** (GPM)
25-312	Germantown Pk, 50' n/o Pleasant Rd	114	104				
25-303	Plymouth Valley Dr, 69' e/o Germantown Pk			1	2 1/2	78	1482

COMMENTS

diffiser used on 2 1/2" butt

The average static pressure for fire hydrant #25-312 is 110 PSI.

NAME	COMPANY	DATE

Please be advised that you should confirm the elevations of the above referenced fire hydrants in determining pressure and flow available to your service area. These figures show conditions at the time of the test. We do not guarantee that these pressures and flows will not vary due to change in system load. The analysis was not performed for duration, therefore Aqua Pennsylvania, Inc. does not guarantee this rate for any duration of time. If the static pressure is 85 PSI or above, confirm with Aqua Pennsylvania, Inc. New Business Rep. whether pressure reducing valves will be required.

**Calculation based on accepted AWWA Standard.

KEY COMPLIANCE GUIDELINES

It is suggested that a copy of this complete document be given to your Project, Construction Manager, and/or Architect so that they are fully aware of the RACP requirements related to each. This document should be included in your bid packages and should be made an addendum to any and all construction contracts, plans and specifications related to the RACP project.

Compliance with all RACP requirements, including the key items in these guidelines will be monitored frequently throughout the construction phase of your project and will be reviewed once more during the legislatively mandated close-out audit.

COMPETITIVE BIDDING REQUIREMENTS

The sole and exclusive bidding requirement for RACP projects is in the Capital Facilities Debt Enabling Act (Act 67 of 2004), which states "Notwithstanding any other provision of law, the solicitation of a minimum of three written bids for all contracted construction work on redevelopment assistance capital projects shall be the sole requirement for the composition, solicitation, opening and award of bids on such projects." Unless the terms of the law change, the Office of the Budget cannot grant waivers for bidding requirements to Grantees.

RACP projects are not subject to separation of trades. You are REQUIRED to solicit a minimum of three (3) bids for "all generally contracted work" being performed within the RACP defined scope of work. You are not required to receive three (3) bid responses. However, you should provide documentation to prove that at least three bids were solicited by providing copies of the solicitation letters (preferably on letterhead of the bidding entity) used in the bidding process. You are not required to select the lowest bidder, but if you do not, you will have to provide a brief written justification for your selection. Note: there is NO threshold level under the RACP program regardless of the size or dollar amount associated with the work to be performed. You need to show that you solicited a minimum of three (3) bids for any contract to be eligible for RACP.

Bidding is acceptable at either the general contractor level (described in option a. below) or at the sub-contractor level (described in option b. below):

- **General Contractor (GC) Level** - If you chose to bid at the GC level, please note that the bid should encompass the entire RACP scope of work to be performed including all associated construction work. The dollar amount bid on the project must include 100% of the work to be performed by the GC and the sub-contractors. Bidding at the GC level will require submission of bidding and construction related documents at the GC level only (see Sub-Contractor level below for a distinction)
- **Sub-Contractor Level** - If you choose not to solicit three bids for a General Contractor, then you are required to solicit a minimum of three bids for EACH Sub-Contractor covering all trades involved in the project. Note that any self-performed work by a non-bid GC is NOT an eligible cost for reimbursement OR match purposes. Bidding at the Sub-Contractor level will require submission of bidding and construction related documents at the sub level...meaning proof of

bidding, construction contracts, payment and performance bonds, insurance etc. will need to be provided for every sub-contractor in the RACP scope.

Professional Services: Professional services associated with the project are not required to be bid as these associated costs are only eligible as match.

Change Orders: Grantees and/or Sub-Grantees are not required to competitively bid out change orders as long as the work was within the RACP scope of the original bid and is less than 20% of the total contract. If a change order is for work beyond the RACP scope of work originally bid, the Grantee will be required to competitively bid out the new scope of work in order to be considered RACP eligible.

PENNSYLVANIA STEEL PRODUCTS PROCUREMENT ACT

The Office of the Budget (OB) cannot grant waivers to the Pennsylvania Steel Products Procurement Act (SPPA) unless the terms of the law change. All RACP Grantees must comply with the SPPA. If a Grantee/RACP project fails to abide by the SPPA, it does so at its own risk.

[A full explanation on the RACP steel requirements is available as a PDF download.](#)

Up to 2011, OB only accepted the ST-4 Form (justification for the use of foreign steel) that the Department of General Services (DGS) had exclusively devised to address exceptions linked to the requirements of the SPPA, when it was necessary. Since 2011, OB has approved the acceptability of two more DGS ST Forms (ST-2, ST-3) with some caveats, providing that the forms are properly filled out. The ST-1 Form will not be accepted by OB. It is not necessary for the ST-2, ST-3, and ST-4 Forms to be notarized.

Effective January 1, 2013, OB began utilizing the DGS Exempt Machinery and Equipment Steel Products listings ([2023](#), [2022](#), [2021](#)) as part of our steel policy. DGS published a Statement of Policy- Steel products procurement in the Pennsylvania Bulletin Volume 43, Number 6 dated February 9, 2013 (See PA Bulletin #43, pages 85-86) that discussed the exemption of certain steel products, based on their analysis of ST-4 forms submitted that list products not produced domestically in sufficient quantity. DGS publishes an updated "Exemption List" annually.

Please be aware that ST forms are acceptable only in cases where nonstructural steel needs to be addressed. The DGS ST forms do not replace the steel certification forms associated with structural steel. OB will continue to require the submission of steel mill certifications to demonstrate compliance with the steel requirements for structural steel.

The PDF copies of the three acceptable ST Forms for RACP listed below can be obtained from the RACP website:

- [ST-2 Steel Origin Certification: Non-Identifiable, Non-Structural Steel](#)
- [ST-3 75% U.S. Manufacture Certification](#)
- [ST-4 Not Domestically Manufactured: Prime Contractor](#) (only to be used when requesting items to be exempted that are not found on the current year's List of Exempt Machinery and Equipment Steel Products)

It is suggested that the certifications be collected at the time any steel for the project is purchased and delivered to ease the collection process.

Be advised that OB DOES NOT need to approve the ST forms prior to the start of the construction period. The ST forms need to be submitted to demonstrate that compliance, when and where necessary, has been met.

We shall deem as ineligible all contracts that are unable to demonstrate compliance via the submission of steel certifications for Structural Steel and for Non-structural Steel the submission of steel certifications and/or ST forms and/or DGS Exempt Machinery and Equipment Steel Products List. Therefore, the value of construction contracts associated with non-compliant steel will be removed (both materials and labor costs) from the scope of the project, which may in turn affect the project's ability to leverage their full grant amount (project may not receive its full grant).

Recycled products, melted from previously used steel, are acceptable, providing that adequate documentation from the supplier has been furnished. The supplier shall certify that the recycled steel product was produced in the USA.

TRADE PRACTICES ACT

In accordance with the Trade Practices Act of July 23, 1968, P.L. 686 (71 P.S. § 773.101 et seq.), the Grantee cannot and shall not use or permit to be used in the work any aluminum or steel products made in a foreign country which is listed below as a foreign country which discriminates against aluminum or steel products manufactured in Pennsylvania. The countries of Argentina, Brazil, South Korea, and Spain have been found to discriminate against certain products manufactured in Pennsylvania. Therefore, the purchase or use of those countries' products, as listed below, is not permitted:

- **Argentina:** carbon steel wire rod and cold-rolled carbon steel sheet.
- **Brazil:** welded carbon steel pipes and tubes; carbon steel wire rod; tool steel; certain stainless steel products, including hot-rolled stainless steel bar; stainless steel wire rod and cold-formed stainless steel bar; pre-stressed concrete steel wire strand; hot-rolled carbon steel plate in coil; hot-rolled carbon steel sheet; and cold-rolled carbon steel sheet.
- **South Korea:** welded carbon steel pipes and tubes; hot-rolled carbon steel plate; hot-rolled carbon steel sheet; and galvanized steel sheet.
- **Spain:** certain stainless steel products, including stainless steel wire rod, hot-rolled stainless steel bars; and cold-formed stainless steel bars; pre-stressed concrete steel wire strand; and certain steel products, including hot-rolled steel plate, cold-rolled carbon steel plate, carbon steel structural shapes; galvanized carbon steel sheet, hot-rolled carbon steel bars, and cold-formed carbon steel bars.

Penalties for violation of the above paragraphs may be found in the Trade Practices Act, which penalties include becoming ineligible for public works contracts for a period of three years.

This provision in no way relieves the Grantee of responsibility to comply with those provisions which prohibit the use of foreign-made steel and cast iron products.

PUBLIC WORKS CONTRACTORS' BOND LAW (PAYMENT & PERFORMANCE BONDS)

The requirement for 100% payment and performance (P&P) bonds is a state law; the Office of the Budget cannot waive this requirement.

A performance bond must be obtained at 100% of the contract amount, conditioned upon the faithful performance of the contract in accordance with the plans, specifications, and conditions of the contract. Such bond shall be solely for the protection of the contracting body which awarded said contract.

A payment bond must be obtained at 100% of the contract amount. Such bond shall be solely for the protection of claimants supplying labor or materials to the Grantee, its contractor or to any of its subcontractors, in the prosecution of the work provided for in such contract, and shall be conditioned for the prompt payment of all such material furnished or labor supplied or performed in the prosecution of the work. "Labor or materials" shall include public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the site.

PA PREVAILING WAGE ACT (PWA)

The Office of the Budget cannot grant waivers for the PA Prevailing Wage Act. All Grantees must comply with the act. Grantees that fail to abide by the Prevailing Wage Act do so at their own risk. Please do not assume that PA Prevailing Wage is always consistent with your local union wages.

All projects should apply for a wage determination letter prior to the start of construction by registering the project with the PA Department of Labor and Industry to obtain the prevailing wage rates relevant to your project. This determination sheet will provide the necessary trade classifications for the project, along with their corresponding hourly wage and hourly fringe rates that are required for the certified payrolls required as part of RACP. The wage determination should be obtained within 120 days of the award of construction contracts. If necessary, the Department of Labor and Industry can issue determinations letters after construction has begun.

The prevailing wage information and forms can be found on the [PA Department of Labor & Industry website](#).

AMERICANS WITH DISABILITIES ACT (ADA)

Typically your architect should provide a letter stating the plans and specs are in compliance with ADA regulations. Additionally, the Grantee agrees to comply with the General Prohibitions Against Discrimination, 28 C.F.R. § 35.130, and all other regulations promulgated under Title II of The Americans with Disabilities Act which are applicable to all benefits, services, programs, and activities provided by the commonwealth through contracts.

FIDELITY BONDS

The Grantee shall procure and furnish evidence to OB of fidelity bonds with coverage to be maintained under the administrative title of the position in amounts and for such positions as are reasonably

determined by OB. Fidelity Bonding is also commonly known as "Employee Dishonesty Insurance." The minimum level of coverage should equal the average monthly RACP reimbursement amount based on the total grant amount.

INSURANCE REQUIREMENTS

- Worker's Compensation Insurance - The Grantee shall provide Worker's Compensation Insurance where required, and shall accept full responsibility for the payment of premiums for Worker's Compensation Insurance and Social Security, as well as income tax withholding and any other taxes or payroll deductions required by law for its employees who are performing services related to the project.
- General Liability & Property Damage Insurance - The Grantee will provide and maintain comprehensive general liability and property damage insurance in the minimum amount of \$250,000.00 per person for injury and death in a single occurrence; \$1,000,000.00 per occurrence for injury or death of more than one (1) person in a single occurrence; and \$500,000.00 for a single occurrence of property damage, and which shall be endorsed to protect the commonwealth.
- Flood Insurance – If the project is wholly or partially within a floodplain, proof of sufficient flood insurance coverage must be provided. In any case, a project is required to provide a copy of a floodplain map of the project area, with the project site being delineated thereon.

Identify Commonwealth as Additional Insured: The commonwealth shall be listed on the above insurance policies as an additional insured. Upon request, the Grantee shall furnish proof of insurance as required by this section to OB.

RESTRICTIONS ON GOVERNMENTAL ENTITIES SELLING RACP PROJECTS

Article 8 of the RACP Grant Agreement spells out sale price restrictions for a governmental entity that sells property that was acquired and/or improved with RACP funds. The restrictions are required to insure that the Grantees CANNOT sell the property for a net gain or even recoup the value of the grant in the sale price. [A PDF download is available that contains more information on Article 8.](#)

**GUIDANCE ON STEEL CERTIFICATION RELATIVE TO THE
REDEVELOPMENT ASSISTANCE CAPITAL PROGRAM (RACP)**

Updated March 2023

The following guidance is a clarification from the Office of the Budget (OB) regarding the requirements associated with the Pennsylvania Steel Products Procurement Act (SPPA) relative to the RACP program whose statutes are regulated under Act 1 of 1999, as amended. In the past, many a grantee has inquired about specific cases and we were able to provide each individual project with specific directions. Additionally, we had only accepted the ST-4 form that the Department of General Services (DGS) had exclusively devised to address exceptions linked to the requirements of the SPPA in the handling of special cases or exceptions. Please note that cost consideration (or convenience) is not an acceptable justification that the ST-4 form can address. Filled out ST-4 forms premised on cost consideration will not be accepted by OB.

Effective immediately, OB will accept two more DGS ST forms (ST-2, ST-3) with some caveats, providing that the forms are properly filled out. The ST-1 form is NOT a valid option and shall NOT be accepted by OB. It is not necessary for the ST-2, ST-3, and ST-4 forms to be notarized. Please, be advised that this guidance is specifically tailored to suit the published and programmatic needs of OB as the overseer of RACP program. This is not a commonwealth-wide policy. Any attempt to impose this guidance on other state agencies is strongly discouraged.

Please, be aware that the aforementioned ST forms are acceptable only in cases where non-structural steel needs to be addressed. The DGS ST forms do not replace the steel certification forms associated with structural steel. It remains the responsibility of the project representatives to provide documented evidence that a non-structural steel product is not domestically produced in sufficient quantities.

OB shall continue to require that steel mill certifications be submitted to demonstrate compliance with the steel requirements. Please, be further advised that OB DOES NOT need to approve the ST forms prior to the start of the construction period. The ST forms need to be submitted to demonstrate that compliance, when and where necessary, has been met. The ST forms exceptions are displayed below. Please, contact us if you have any questions.

It is suggested that the certifications be collected at the time any steel for the project is purchased and delivered to ease the collection process.

Effective January 1, 2013 OB began utilizing the DGS Exempt Machinery and Equipment Steel Products listings as part of the RACP steel policy. DGS published a Statement of Policy - Steel Products Procurement in the Pennsylvania Bulletin Volume 43, Number 6 dated February 9, 2013 (See PA Bulletin #43, pages 85-86) that discussed their production of an annual list, based on their analysis of submitted ST-4 forms, which exempts certain steel products not produced domestically in sufficient quantity.

No other changes in RACP steel policy resulted from this new adjustment; consequently, the use of steel certificates for structural steel will still be required. Please note that the use of ST 2, 3, and 4, as requested for other steel products, will still be utilized unless an exemption based on the list has been formulated and forwarded to OB.

RACP Policy for Compliance with the Steel Products Procurement Act:

Two distinct approaches are presented below:

Structural Steel Products

Pursuant to the SPPA, OB will require a mill certificate containing the statement "milled, melted, and manufactured in the USA" for all structural steel products used on RACP projects. We shall deem as ineligible all contracts that are unable to demonstrate compliance via the submission of steel certifications. Therefore, the value of construction contracts associated with non-compliant steel will be removed (both materials and labor costs) from the scope of the project.

Non-Structural Steel Products

Pursuant to the SPPA, OB will require, either, a mill certificate containing the statement "milled, melted, and manufactured in the USA" or the appropriate ST form or an **Exemption Request** to utilize the DGS current years' Final List of Exempt Machinery and Equipment Steel Products to demonstrate compliance associated with the non-structural steel products used on RACP projects. OB shall deem as ineligible all contracts that are unable to demonstrate compliance via the submission of steel certifications /**ST forms/Exemption Request** based on the DGS Exempt Machinery and Equipment Steel Products listing. Therefore, the value of construction contracts associated with non-compliant steel will be removed (both materials and labor costs) from the scope of the project.

Recycled products, melted from previously used steel, are acceptable, providing that adequate documentation from the supplier has been furnished. The supplier shall certify that the recycled steel product was produced in the USA.

Furthermore, the burden of proof for all non-structural steel products not produced domestically in sufficient quantities is still the project's responsibility to provide.

Please be aware that the acceptance of ST forms is contingent upon the form being fully filled-in and compliant with the submission guidelines for steel certifications for DGS projects (see attached) with the following exceptions:

- A. It is not necessary for the forms to be notarized; however, all ST forms must be signed. Original signatures or electronic signatures through Adobe fill/sign, DocuSign, or Nuance (program which allows electronic signature similar to Adobe fill/sign) are acceptable.
- B. Any questions regarding steel certification submissions and/or compliance with the Act shall be submitted to OB (Scott Bowman - scotbowman@pa.gov).
- C. The Steel certification forms do NOT need to be submitted and approved by OB before the steel product arrives on site so as not to interfere with the project construction schedule.
- D. OB assumes responsibility for acceptance of the DGS ST forms in accordance with this policy.

Completion of the ST-2, ST-3, and ST-4 forms shall follow the DGS directions attached to the form with the following exceptions:

- o ST forms do NOT need to be submitted and approved by OB before the steel product arrives on site so as not to interfere with the construction schedule.

- o RACP ME# assigned to the project shall be inserted in all areas requiring the DGS contract number (Line#5).
- o RACP official project name shall be inserted in all areas requiring the contract title (Line #6).

Note:

Acceptance of each ST form shall be determined by OB at its sole discretion. All documents and other information to be delivered in order to demonstrate compliance with the steel requirements shall be and are, in form, content and substance, subject to the approval of OB, which approval may be withheld or delayed at OB's discretion. OB reserves the right to reject all improperly filled out or unsupported ST forms.

Below are links to PDF copies of the three acceptable ST Forms that can be obtained from the RACP website:

- [ST-2 Steel Origin Certification: Non-Identifiable, Non-Structural Steel](#)
- [ST-3 75% U.S. Manufacture Certification](#)
- [ST-4 Not Domestically Manufactured: Prime Contractor](#) (only to be used when the items requested to be exempted are not found on the appropriate year's List of Exempt Machinery and Equipment Steel Products [see section below entitled "Year of DGS Exemption Listing to Use"])

To implement the RACP policy on Non-structural Steel Exemption Request utilizing the DGS's current years' Final List of Exempt Machinery and Equipment Steel Products, referred to as the "Exemption List", please follow the below requirements:

1. The Project must be under "active" construction (workers on site) on or AFTER 1/01/2013 (RACP effective date) to use the "Exemption List".
2. "Active" construction does not include performance of just "punch list" items.
3. Effective date is based on the "active" construction date and not the date the machinery and equipment were purchased.
4. There is no retroactive application of utilization of the "Exemption List".
5. No ST-4 form is required for a RACP Exemption Request based on the "Exemption List".
6. RACP Exemption Request (to utilize the "Exemption List") must come from a contractor involved in the construction of the project and be:
 - On Construction Company Letterhead.
 - Dated and Signed by appropriate company official (does not need to be notarized).
 - Should be addressed to Office of Budget
 - Should contain RACP project name and/or ME #
 - Lists any/all machinery and equipment that the Company is requesting to have exempted from ST-4 documentation.
 - All items listed on RACP Exemption Request letter must clearly match-up to an item on the appropriate year's "Exemption List" and the Exemption List year should be notated for each item.
 - There can/may be multiple construction company RACP Exemption Request letters utilized for various machinery and equipment, as applicable, per project.
 - Exemption Request can be submitted directly by the project to OB or through the State Assigned Consultant for their project.

- Any questions regarding the exemption request submission and/or compliance with the SPPA shall also be submitted to OB, to the attention of Scott Bowman, Scotbowman@pa.gov

Year of DGS Exemption Listing to Use:

A project should be using the exemption listing for when they are in active construction. For example, if construction was active (and complete) in 2019 they would use the 2019 listing. If a project overlaps a calendar year, they should use the latest listing in which construction is active. For example, if construction is active in 2019 and 2020, they would use the 2020 listing.

If a project is phased, they should use the listing for the year they are in active construction for each phase. For example, if the first phase starts and ends in 2020 whereas the second phase starts and ends in 2021, the first phase would use the 2020 listing while the second phase would use the 2021 listing. If a phase overlaps a calendar year, follow the 1st paragraph above.

Among other items, the DGS web page for Steel Products Procurement Act information includes links for a copy of the Act; the current year's Final List of Exempt Machinery and Equipment Steel Products; the PA Bulletin's Steel Products Procurement Act Statement of Policy; and Frequently Asked Questions. Certain prior years DGS Exemption Lists are downloadable from the RACP website.

Please be aware that all other steel items not specifically exempted or that may require any type of interpretation would be discretionary to OB's policy. Be reminded that this exemption listing is not effective for structural steel.

Note:

Acceptance of each Exemption Request shall be determined by OB at its sole discretion. All documents and other information to demonstrate compliance with the steel requirements shall be in form, content, and substance, subject to the approval of OB, which approval may be withheld or delayed at OB's discretion. OB reserves the right to reject all improperly filled out or unsupported Exemption Request.

2023 List of Exempt Machinery and Equipment Steel Products

The Department of General Services (DGS) has reviewed all comments and supporting documentation received prior to the end of the thirty-day (30) comment period and presents here its annual list of exempt machinery and equipment steel products. Contractors, subcontractors, suppliers, bidders, offerors and public agencies may rely on the list of exempt steel products in preparing bids and contracts for any project that is subject to the Steel Products Procurement Act.

Pursuant to the department's Statement of Policy and the Steel Products Procurement Act, DGS will not make any changes to this list during the calendar year for which it was created. In early 2024 DGS will identify, from ST-4 waivers approved in calendar year 2023, specific machinery and equipment steel products that have been recognized as not being produced in the United States in sufficient quantities to meet the 2023 contract requirements. Those items will be added to the list presented below and the resultant list will be published in the Pennsylvania Bulletin for a thirty-day (30) public comment period at that time.

Exempt Machinery and Equipment Steel Products

Air Conditioning Units
Air Duct Housing w/Sample Tubes
Air Handling Units
Anchor Bolt
Audio RA Station
Annunciator Panel
AV Rack Kit
Back Box
Backflow Preventer
Battery Cabinet
Blank Filler Plate for Fiber (for rackmount and wall mount enclosures)
Blank Metal Door
Blank Plate for Outer Door
Bottom Dead Front Panel
Bridge for Cameras
~~Butterfly Valves~~ (No Longer Exempt)
Cabinet
Cardcage
Cast Steel Gate Valve
CCTV Power Supply
Ceiling Flange
Central Control Unit
Centrifugal pumps

Channel Video
Circulating Pump
Closers
Color Monitor
Combination Round Head Steel Zinc- Plated Toggle Bolts
Condensing Boilers
Conduit Fittings
Control Module Plate
Control Panel
Control Valve
Data Converter Unit
Deck Inserts
Deck and Rub Rail Fasteners
Digital Communicators
Digital Record
Door Protection
Door Trim/Handles
Drinking Fountain
Drip Pan ELL
Drop-In Anchors
Dry Tape Transformer
Drywall Screws
Dual Interface Module
Duct Detector w/Relay
Duct Housing
Ductless Split System
DVR Rack
Electric Traction Elevators
Electric Water Cooler
Elevator Controller
Elevator Hoistway
Encl. for Annunciator
Exit Devices
Exp Cage
Fence System Nuts and Bolts
Fire Alarm NAC Extender
Fire Alarm Peripherals
Fixed Door Station
Flexible Drops
Full Blank Plate
Galvanized Carriage Bolts

Garage Door Tracking
Gas Furnace
Gas Piping Butt Weld Tees
Generator
Globe Valve (Steam)
Hand Dryer
Hanger Mounting Plates
Hangermates
Hangers Supports
Horn/Strobe
Inclined Platform Wheelchair Lifts
Inner & Outer Door
Inner Door Blank Plate
Interface Module
Lag Bolts
Large Remote Cab
Lighting Fixtures, Interior/Recessed
Lighting Fixtures, Surface Wrap
Lighting Fixtures, Track Head
Lock Cylinders
Locknuts
Locksets
Low Temp. Detection Thermostats
Lubrication Unit
Machine Screws
Main Control Board
Metal Lockers
Manual Pull Station
Med. Enclosure
Middle Dead Front
Mini-Interface Module
Monitor Mount
Monitor Wall Brk
Mounting Plate
Network Fiber Switch
Overhead Door
Overhead Stops
Patient Wandering Alarm
Pipe Clamps
Pivots
Power Supply
Pull Station Box

RA Annunciator Panel
Rack Mount Card Cage
Rack Mount Kit
Radiant Panels
Reader Interface
Relay Module
Remote Chiller
Round Head Machine Screw
Safety Relief Valve
Sampling Tube
Security Panel
Security Unit
Security/CCTV Camera Housing
Self-Turn / Self Tapping Screw
Shower/eye Washers
Signal Extender Module
Single Blank
Smoke Detector Wire
Speaker
Speaker/Strobe
Split HVAC System
Split Ring Hangers
Split Rings
Split System Air Conditioning
SSD-C Remote Display w/Control
SSD-C-REM Rem Display
Stainless Flat Bars
Stainless Steel Cable
Strobe
Submersible pump
Sump Pump
Surface Mount Speaker
Surface Station Box
Surge Arrester
Surge Protector
T8 Light Troffer
Tamper Proof Screws & Nuts
Threaded Rod Hanger
Tie Wire 21 gauge
Tie Wire Anchor
Toggle Wing

Transformer
Turbine Pumps
Uninterruptible Power Supply
VRV Fan Coils/Cond. Units
Wall Mounted Boiler
Wall Mounted Fountain
Water Coolers
Water Fountain Mounting Frame
Water Heater
Wing Toggle

ST-2

This form must be filled out for non-identifiable, non-structural steel products.

SECTION A

To be filled out by the Purchaser, the firm that pays the Fabricator

Line #1 This is the name of the firm that is dealing directly with the Fabricator

Line #2 This is the purchaser's mailing address.

Line #3 This is the purchaser's business phone.

Line #4 This is the date the ST-2 form is sent to the fabricator.

Line #5 This is the ~~DGS contract number or~~ **RACP ME#** for the project.

Line #6 This is the ~~DGS project description~~ **RACP Project Name.**

Line #7 This is the "steel product" being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like "structural steel", "heating unit" or "air conditioning Unit". The model number, if any, of the steel product must be listed as indicated.

<p>LINE #7 IS THE MOST CRITICAL PART OF THE FORM. FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE SUBMITTED.</p>

SECTION B

To be filled out by the Fabricator, the firm that assembles the product listed on Line #7.

Line #1 This is the Fabricator's name.

Line #2 This is the Fabricator's mailing address.

Line #3 This is the Fabricator's business phone.

Line #4 This is the date the Fabricator receives the ST-2 from the Purchaser.

Line #5 This is the Fabricator's Federal I.D. number.

SECTION C

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-1 form. The Prime Contractor's President/Vice President must sign on one line and the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature lines. Failure to type in the names **does not** invalidate the ST form.

ST-2 STEEL ORIGIN CERTIFICATION:
NON-IDENTIFIABLE, NON-STRUCTURAL STEEL

This form must be executed by the Purchaser and the Fabricator of any item containing steel that is not structural steel. This form must be submitted to the APM within 30 days from the date the Professional approved a submittal listing a "steel product". No steel product may be delivered on-site unless DGS has received the ST form. Structural steel is defined as steel products used as a basic structural element or a project (i.e. steel beams, columns, decking stairways, reinforcing bars, pipes, etc.). Purchasers of structural steel products (contractors or subcontractors) **must** provide bills of lading, invoices **and** mill certifications that the steel was manufactured in the United States instead of this form. The Fabricator shall be herein defined as the firm that assembles the component parts of the product to be purchased. The Department of General Services will accept the certification of firms that are earlier in the chain of purchase (i.e. manufacturers of components, steel suppliers) in lieu of the Fabricator.

A. TO BE COMPLETED BY THE PURCHASER:

1. Name of purchasing firm: _____
 2. Firm's address: _____
 3. Firm's phone number: _____ 4. Date submitted to Fabricator: _____
 5. Contract No. DGS _____ 6. Contract Title: _____
 7. Steel Product Certified: _____
- Model: _____

B. TO BE COMPLETED BY THE FABRICATOR/MANUFACTURER:

1. Name of firm: _____
2. Address of firm: _____
3. Firms phone number: _____ 4. Date Received: _____
5. Federal Employer ID. No: _____

CERTIFICATION: I, the undersigned officer of the Fabricator/Manufacturer, do certify that our firm assembled/fabricated the components to the steel products listed in Section A, Item 7, and that all steel components therein are comprised of steel that is melted and/or fabricated in the United States. I understand that, by signing this document, I certify that I have received assurances from the suppliers/manufacturers of the components that said components do not contain foreign manufactured steel. I further understand that this document is subject to the provisions of the Unsworn Falsification to Authorities Act (18 P.S. § 4904). I also understand that I am subject to the provisions of the Steel Products Procurement Act (73 P.S. § 1881, et. seq.) which provides penalties including, but not limited to, debarment from supplying any products for Commonwealth of Pennsylvania Public works projects for a period of five (5) years for violations therein. I agree to provide documentation supporting these facts if requested by the Commonwealth. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

WITNESS:

Name:
Secretary or Treasurer

Name: _____ (Seal)
President or Vice President

ST-3

2-STEP ELIGIBILITY ANALYSIS:

BEFORE A PRIME CONTRACTOR CAN SUBMIT AN ST-3, THE FOLLOWING ANALYSIS MUST BE SATISFIED

STEP #1: The contractor must establish that the “product” **contains BOTH:**

- Steel melted in the USA

AND

- Foreign Steel

Note: Step #1 focuses upon the **content** of the “product”.

Note: The % need not be close; it can be 99-1, so long as there is both foreign and domestic steel in the “product”.

STEP #2: The contractor must establish that 75% of the **cost** of the “product” has been mined, produced or manufactured in the USA.

Note: Step #2 focuses upon the cost of the entire “product”, not just the steel within it.

SECTION A

Line #1 This is the Prime Contractor’s name.

Line #2 This is the Prime Contractor’s business address.

Line #3 This is the Prime Contractor’s phone number.

Line #4 This is the date the ST-3 is submitted to the fabricator.

Line #5 This is ~~DCS contract number or~~ **RACP ME#** for the project for the project.

Line #6 This is the ~~DCS project description~~ **RACP Project Name.**

Line #7 This is the “steel product” being certified, such as a chiller, condenser, hollow metal doors. The prime contractor **may not** fill in the line with a description like “structural steel”, “heating unit” or “air conditioning unit”. The model number, if any, or the steel product must be listed as indicated.

<p>LINE #7 IS THE MOST CRITICAL PART OF THE FORM. FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE SUBMITTED.</p>

SECTION B **To be filled out by the Fabricator/Manufacturer, the firm that fabricates the product listed on Line A7.**

Line #1 This is the Fabricator's name.

Line #2 This is the Fabricator's business address.

Line #3 This is the Fabricator's business phone.

Line #4 This is the date the Fabricator receives the ST-3 from the purchaser.

Line #5 This is the Fabricator's Federal I.D. Number.

Line #6 The Fabricator must insert the percentage of the cost of the articles, materials and supplies which have been mined, produced or manufactured in the U.S. for the product listed on Line #7.

SECTION C

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-3 form. The Fabricator's President/Vice President must sign on one line **and** the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature lines. Failure to type in the names does not validate the ST form.

NOTES on ST-3 Forms:

- It is not necessary to submit an ST-1 with the ST-3.
- **DGS reserves the right to request additional documentation to support the percentage specified on Line 14. If the Fabricator/manufacturer refuses to produce such documentation and/or DGS deems it to be in the Commonwealth's best interests, DGS may request the Office of Inspector General to investigate the submission of the ST-3 form.**

ST-3
75% U.S. MANUFACTURE CERTIFICATION

The Steel Products Procurement Act (73 P.S. § 1881, et. seq.) allows the use of steel products with **both** foreign and domestic steel **if at least 75 percent of the cost** of the materials (including steel, rubber, wood, plastics, etc.) in the product are manufactured or produced, as the case may be, in the United States.

This form must be executed by a Fabricator of any item containing BOTH U.S. AND FOREIGN STEEL. The fabricator shall hereby be defined as the firm that assembles the component parts of the product to be purchased. The Department of General Services will accept the certification of firms that are **earlier** in the chain of purchase (i.e., manufacturers of components, steel suppliers) in lieu of the Fabricator.

This form must be submitted to the APM within 30 days from the date the Professional approves a submittal listing a "steel product". No steel product may be delivered on-site unless DGS has received an ST form.

A. TO BE COMPLETED BY THE PRIME CONTRACTOR (PURCHASER):

1. Name of Contractor: _____
2. Address of Contractor: _____
3. Phone Number: _____ 4. Date submitted to Fabricator: _____
5. Contract No. DGS: _____ 6. Contract Title: _____
7. Steel Product Certified: _____
Model: _____

B. TO BE COMPLETED BY THE FABRICATOR/MANUFACTURER:

1. Name of Firm: _____
2. Address of Firm: _____
3. Firm's Phone number: _____ 4. Date Received: _____
5. Federal Employer ID No. _____

6. Percentage of the cost of the articles, materials and supplies which have been mined, produced or manufactured in the U.S. for the product listed above on line 7: _____

CERTIFICATION: I, the undersigned Officer of the Fabricator/Manufacturer, do certify that our firm assembled/manufactured the components to the steel product listed in Section 7, that the steel in said product is both foreign and domestically manufactured, and that all the facts contained in this document are true. I agree to provide documentation supporting these facts if requested by the Commonwealth. I further understand that this document is subject to the provisions of the unsworn Falsification to Authorities Act (18 P.S. § 4904) and the Steel products Procurement Act (73 P.S. § 1881, et seq.) which provide penalties including, but not limited to, debarment from supplying any products for Commonwealth of Pennsylvania public works projects for a period of five (5) years for violations therein. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

WITNESS:

Name:
Secretary or Treasurer

Name: (Seal)
President or Vice President

ST-4

This form may be submitted in circumstances where the Prime contractor believes that the “product” on Line #7 is not made in sufficient quantities to satisfy the requirements of the contract.

The information submitted by a Prime contractor is subject to verification by the Department. Any Prime contractor who executes a Purchase Order or other type of purchase agreement encompassing a “steel product” prior to receiving the Department’s written determination that the “steel product” listed on Line #7 of the ST-4 form is not manufactured in sufficient quantity to meet the requirements of the project does so at its own risk and faces penalties including, but not limited to, non-payment for the product; removal and replacement of the product at its own costs; and/or an Office of Inspector General investigation which may lead to debarment.

**Domestic availability will be determined as of the date
the ST-4 form is submitted to DGS for approval**

Line #1 this is the Prime Contractor’s formal business name.

Line #2 This is the Prime Contractor’s business address.

Line #3 This is the Prime Contractor’s business phone.

Line #4 This is the date the ST-4 form is submitted to ~~DGS~~. Office of the Budget.

Line #5 This is the ~~DGS contract number or~~ RACP ME# for the project.

Line #6 This is the ~~DGS project description~~ RACP Project Name.

Line #7 This is the “steel product” being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like “structural steel”, “heating unit” or air conditioning unit”.

**LINE #7 IS THE MOST CRITICAL PART OF THE FORM.
FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM
MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE
SUBMITTED FOR APPROVAL.**

Line #8 These four lines, (a) through (d), are to be filled out completely by the Prime Contractor. At least four suppliers/manufacturers must be contacted by the Prime Contractor to ascertain if the “product” on Line #7 is manufactured with domestic steel.

CERTIFICATION

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-4 form. The Prime Contractor’s President/Vice President must sign on one line **and** the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature line. Failure to type in the names **does not** invalidate the ST form.

NOTE ON ST-4 FORMS:

- It is not necessary to submit an ST-1 form with an ST-4 form.

ST-4 NOT DOMESTICALLY MANUFACTURED: PRIME CONTRACTOR

This form must be executed by the Prime Contractor and submitted to the APM within 30 days from the date the Professional approves a submittal listing a “steel product”. No steel product may be delivered on-site unless DGS has received, reviewed and provided written approval of the ST-4 form. An ST-4 form can only be submitted for approval when a steel product is not domestically produced in sufficient quantities. DGS will verify the accuracy of the information on the ST-4 form and will contact additional suppliers/manufacturers to ascertain the availability of a domestic steel product.

1. Prime Contractor:_____ 2. Address:_____
3. Phone Number:_____ 4. Date Submitted:_____ 5. Contract No. DGS:_____
6. Contract Title:_____ 7. Steel Product:_____
8. Suppliers/manufacturers contacted by the Prime Contractor that claimed that the above product is not produced/manufactured with U.S. manufactured steel. At least four Suppliers/Manufacturers are needed. Manufacturers listed in specifications must be contacted.
 - a. Firm Name:_____ Phone Number:_____
Address:_____
Person Contacted:_____ Date Contacted:_____
 - b. Firm Name:_____ Phone Number:_____
Address:_____
Person Contacted:_____ Date Contacted:_____
 - c. Firm Name:_____ Phone Number:_____
Address:_____
Person Contacted:_____ Date Contacted:_____
 - d. Firm Name:_____ Phone Number:_____
Address:_____
Person Contacted:_____ Date Contacted:_____

CERTIFICATION: I, the undersigned Officer of the Contractor, do certify that I have contacted the firms listed in Section 9, and was informed that said firms do not produce/manufacture the steel product listed on Line 7 with U.S. Steel in sufficient quantities to complete the above-referenced project. I understand that this document is subject to the provisions of the Unsworn Falsifications to Authorities Act (18 P.S. § 4904) and the Steel Products Procurement Act, which provide penalties including, but not limited to, debarment from bidding on any Commonwealth of Pennsylvania public works project for a period of five years. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth’s interest and ensure compliance with the laws of the Commonwealth.

WITNESS:

Name:
Secretary or Treasurer

_____(SEAL)
Name:
President or Vice President

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

DOCUMENT 00 4333 - SUBCONTRACTOR AND MAJOR MATERIALS SUPPLIER'S LIST

1. Bidder, upon Notice of Intention to Award shall complete the attached form for submission to the Architect. In all cases, this list shall be submitted no less than ten (10) days prior to a Subcontractor starting work.
 - A. Bid Form Supplement:
 - 1) CSI 15.1 - Subcontractor and Major Materials Suppliers List (1 sheet).
 - B. Required information: Each Bidder shall identify on the attached form Subcontractors for all work which the Bidder is not qualified to perform or which the Bidder will not be doing with his own forces. Bidder shall also list all major material suppliers. List shall be acceptable to the Architect.

END OF DOCUMENT 00 4333



SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____ From (Contractor): _____

Date: _____
To (A/E): _____ A/E Project Number: _____

Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact
-------------------	------------------	------	---------	------------------------------	---------

☐ Attachments

Signed by: _____ Date: _____

Copies: ☐ Owner ☐ Consultants ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ File

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

SECTION 00 5216 - AGREEMENT FORM

The “Standard Form of Agreement, modified by the Owner for this project, shall be in effect for the duration of this project. A draft copy of the modified Agreement Form is bound herein.

- A. The Form of the Agreement for the Work shall be written on AIA Document A101 – 2017 Edition, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

END OF SECTION 00 5216

DRAFT AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

« Plymouth Township »« »
« 700 Belvoir Road »
« Plymouth Meeting, PA 19462 »
« »

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

« A New Fire Station for Harmonville Fire Company – Plymouth Valley Station »
« 904 Germantown Pike »
« Plymouth Meeting, PA 19462 »

The Architect:
(Name, legal status, address and other information)

« »« »
Kelly Clough Bucher and Associates (DBA KCBA Architects) »« »
8 East Broad Street »
Hatfield, PA 19440 »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
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EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- ☐ [« »] The date of this Agreement.
- ☒ [«X»] A date set forth in a notice to proceed issued by the Owner.
- ☐ [« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

- ☐ [« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[**« X»**] By the following date: «TBD »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
Building envelope enclosure	TBD

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » (\$ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

<< >>

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

<< >>

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

<< >>

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

<< >>

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

<< >> % << >>

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

<< >>

<< >>

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<< >>

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2017

☒ Litigation in a court of competent jurisdiction

☐ Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

« »

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

« »

« »

« »

« »

« »

« »

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

« »

« »

« »

« »

« »

« »

§ 8.4 Neither the Owner’s nor the Contractor’s representative shall be changed without ten days’ prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

<< >>

§ 8.7 Other provisions:

<< >>

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203-2013 incorporated into this Agreement.)

<< >>

- .5 Drawings

Number	Title	Date

- .6 Specifications

Section	Title	Date	Pages

- .7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

- .8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[<< >>] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

<< >>

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

« »« »

(Printed name and title)

CONTRACTOR (Signature)

« »« »

(Printed name and title)

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

DOCUMENT 00 6200 - CERTIFICATES AND OTHER FORMS

1. Information bound in the project manual and included as part of this document consists of the following information.
 - A. Administrative Forms (2 Sheets).
 - 1) Submittal Transmittal (1 sheet).
 - 2) Electronic Data Transfer Release Form.

END OF SECTION 00 6200

SUBMITTAL

Submittal #: 00-0000_100-1

PROJECT NAME

Owner: ...
Architect: KCBA Architects
Construction Manager: ...
Contractor: ...,

SPEC. INFORMATION

Spec. Section: **00 0000 "Specification Name"** Date: ...
Drawing # Ref.: _____
Subcontractor: _____
Supplier/Mfgr: _____
Installed Location: _____
LEED Point Ref.: _____

SUBMITTAL(S):

Item No.:	Copies:	Dwg. No.:	Description:	Status:
1	1			

(NET/FAC/FACR/RAR/RJ/NR)

SUBMITTAL

Submittal #: 00-0000_100-1

REVIEW:

Date Received:

Date Returned:

Contractor's Stamp:

Architect/Engineer Stamp:

Comments:

DISTRIBUTION:

- ☐ 01 – GC: ...
- ☐ 02 – MC: ...
- ☐ 03 – EC: ...
- ☐ 04 – PC: ...
- ☐ Civil Engineer – ...

- ☐ Owner –...
- ☐ CM – ...
- ☐ Architect – KCBA Architects
- ☐ MEP Engineer – ...

SUBMITTAL

Submittal #: 00-0000_100-1

ELECTRONIC DATA TRANSFER RELEASE AND LICENSE FORM

TO		ATTENTION	
		DATE	
		PROJECT	

TERMS AND CONDITIONS

1. The disc(s) which are the subject of this License Form is/are not copy protected. You are not purchasing the disk(s) or the data on the disk(s) and this transaction shall not be considered a sale of the disks or of the data on the disk(s). Payment of \$_____ is merely reimbursement for the media and the cost of transferring the data to the media. You may make backup copies for your own use. IT IS ILLEGAL TO GIVE OR SELL COPIES OF THE DISC(S) OR ANY OF THE DATA ON THE DISK(S) TO ANOTHER PERSON OR BUSINESS OR TO USE THE DISK(S) OR THE DATA ON THE DISK(S) FOR ANY PURPOSE OTHER THAN AS AUTHORIZED BY THIS FORM WITHOUT THE EXPRESSED WRITTEN CONSENT OF KELLY CLOUGH BUCHER and ASSOCIATES, INC. (KCBA INC.). The disk(s) contain the files listed on Exhibit "B" ("CAD Files & Revit Files") and the license set forth below to use the disk(s), the CAD Files & Revit Files and the data contained thereon granted by this License Form applies only to the files listed on Exhibit "B", even if other files are contained on the disk(s).
2. To the best of KELLY CLOUGH BUCHER AND ASSOCIATES Inc.'s knowledge, no computer viruses, adware, spyware or other malicious files have been detected on this disk(s). However, Recipient is solely responsible for analyzing the disk and the files contained thereon for the presence of any virus, adware, spyware or other malicious files and releases KELLY CLOUGH BUCHER AND ASSOCIATES Inc. and its employees from any liability for any damage which may be caused by the presence of such files.
3. The CAD Files & Revit Files are supplied in the following format: KELLY CLOUGH BUCHER AND ASSOCIATES INC. makes no representation as to the compatibility of the CAD Files & Revit Files with any hardware or software.
4. Since the information set forth on the CAD Files & Revit Files can be modified unintentionally or otherwise, KELLY CLOUGH BUCHER AND ASSOCIATES INC. reserves the right to remove all indicia of its ownership and/or involvement from each electronic display.
5. All information added to the drawings or other documents contained in CAD Files & Revit Files by the Recipient shall be in a distinctively heavier pen weight and different font, such that all Recipient supplied information can be clearly distinguished from the data on the CAD Files & Revit Files as delivered to Recipient.
6. Any information added by the Recipient, which represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation. This License Form does not authorize any changes to the original design. Modifications to the design required the written authorization of the Architect before they can be implemented.
7. The CAD Files & Revit Files and all information on the CAD Files & Revit Files shall be considered instruments of service of the Architect and its consultants solely for use in connection with this Project and only for the limited purpose for which the license is granted. The Architect and its consultants are the authors of their respective instruments of service and retain all common law, statutory and other reserved rights including the copyright. Upon payment of the sums due as described in paragraph 1 and compliance with all of the terms and conditions of this Form, Architect grants recipient a non-exclusive license to use the CAD Files & Revit Files for its convenience for the purpose of preparing submittals required for the Project. Payment of any fee due and the Recipient's compliance with all of the terms and conditions of this License Form are a condition precedent to the existence and continued viability of the license herein granted.

8. KELLY CLOUGH BUCHER AND ASSOCIATES Inc. makes no representation regarding the accuracy, completeness, or permanence of CAD Files & Revit Files, nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the CAD Files & Revit Files may not have been incorporated. In the event of a conflict between the Architect's sealed contract drawings and CAD Files & Revit Files, the sealed contract drawings shall govern. It is the Recipient's responsibility to determine if any conflicts exist. The CAD Files & Revit Files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction and any Supplemental Conditions. **IT IS SPECIFICALLY AGREED BY THE CONTRACTOR THAT THERE ARE NO WARRANTIES OF ANY KIND IN THE CAD FILES & REVIT FILES OR IN THE MEDIA IN WHICH THEY ARE CONTAINED, EITHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS. CONTRACTOR EXPRESSLY WAIVES ANY SUCH WARRANTIES.**
9. The use of CAD Files & Revit Files prepared by the Architect shall not relieve Recipient of any of its obligations under any contract enter into with regard to Project. Furthermore, if Recipient is a contractor, the use of the CAD Files & Revit Files does not in any way negate the Contractor's responsibility for coordination with other trades or for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection and for fulfilling all of the other obligations of the General and Supplemental Conditions and its contract, including with regard to the preparation of any submittals.
10. The Recipient releases KELLY CLOUGH BUCHER AND ASSOCIATES Inc. and its employees from any and all claims, demands or liabilities arising from Recipient's use of the CAD Files & Revit Files and covenants not to sue or bring, maintain or participate in any action or suit against KELLY CLOUGH BUCHER AND ASSOCIATES Inc. or its consultants or and of their employees arising from the use of CAD Files & Revit Files. Furthermore, the Recipient shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect and its consultants and each of their shareholders, partners, members, directors, officers and employees from and against any and all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the CAD Files & Revit Files by the Recipient, or by third party recipients of the CAD Files & Revit Files from the Recipient.
11. KELLY CLOUGH BUCHER AND ASSOCIATES Inc. believes that no licensing or copyright fees are due to others on account of this license for the use of the CAD Files & Revit Files, but to the extent any are, the Recipient will pay the appropriate fees and hold KELLY CLOUGH BUCHER AND ASSOCIATES Inc. harmless from such claims as may arise.
12. Any purchase order number provided by the Recipient is for Recipient's accounting purposes only. Recipient's purchase order terms and conditions are void and are not a part of this license.
13. Payment of the service fee is due upon delivery of the disk(s).
14. This License shall be governed by the laws of the principal place of business of the Architect. Recipient agrees that notwithstanding this License, the Recipient and Architect are not in privity for purposes of the economic loss doctrine as it applies to any claims that arise out of this Project.

Please endorse one copy of this License Form and return it to KELLY CLOUGH BUCHER AND ASSOCIATES Inc. as your acknowledgment of receipt of this data and acceptance of the terms outlined herein. Use in any form of the electronic data provided shall constitute acknowledgment of receipt and acceptance of the terms outlined herein.

RECIPIENT SIGNATURE _____

DATE _____

PRINT NAME AND TITLE _____

KELLY CLOUGH BUCHER AND ASSOCIATES INC.

AUTHORIZED SIGNATURE _____

DATE _____

PRINT NAME AND TITLE _____

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

DOCUMENT 00 6300 - CLARIFICATION AND MODIFICATION FORMS

1. Information bound in the project manual and included as part of this document consists of 5 pages containing the following information.
 - A. Administrative Forms:
 - 1) CSI 1.5C – Substitution Request - during bidding (1 sheet).
 - 2) CSI 13.1A – Substitution Request (2 sheets).
 - 3) Request for Interpretation (1 sheet).
 - 4) Architect's Supplemental Instruction (1 sheet).
 - 5) Allowance Adjustment (1 sheet).

END OF DOCUMENT 00 6300



SUBSTITUTION REQUEST

(During the Bidding Phase)

Project: _____ Substitution Request Number: _____

From: _____
To: _____ Date: _____
A/E Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____
Signed by: _____
Firm: _____
Address: _____
Telephone: _____

A/E's REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: _____

Date: _____

Supporting Data Attached: ☐ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST

Project:

Substitution Request Number:

From:

To:

Date:

A/E Project Number:

Re:

Contract For:

Specification Title:

Description:

Section:

Page:

Article/Paragraph:

Proposed Substitution:

Manufacturer:

Address:

Phone:

Trade Name:

Model No.:

Installer:

Address:

Phone:

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product:

☐ Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

Savings to Owner for accepting substitution: _____ (\$ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST (Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

☐ Substitution approved – Make submittals in accordance with Specification Section 01330.

☐ Substitution approved as noted – Make submittals in accordance with Specification Section 01330.

☐ Substitution rejected – Use specified materials.

☐ Substitution Request received too late – Use specified materials.

Signed by: _____

Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____



KCB Architects
8 East Broad Street
Hatfield, PA 19440-2401
t 215.368.5806
www.kcba-architects.com

Request For Interpretation (R.F.I.)

PROJECT:

Architects Project
No:

R.F.I. Number:

From:

Date of Issuance:

To:

Date Required By:

CC:

Specification/Drawing:

SUBJECT:

QUESTION:

INTERPRETATION:

RESPONDED BY:

RESPONSE DATE:

ATTACHMENTS:



KCBA Architects
8 East Broad Street
Hatfield, PA 19440-2401
t 215.368.5806
f 215.368.3580
www.kcba-architects.com

Architects Supplemental Instructions

PROJECT:

Architects Project No:	A.S.I. Number:
To:	Date of Issuance:
CC:	Issued By:
	Revised:

The work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time. Or, if the Contractor believes that the work described shall result in an adjustment to the Contract sum or Contact Time, the Contractor shall issue a fully itemized proposal within 10 working days. Failure to issue a proposal or written notification to the Architect within the appropriate time shall indicate the Contractor's acknowledgment that there will be no change in the Contract Sum or Contact Time.

DESCRIPTION: NAME OF CHANGE

Please provide a G709 Work Change Proposal within ten days for the noted work, if required.

ATTACHMENTS:



KCBA Architects
8 East Broad Street
Hatfield, PA 19440-2401
t 215.368.5806
f 215.368.3580
www.kcba-architects.com

Distribution to:
OWNER
ARCHITECT
CONTRACTOR
FIELD
CONSULTANT

☐
☐
☐
☐
☐

Allowance Adjustment

PROJECT:		ALLOWANCE ADJ. NO.:	
		DATE:	
CONTRACTOR:		ARCHITECT'S PROJ. NO.	
		CONTRACT DATE:	
ALLOWANCE ITEM:		CONTRACT FOR:	

DESCRIPTION OF
WORK:

The original Allowance Amount was	\$0.00
Net change by previous Adjustments	\$0.00
The Allowance Amount prior to this Adjustment was	\$0.00
The Allowance will be decreased by this Adjustment	\$0.00
The remaining Allowance Amount will be	\$0.00

Architect	Contractor	Owner
Address	Address	Address
BY	BY	BY
DATE	DATE	DATE

A New Fire Station for
Harmonville Fire Company – Plymouth Valley Station

DOCUMENT 00 7343 - PENNSYLVANIA PREVAILING WAGE RATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Document specifies administrative and procedural requirements for the implementation of Pennsylvania Prevailing Wage Rates.
- B. Pennsylvania Prevailing Wage Rates: For work with a total value in excess of \$25,000, this regulation and the general Pennsylvania prevailing minimum wage rates (Act 442 of 1961, P.L. 987, amended by Act 342 of 1963, P.L. 653 and as amended from time to time (43 P.S. § 165-1, et seq.)). amended), as determined by the Secretary of Labor and Industry, which shall be paid for each craft or classification of all workers needed to perform the contract during the anticipated term therefore in the locality in which public work is performed, are made part of the Contract Documents.
- C. Attachments: Two pages of Pennsylvania prevailing wage forms, and 8 pages of Pennsylvania prevailing wage rates are attached to the end of this document.

1.2 PENNSYLVANIA PREVAILING WAGE PROVISIONS

- A. The general provisions of the Pennsylvania Prevailing Wage Act, approved August 15, 1961, as amended are applicable to this project.
- B. The general prevailing minimum wage rates including contributions for employee benefits as shall have been determined by the Secretary of Labor and Industry (hereinafter "Secretary") which must be paid to the workmen employed in the performance of the Contract.
- C. The Contractor shall pay no less than the wage rates as determined in the decision of the Secretary and shall comply with the conditions of the Pennsylvania Prevailing Wage Act approved August 15, 1961 (Act No. 442), as amended August 9, 1963 (Act No. 342), and the Regulations issued pursuant thereto, to assure the full and proper payment of said rates.
- D. These Contract provisions shall apply to all work performed on the Contract by the Contractor and to all work performed on the Contract by all subcontractors.
- E. The Contractor shall insert in each of his subcontracts all of the stipulations contained in these required provisions.
- F. No workmen may be employed on the Work except in accordance with the classifications set forth in the decision of the Secretary. In the event that additional or different classifications are necessary the procedure set forth in the Regulations shall be followed.
- G. All workmen employed or working on the Work shall be paid unconditionally, regardless of whether any contractual relationship exists or the contractual relationship which may be alleged to exist between any Contractor, subcontractor and workmen, not less than once a week without deductions or rebate, on any account, either directly or indirectly, except

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authorized deductions, the full amount due at the time of payment, computed at the rates applicable to the time worked in the appropriate classification. Nothing in this Contract, the Act or the Regulations shall prohibit the payment of more than the general prevailing minimum wage rates as determined by the Secretary to the workmen on the Work.

- H. The Contractor and each subcontractor shall post for the entire period of construction the wage determination decisions of the Secretary, including the effective date of any changes thereof, in a prominent and easily accessible place or places at the site of the work and at such place or places used by them to pay workmen their wages. The posted notice of wage rates must contain the following information.
1. Name of project.
 2. Name of public body of which it is constructed.
 3. The crafts and classifications of workmen listed in the Secretary's general prevailing minimum wage rate determination for the particular project.
 4. The general prevailing minimum wage rates determined for each craft and classification and the effective date of any changes.
 5. A statement advising workmen that if they have been paid less than the general prevailing minimum wage rate for their job classification or that the Contractor and/or subcontractor are not complying with the Act or the Regulations in any manner whatsoever, they may file a protest with the Secretary within three (3) months of the date of the occurrence, objecting to the payment to the Contractor to the extent of the amount or amounts due or to become due to them as wages for work performed on the Project. Any workmen paid less than the rate specified in the Contract shall have a civil right of action for the difference between the wage paid and wages stipulated in the Contract, which right of action must be exercised within six (6) months from the occurrence of the event creating such right.
- I. The Contractor and all subcontractors, shall keep an accurate record showing the name, craft and/or classification, number of hours worked per day, and the actual hourly rate of wage paid (including employee benefits) to each workman employed by him in connection with the Work and such record must include any deductions from each workman. The record shall be preserved for two (2) years from the date of payment and shall open at all reasonable hours to the inspection of the Owner and to the Secretary or his duly authorized representative.
- J. Apprentices shall be limited to such numbers as shall be in accordance with a bona fide apprenticeship program registered with and approved by the Pennsylvania Apprenticeship and Training Council and only apprentices whose training and employment are in full compliance with the provisions of the Apprenticeship and Training Act approved July 14, 1961 (Act No. 304) and the Rules and Regulation issued pursuant thereto shall be employed on the Work. Any workmen using the tools of a craft who does not qualify as an apprentice within the provisions of the Apprenticeship and Training Act shall be paid the rate predetermined for journeyman in that particular craft and/or classification.
- K. Wages shall be paid without any deductions except authorized deductions. Employers not party to a Contract requiring contributions for employee benefits which the Secretary has determined to be included in the general prevailing minimum wage rate shall pay the monetary equivalent thereof directly to the workman.
- L. Payment of compensation to workmen for work performed on public work on a lump sum basis, or a piece work system, or a price certain for the completion of a certain amount of

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Harmonville Fire Company – Plymouth Valley Station

work, or the production of a certain result shall be deemed a violation of the Pennsylvania Prevailing Wage Act and the Regulations, regardless of the average hourly earnings resulting there from.

M. Prevailing Wage Certification: Each Contractor and each subcontractor shall file a statement each week and a final statement at the conclusion of the Work on the Contract with Owner, under oath, and in form satisfactory to the Secretary, certifying that all workmen have been paid wages in strict conformity with the provisions of the Contract as prescribed by the Regulations, or if any wages remain unpaid, to set forth the amount of wages due and owing to each workman respectively.

N. The provision of the Act and the Regulations are incorporated by reference in the Contract.

PART 2 - PRODUCTS (Not Used)


PART 3 - EXECUTION (Not Used)

END OF DOCUMENT 00 7343

WEEKLY PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

☐ Contractor or
 ☐ Subcontractor (Please check one)

ALL INFORMATION MUST BE COMPLETED

CONTRACTOR ADDRESS		SUBCONTRACTOR ADDRESS		 DEPARTMENT OF LABOR & INDUSTRY <small>COMMONWEALTH OF PENNSYLVANIA</small> BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGE DIVISION 7TH & FORSTER STREETS HARRISBURG, PA 17120 1-800-932-0665
PAYROLL NUMBER	WEEK ENDING DATE	PROJECT AND LOCATION		
		PROJECT SERIAL #	PROJECT #	

EMPLOYEE NAME	APPR. RATE (%)	WORK CLASSIFICATION	DAY AND DATE							S- TIME 0- TIME	BASE HOURLY RATE	TOTAL FRINGE BENEFITS (C=Cash) (FB=Contributions)*	TOTAL DEDUCTIONS	GROSS PAY FOR PREVAILING RATE JOB(S)	CHECK #
			HOURS WORKED EACH DAY												
											C:				
											FB:				
											C:				
											FB:				
											C:				
											FB:				
											C:				
											FB:				
											C:				
											FB:				

*SEE REVERSE SIDE

PAGE NUMBER _____ OF _____

THE NOTARIZATION MUST BE COMPLETED ON FIRST AND LAST SUBMISSIONS ONLY. ALL OTHER INFORMATION MUST BE COMPLETED WEEKLY.

*FRINGE BENEFITS EXPLANATION (FB): Bona fide benefits contribution, except those required by Federal or State Law (unemployment tax, workers' compensation, income taxes, etc.)

Please specify the type of benefits provided and contributions per hour:

- 1) Medical or hospital care _____
- 2) Pension or retirement _____
- 3) Life insurance _____
- 4) Disability _____
- 5) Vacation, holiday _____
- 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

1. The undersigned, having executed a contract with _____
(AWARDING AGENCY, CONTRACTOR OR SUBCONTRACTOR)
_____ for the construction of the above-identified project, acknowledges that:
 - (a) The prevailing wage requirements and the predetermined rates are included in the aforesaid contract.
 - (b) Correction of any infractions of the aforesaid conditions is the contractor's or subcontractor's responsibility.
 - (c) It is the contractor's responsibility to include the Prevailing Wage requirements and the predetermined rates in any subcontract or lower tier subcontract for this project.
2. The undersigned certifies that:
 - (a) Neither he nor his firm, nor any firm, corporation or partnership in which he or his firm has an interest is debarred by the Secretary of Labor and Industry pursuant to Section 11(e) of the PA Prevailing Wage Act, Act of August 15, 1961, P.L. 987 as amended, 43 P.S. § 165-11(e).
 - (b) No part of this contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation or partnership in which such subcontractor has an interest is debarred pursuant to the aforementioned statute.
3. The undersigned certifies that:
 - (a) the legal name and the business address of the contractor or subcontractor are: _____

 - (b) The undersigned is: ☐ a single proprietorship ☐ a corporation organized in the state of _____
☐ a partnership ☐ other organization (describe) _____
 - (c) The name, title and address of the owner, partners or officers of the contractor/subcontractor are:

NAME	TITLE	ADDRESS

The willful falsification of any of the above statements may subject the contractor to civil or criminal prosecution, provided in the PA Prevailing Wage Act of August 15, 1961, P.L. 987, as amended, August 9, 1963, 43 P.S. § 165.1 through 165.17.

(DATE)

(SIGNATURE)

(TITLE)

SEAL

Taken, sworn and subscribed before me this _____ Day
of _____ A.D., _____

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project Name:	Harmonville Fire Company - Plymouth Valley Station
General Description:	A new two story fire station of approximately 8,800 square feet in area. Project includes demolition of existing building and associated sitework.
Project Locality	904 Germantown Pike, Plymouth
Awarding Agency:	Plymouth Township
Contract Award Date:	5/1/2025
Serial Number:	25-01984
Project Classification:	Building/Highway
Determination Date:	2/25/2025
Assigned Field Office:	Philadelphia
Field Office Phone Number:	(215)560-1858
Toll Free Phone Number:	
Project County:	Montgomery County

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-01984 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	6/1/2023		\$57.84	\$43.36	\$101.20
Asbestos & Insulation Workers	5/1/2024		\$59.37	\$46.03	\$105.40
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2024		\$36.71	\$19.13	\$55.84
Boilermakers	1/1/2023		\$51.27	\$35.30	\$86.57
Boilermakers	1/1/2024		\$52.10	\$35.72	\$87.82
Bricklayer	5/1/2023		\$47.50	\$31.42	\$78.92
Carpenter - Chief of Party (Surveying & Layout)	5/1/2023		\$50.57	\$29.02	\$79.59
Carpenter - Chief of Party (Surveying & Layout)	5/1/2024		\$52.58	\$29.02	\$81.60
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		\$54.59	\$29.02	\$83.61
Carpenter - Instrument Person (Surveying & Layout)	5/1/2023		\$43.97	\$29.02	\$72.99
Carpenter - Instrument Person (Surveying & Layout)	5/1/2024		\$45.72	\$29.02	\$74.74
Carpenter - Instrument Person (Surveying & Layout)	5/1/2025		\$47.47	\$29.02	\$76.49
Carpenter - Rodman (Surveying & Layout)	5/1/2023		\$21.99	\$20.62	\$42.61
Carpenter - Rodman (Surveying & Layout)	5/1/2024		\$22.86	\$20.62	\$43.48
Carpenter - Rodman (Surveying & Layout)	5/1/2025		\$23.74	\$20.62	\$44.36
Carpenters	5/1/2023		\$43.97	\$29.02	\$72.99
Carpenters	5/1/2024		\$45.72	\$29.02	\$74.74
Carpenters	5/1/2025		\$47.47	\$29.02	\$76.49
Cement Finishers & Plasterers	5/1/2022		\$38.57	\$32.39	\$70.96
Cement Masons	5/1/2023		\$44.20	\$32.96	\$77.16
Cement Masons	5/1/2024		\$46.70	\$32.46	\$79.16
Dockbuilder, Pile Drivers	5/1/2023		\$50.48	\$37.99	\$88.47
Dockbuilder, Pile Drivers	5/1/2024		\$52.98	\$37.99	\$90.97
Dockbuilder, Pile Drivers	5/1/2025		\$55.23	\$37.99	\$93.22
Dockbuilder, Pile Drivers	5/1/2026		\$56.98	\$37.99	\$94.97
Dockbuilder/Pile Driver Diver	5/1/2023		\$58.41	\$41.74	\$100.15
Dockbuilder/Pile Driver Diver	5/1/2024		\$61.54	\$41.74	\$103.28
Dockbuilder/Pile Driver Diver	5/1/2025		\$64.35	\$41.74	\$106.09
Dockbuilder/Pile Driver Diver	5/1/2026		\$66.54	\$41.74	\$108.28
Dockbuilder/pile driver tender	5/1/2023		\$50.48	\$37.99	\$88.47
Dockbuilder/pile driver tender	5/1/2024		\$52.98	\$37.99	\$90.97
Dockbuilder/pile driver tender	5/1/2025		\$55.23	\$37.99	\$93.22
Dockbuilder/pile driver tender	5/1/2026		\$56.98	\$37.99	\$94.97
Drywall Finisher	5/1/2023		\$38.77	\$31.12	\$69.89
Drywall Finisher	5/1/2024		\$42.25	\$32.56	\$74.81
Electricians	5/2/2022		\$53.94	\$42.97	\$96.91
Electricians	5/1/2023		\$55.41	\$44.50	\$99.91
Electricians	4/29/2024		\$56.67	\$46.24	\$102.91
Elevator Constructor	1/1/2023		\$66.21	\$43.64	\$109.85
Elevator Constructor	1/1/2024		\$68.97	\$44.70	\$113.67
Elevator Constructor	1/1/2025		\$71.85	\$45.77	\$117.62
Floor Coverer	5/1/2023		\$50.12	\$29.21	\$79.33
Floor Coverer	5/1/2024		\$52.19	\$29.21	\$81.40
Glazier	5/1/2023		\$46.68	\$36.62	\$83.30

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-01984 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Glazier	5/1/2024		\$48.00	\$37.50	\$85.50
Interior Finish	5/1/2019		\$30.20	\$25.80	\$56.00
Interior Finish	5/1/2023		\$34.60	\$25.80	\$60.40
Iron Workers (Bridge, Structural, Ornamental, Precast)	1/1/2023		\$50.70	\$39.51	\$90.21
Iron Workers (Bridge, Structural, Ornamental, Precast)	7/1/2024		\$53.20	\$45.01	\$98.21
Iron Workers (Riggers)	7/1/2023		\$42.53	\$34.14	\$76.67
Iron Workers (Riggers)	7/1/2024		\$44.64	\$34.39	\$79.03
Iron Workers (Rodman/Reinforcing)	7/1/2023		\$45.70	\$34.77	\$80.47
Iron Workers (Rodman/Reinforcing)	7/1/2024		\$47.70	\$34.77	\$82.47
Laborers (Class 01 - See notes)	5/1/2022		\$33.35	\$25.65	\$59.00
Laborers (Class 01 - See notes)	5/1/2023		\$34.60	\$25.80	\$60.40
Laborers (Class 01 - See notes)	5/1/2024		\$35.85	\$26.00	\$61.85
Laborers (Class 02 - See notes)	5/1/2022		\$36.70	\$27.00	\$63.70
Laborers (Class 02 - See notes)	5/1/2023		\$37.95	\$27.30	\$65.25
Laborers (Class 02 - See notes)	5/1/2024		\$39.40	\$27.55	\$66.95
Laborers (Class 03 - See notes)	5/1/2022		\$33.77	\$25.83	\$59.60
Laborers (Class 03 - See notes)	5/1/2023		\$35.02	\$25.98	\$61.00
Laborers (Class 03 - See notes)	5/1/2024		\$36.27	\$26.18	\$62.45
Laborers (Class 04 - See notes)	5/1/2022		\$33.77	\$25.83	\$59.60
Laborers (Class 04 - See notes)	5/1/2023		\$35.02	\$25.98	\$61.00
Laborers (Class 04 - See notes)	5/1/2024		\$36.27	\$26.18	\$62.45
Laborers (Class 05 - See notes)	5/1/2022		\$33.35	\$25.65	\$59.00
Laborers (Class 05 - See notes)	5/1/2023		\$34.60	\$25.50	\$60.10
Laborers (Class 05 - See notes)	5/1/2024		\$35.85	\$26.00	\$61.85
Landscape Laborer	5/1/2023		\$29.45	\$23.98	\$53.43
Landscape Laborer	5/1/2024		\$30.70	\$24.23	\$54.93
Marble Finisher	5/1/2023		\$39.52	\$29.30	\$68.82
Marble Mason	5/1/2023		\$47.20	\$31.95	\$79.15
Mason Tender, Cement	5/1/2019		\$30.52	\$25.98	\$56.50
Mason Tender, Cement	5/1/2023		\$35.02	\$25.98	\$61.00
Millwright	5/1/2023		\$51.60	\$35.81	\$87.41
Millwright	5/1/2024		\$54.67	\$35.81	\$90.48
Millwright	5/1/2025		\$57.39	\$35.81	\$93.20
Millwright	5/1/2026		\$60.20	\$35.81	\$96.01
Operators (Building, Class 01 - See Notes)	5/1/2023		\$52.20	\$32.81	\$85.01
Operators (Building, Class 01 - See Notes)	5/1/2024		\$53.36	\$33.65	\$87.01
Operators (Building, Class 01 - See Notes)	5/1/2025		\$54.52	\$34.49	\$89.01
Operators (Building, Class 01 - See Notes)	5/1/2026		\$55.67	\$35.34	\$91.01
Operators (Building, Class 01A - See Notes)	5/1/2023		\$55.20	\$33.70	\$88.90
Operators (Building, Class 01A - See Notes)	5/1/2024		\$56.37	\$34.53	\$90.90
Operators (Building, Class 01A - See Notes)	5/1/2025		\$57.52	\$35.38	\$92.90
Operators (Building, Class 01A - See Notes)	5/1/2026		\$58.68	\$36.22	\$94.90
Operators (Building, Class 02 - See Notes)	5/1/2023		\$51.95	\$32.74	\$84.69
Operators (Building, Class 02 - See Notes)	5/1/2024		\$53.11	\$33.58	\$86.69

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-01984 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Building, Class 02 - See Notes)	5/1/2025		\$54.27	\$34.42	\$88.69
Operators (Building, Class 02 - See Notes)	5/1/2026		\$55.43	\$35.26	\$90.69
Operators (Building, Class 02A - See Notes)	5/1/2023		\$54.97	\$33.61	\$88.58
Operators (Building, Class 02A - See Notes)	5/1/2024		\$56.13	\$34.45	\$90.58
Operators (Building, Class 02A - See Notes)	5/1/2025		\$57.29	\$35.29	\$92.58
Operators (Building, Class 02A - See Notes)	5/1/2026		\$58.44	\$36.14	\$94.58
Operators (Building, Class 03 - See Notes)	5/1/2023		\$47.87	\$31.53	\$79.40
Operators (Building, Class 03 - See Notes)	5/1/2024		\$49.03	\$32.37	\$81.40
Operators (Building, Class 03 - See Notes)	5/1/2025		\$50.18	\$33.22	\$83.40
Operators (Building, Class 03 - See Notes)	5/1/2026		\$51.34	\$34.06	\$85.40
Operators (Building, Class 04 - See Notes)	5/1/2023		\$47.57	\$31.44	\$79.01
Operators (Building, Class 04 - See Notes)	5/1/2024		\$48.73	\$32.28	\$81.01
Operators (Building, Class 04 - See Notes)	5/1/2025		\$49.88	\$33.13	\$83.01
Operators (Building, Class 04 - See Notes)	5/1/2026		\$51.04	\$33.97	\$85.01
Operators (Building, Class 05 - See Notes)	5/1/2023		\$45.85	\$30.93	\$76.78
Operators (Building, Class 05 - See Notes)	5/1/2024		\$47.00	\$31.78	\$78.78
Operators (Building, Class 05 - See Notes)	5/1/2025		\$48.16	\$32.62	\$80.78
Operators (Building, Class 05 - See Notes)	5/1/2026		\$49.32	\$33.46	\$82.78
Operators (Building, Class 06 - See Notes)	5/1/2023		\$44.85	\$30.65	\$75.50
Operators (Building, Class 06 - See Notes)	5/1/2024		\$46.02	\$31.48	\$77.50
Operators (Building, Class 06 - See Notes)	5/1/2025		\$47.17	\$32.33	\$79.50
Operators (Building, Class 06 - See Notes)	5/1/2026		\$48.34	\$33.16	\$81.50
Operators (Building, Class 07A- See Notes)	5/1/2023		\$63.33	\$37.68	\$101.01
Operators (Building, Class 07A- See Notes)	5/1/2024		\$64.80	\$38.61	\$103.41
Operators (Building, Class 07A- See Notes)	5/1/2025		\$66.26	\$39.55	\$105.81
Operators (Building, Class 07A- See Notes)	5/1/2026		\$67.73	\$40.48	\$108.21
Operators (Building, Class 07B- See Notes)	5/1/2023		\$63.04	\$37.59	\$100.63
Operators (Building, Class 07B- See Notes)	5/1/2024		\$64.50	\$38.53	\$103.03
Operators (Building, Class 07B- See Notes)	5/1/2025		\$65.97	\$39.46	\$105.43
Operators (Building, Class 07B- See Notes)	5/1/2026		\$67.44	\$40.39	\$107.83
Painters Class 1 (see notes)	5/1/2023		\$42.32	\$32.91	\$75.23
Painters Class 1 (see notes)	5/1/2024		\$42.97	\$34.11	\$77.08
Painters - Line Stripping	12/1/2024		\$44.12	\$27.91	\$72.03
Painters Class 4 (see notes)	5/1/2023		\$44.41	\$32.91	\$77.32
Painters Class 4 (see notes)	5/1/2024		\$45.06	\$34.11	\$79.17
Plasterers	5/1/2021		\$38.37	\$31.84	\$70.21
Plasterers	5/1/2023		\$39.32	\$32.64	\$71.96
Plasterers	5/1/2024		\$39.88	\$33.08	\$72.96
plumber	5/1/2023		\$64.73	\$37.61	\$102.34
plumber	5/1/2024		\$67.53	\$38.31	\$105.84
Pointers, Caulkers, Cleaners	5/1/2023		\$48.80	\$30.70	\$79.50
Roofers (Composition)	5/1/2023		\$42.63	\$34.62	\$77.25
Roofers (Composition)	5/1/2024		\$44.13	\$34.77	\$78.90
Roofers (Shingle)	5/1/2021		\$30.50	\$21.55	\$52.05

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 25-01984 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Roofers (Shingle)	5/1/2023		\$32.85	\$22.10	\$54.95
Roofers (Shingle)	5/1/2024		\$34.35	\$22.20	\$56.55
Roofers (Slate & Tile)	5/1/2021		\$33.50	\$21.55	\$55.05
Roofers (Slate & Tile)	5/1/2023		\$35.85	\$22.10	\$57.95
Roofers (Slate & Tile)	5/1/2024		\$37.35	\$22.20	\$59.55
Sheet Metal Workers	5/1/2023		\$57.31	\$48.97	\$106.28
Sheet Metal Workers	5/1/2024		\$59.22	\$50.56	\$109.78
Sign Makers and Hangars	7/15/2022		\$30.54	\$24.35	\$54.89
Sign Makers and Hangars	7/15/2023		\$31.76	\$24.63	\$56.39
Sign Makers and Hangars	7/15/2024		\$32.32	\$25.82	\$58.14
Sprinklerfitters	1/1/2023		\$62.23	\$31.99	\$94.22
Steamfitters	5/1/2023		\$67.37	\$41.99	\$109.36
Steamfitters	5/1/2024		\$70.32	\$43.09	\$113.41
Stone Masons	5/1/2023		\$47.20	\$31.95	\$79.15
Terrazzo Finisher	5/1/2023		\$43.75	\$27.86	\$71.61
Terrazzo Grinder	5/1/2023		\$44.02	\$27.86	\$71.88
Terrazzo Mechanics	5/1/2023		\$50.26	\$29.56	\$79.82
Tile Finisher	5/1/2023		\$39.52	\$29.30	\$68.82
Tile Setter	5/1/2023		\$50.26	\$29.56	\$79.82
Truckdriver class 1(see notes)	5/1/2022		\$35.60	\$20.74	\$56.34
Truckdriver class 1(see notes)	5/1/2023		\$36.29	\$21.55	\$57.84
Truckdriver class 1(see notes)	5/1/2024		\$36.79	\$22.54	\$59.33
Truckdriver class 2 (see notes)	5/1/2022		\$35.70	\$20.74	\$56.44
Truckdriver class 2 (see notes)	5/1/2023		\$36.39	\$21.55	\$57.94
Truckdriver class 2 (see notes)	5/1/2024		\$36.89	\$22.54	\$59.43
Window Film / Tint Installer	6/1/2019		\$24.52	\$12.08	\$36.60
Window Film / Tint Installer	6/1/2024		\$26.37	\$14.83	\$41.20

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-01984 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter - Chief of Party (Surveying & Layout)	5/1/2023		\$63.24	\$29.06	\$92.30
Carpenter - Chief of Party (Surveying & Layout)	5/1/2024		\$65.19	\$29.06	\$94.25
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		\$67.15	\$29.06	\$96.21
Carpenter - Chief of Party (Surveying & Layout)	5/1/2026		\$69.10	\$29.06	\$98.16
Carpenter - Instrument Person (Surveying & Layout)	5/1/2023		\$54.99	\$29.06	\$84.05
Carpenter - Instrument Person (Surveying & Layout)	5/1/2024		\$56.69	\$29.06	\$85.75
Carpenter - Instrument Person (Surveying & Layout)	5/1/2025		\$58.39	\$29.06	\$87.45
Carpenter - Instrument Person (Surveying & Layout)	5/1/2026		\$60.09	\$29.06	\$89.15
Carpenter - Rodman (Surveying & Layout)	5/1/2023		\$43.99	\$22.41	\$66.40
Carpenter - Rodman (Surveying & Layout)	5/1/2024		\$45.35	\$22.41	\$67.76
Carpenter - Rodman (Surveying & Layout)	5/1/2025		\$46.71	\$22.41	\$69.12
Carpenter - Rodman (Surveying & Layout)	5/1/2026		\$48.07	\$22.41	\$70.48
Carpenter	5/1/2023		\$54.99	\$29.06	\$84.05
Carpenter	5/1/2024		\$56.69	\$29.06	\$85.75
Carpenter	5/1/2025		\$58.49	\$29.06	\$87.55
Carpenter	5/1/2026		\$60.19	\$29.06	\$89.25
Cement Masons	5/1/2023		\$43.20	\$32.91	\$76.11
Dockbuilder, Pile Drivers	5/1/2023		\$50.48	\$37.99	\$88.47
Dockbuilder, Pile Drivers	5/1/2024		\$52.98	\$37.99	\$90.97
Dockbuilder, Pile Drivers	5/1/2025		\$55.23	\$37.99	\$93.22
Dockbuilder, Pile Drivers	5/1/2026		\$56.98	\$37.99	\$94.97
Dockbuilder/ Pile driver diver	5/1/2023		\$63.10	\$37.99	\$101.09
Dockbuilder/ Pile driver diver	5/1/2024		\$66.25	\$37.99	\$104.24
Dockbuilder/ Pile driver diver	5/1/2025		\$69.04	\$37.99	\$107.03
Dockbuilder/ Pile driver diver	5/1/2026		\$71.23	\$37.99	\$109.22
Dockbuilder/Pile Driver Diver	5/1/2023		\$58.41	\$41.74	\$100.15
Dockbuilder/Pile Driver Diver	5/1/2024		\$61.54	\$41.74	\$103.28
Dockbuilder/Pile Driver Diver	5/1/2025		\$64.35	\$41.74	\$106.09
Dockbuilder/Pile Driver Diver	5/1/2026		\$66.54	\$41.74	\$108.28
Dockbuilder/pile driver tender	5/1/2023		\$50.48	\$37.99	\$88.47
Dockbuilder/pile driver tender	5/1/2024		\$52.98	\$37.99	\$90.97
Dockbuilder/pile driver tender	5/1/2025		\$55.23	\$37.99	\$93.22
Dockbuilder/pile driver tender	5/1/2026		\$56.98	\$37.99	\$94.97
Electric Lineman	5/30/2022		\$59.17	\$31.48	\$90.65
Electric Lineman	5/29/2023		\$60.48	\$32.77	\$93.25
Electric Lineman	6/3/2024		\$62.07	\$33.96	\$96.03
Iron Workers (Bridge, Structural, Ornamental, Precast)	1/1/2023		\$50.70	\$39.51	\$90.21
Iron Workers (Bridge, Structural, Ornamental, Precast)	7/1/2024		\$53.20	\$45.01	\$98.21
Iron Workers (Riggers)	7/1/2023		\$42.53	\$34.14	\$76.67
Iron Workers (Rodman/Reinforcing)	7/1/2023		\$45.70	\$34.77	\$80.47
Laborers (Class 01 - See notes)	5/1/2022		\$36.30	\$27.20	\$63.50
Laborers (Class 01 - See notes)	5/1/2023		\$37.55	\$27.45	\$65.00
Laborers (Class 01 - See notes)	5/1/2024		\$38.80	\$27.65	\$66.45
Laborers (Class 02 - See notes)	5/1/2022		\$36.50	\$27.20	\$63.70

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-01984 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 02 - See notes)	5/1/2023		\$37.75	\$27.45	\$65.20
Laborers (Class 02 - See notes)	5/1/2024		\$39.00	\$27.65	\$66.65
Laborers (Class 03 - See notes)	5/1/2022		\$36.50	\$27.20	\$63.70
Laborers (Class 03 - See notes)	5/1/2023		\$37.75	\$27.45	\$65.20
Laborers (Class 03 - See notes)	5/1/2024		\$39.00	\$27.65	\$66.65
Laborers (Class 04 - See notes)	5/1/2022		\$31.10	\$27.20	\$58.30
Laborers (Class 04 - See notes)	5/1/2023		\$32.35	\$27.45	\$59.80
Laborers (Class 04 - See notes)	5/1/2024		\$33.60	\$27.65	\$61.25
Laborers (Class 05 - See notes)	5/1/2022		\$37.15	\$27.20	\$64.35
Laborers (Class 05 - See notes)	5/1/2023		\$38.40	\$27.45	\$65.85
Laborers (Class 05 - See notes)	5/1/2024		\$39.65	\$27.65	\$67.30
Laborers (Class 06 - See notes)	5/1/2022		\$37.20	\$27.20	\$64.40
Laborers (Class 06 - See notes)	5/1/2023		\$38.40	\$27.45	\$65.85
Laborers (Class 06 - See notes)	5/1/2024		\$39.70	\$27.65	\$67.35
Laborers (Class 07 - See notes)	5/1/2022		\$37.05	\$27.20	\$64.25
Laborers (Class 07 - See notes)	5/1/2023		\$38.30	\$27.45	\$65.75
Laborers (Class 07 - See notes)	5/1/2024		\$39.55	\$27.65	\$67.20
Laborers (Class 08 - See notes)	5/1/2022		\$36.80	\$27.20	\$64.00
Laborers (Class 08 - See notes)	5/1/2023		\$38.05	\$27.45	\$65.50
Laborers (Class 08 - See notes)	5/1/2024		\$39.30	\$27.65	\$66.95
Laborers (Class 09 - See notes)	5/1/2022		\$36.65	\$27.20	\$63.85
Laborers (Class 09 - See notes)	5/1/2023		\$37.90	\$27.45	\$65.35
Laborers (Class 09 - See notes)	5/1/2024		\$39.15	\$27.65	\$66.80
Laborers (Class 10- See notes)	5/1/2022		\$36.80	\$27.20	\$64.00
Laborers (Class 10- See notes)	5/1/2023		\$38.05	\$27.45	\$65.50
Laborers (Class 10- See notes)	5/1/2024		\$39.30	\$27.65	\$66.95
Laborers (Class 11 -See Notes)	5/1/2022		\$36.70	\$27.20	\$63.90
Laborers (Class 11 -See Notes)	5/1/2023		\$37.95	\$27.45	\$65.40
Laborers (Class 11 -See Notes)	5/1/2024		\$39.20	\$27.65	\$66.85
Laborers (Class 12 -See Notes)	5/1/2022		\$38.40	\$27.20	\$65.60
Laborers (Class 12 -See Notes)	5/1/2023		\$39.65	\$27.45	\$67.10
Laborers (Class 12 -See Notes)	5/1/2024		\$40.90	\$27.65	\$68.55
Laborers (Class 13 -See Notes)	5/1/2022		\$40.43	\$27.20	\$67.63
Laborers (Class 13 -See Notes)	5/1/2023		\$41.65	\$27.45	\$69.10
Laborers (Class 13 -See Notes)	5/1/2024		\$42.93	\$27.65	\$70.58
Laborers (Class 14 -See Notes)	5/1/2022		\$36.55	\$27.20	\$63.75
Laborers (Class 14 -See Notes)	5/1/2023		\$38.25	\$27.45	\$65.70
Laborers (Class 14 -See Notes)	5/1/2024		\$39.50	\$27.65	\$67.15
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2022		\$30.17	\$19.18	\$49.35
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2023		\$31.42	\$19.43	\$50.85
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2024		\$32.67	\$19.63	\$52.30
Laborers Utility (PGW ONLY)	5/1/2022		\$37.20	\$19.18	\$56.38
Laborers Utility (PGW ONLY)	5/1/2023		\$38.45	\$19.43	\$57.88
Laborers Utility (PGW ONLY)	5/1/2024		\$39.70	\$19.63	\$59.33

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-01984 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Landscape Laborer	5/1/2022		\$27.73	\$23.65	\$51.38
Landscape Laborer	5/1/2023		\$29.03	\$23.80	\$52.83
Landscape Laborer	5/1/2024		\$30.28	\$24.05	\$54.33
Millwright	5/1/2023		\$51.60	\$35.81	\$87.41
Millwright	5/1/2024		\$54.67	\$35.81	\$90.48
Millwright	5/1/2025		\$57.39	\$35.81	\$93.20
Millwright	5/1/2026		\$60.20	\$35.81	\$96.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2023		\$52.20	\$32.81	\$85.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2024		\$53.36	\$33.65	\$87.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2025		\$54.52	\$34.49	\$89.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2026		\$55.67	\$35.34	\$91.01
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2023		\$55.20	\$33.70	\$88.90
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2024		\$56.37	\$34.53	\$90.90
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2025		\$57.52	\$35.38	\$92.90
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2026		\$58.68	\$36.22	\$94.90
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2023		\$51.95	\$32.74	\$84.69
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2024		\$53.11	\$33.58	\$86.69
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2025		\$54.27	\$34.42	\$88.69
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2026		\$55.43	\$35.26	\$90.69
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2023		\$54.97	\$33.61	\$88.58
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2024		\$56.13	\$34.45	\$90.58
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2025		\$57.29	\$35.29	\$92.58
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2026		\$58.44	\$36.14	\$94.58
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2023		\$47.87	\$31.53	\$79.40
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2024		\$49.03	\$32.37	\$81.40
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2025		\$50.18	\$33.22	\$83.40
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2026		\$51.34	\$34.06	\$85.40
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2023		\$47.57	\$31.44	\$79.01
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2024		\$48.73	\$32.28	\$81.01
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2025		\$49.88	\$33.13	\$83.01

BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGES PROJECT RATES

Project: 25-01984 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Highway)					
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2026		\$51.04	\$33.97	\$85.01
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2023		\$45.85	\$30.93	\$76.78
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2024		\$47.00	\$31.78	\$78.78
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2025		\$48.16	\$32.62	\$80.78
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2026		\$49.32	\$33.46	\$82.78
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2023		\$44.85	\$30.65	\$75.50
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2024		\$46.02	\$31.48	\$77.50
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2025		\$47.17	\$32.33	\$79.50
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2026		\$48.34	\$33.16	\$81.50
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2023		\$63.33	\$37.68	\$101.01
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2024		\$64.80	\$38.61	\$103.41
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2025		\$66.26	\$39.55	\$105.81
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2026		\$67.73	\$40.48	\$108.21
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2023		\$63.04	\$37.59	\$100.63
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2024		\$64.50	\$38.53	\$103.03
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2025		\$65.97	\$39.46	\$105.43
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2026		\$67.44	\$40.39	\$107.83
Painters - Line Stripping	12/1/2023		\$42.10	\$27.43	\$69.53
Painters - Line Stripping	12/1/2024		\$44.12	\$27.91	\$72.03
Painters Class 2 (see notes)	2/1/2023		\$48.82	\$32.09	\$80.91
Painters Class 2 (see notes)	2/1/2024		\$49.57	\$33.34	\$82.91
Painters Class 2 (see notes)	2/1/2025		\$50.85	\$33.91	\$84.76
Painters Class 3 (see notes)	2/1/2023		\$59.78	\$32.13	\$91.91
Painters Class 3 (see notes)	2/1/2024		\$60.53	\$33.38	\$93.91
Painters Class 3 (see notes)	2/1/2025		\$61.81	\$33.95	\$95.76
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2022		\$61.34	\$40.28	\$101.62
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2023		\$64.00	\$41.68	\$105.68
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2024		\$66.80	\$42.93	\$109.73
Truckdriver class 1(see notes)	5/1/2022		\$35.45	\$20.74	\$56.19
Truckdriver class 1(see notes)	5/1/2023		\$36.14	\$21.55	\$57.69
Truckdriver class 1(see notes)	5/1/2024		\$36.64	\$22.54	\$59.18
Truckdriver class 2 (see notes)	5/1/2022		\$35.55	\$20.74	\$56.29

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 25-01984 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Truckdriver class 2 (see notes)	5/1/2023		\$36.24	\$21.55	\$57.79
Truckdriver class 2 (see notes)	5/1/2024		\$36.74	\$22.54	\$59.28

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Type of the Contract
3. Work covered by Contract Documents.
4. Time of Completion.
5. Work by Owner.
6. Work under separate contracts.
7. Future work.
8. Owner-furnished products.
9. Access to site.
10. Coordination with occupants.
11. Work restrictions.
12. Specification and Drawing conventions.
13. Miscellaneous provisions.

- B. Related Requirements:

1. Section 012000 "Multiple Contract Summary" for division of responsibilities for the Work.
2. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
3. Section 017300 "Execution" for coordination of Owner-installed products.

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

- A. Project Identification: A New Fire Station for Harmonville Fire Company – Plymouth Valley Station.

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1. Project Location: 904 Germantown Pike, Plymouth Meeting, PA 19462.
- B. Owner: Plymouth Township.
 1. Owner's Co-Representatives:
 - a. Matt West, Township Manager,
mwest@plymouthtownship.org
 - b. Rick Carbo, Buildings and Grounds Director
rcarbo@plymouthtownship.org
- C. Architect: KCBA Architects, 8 East Broad Street, Hatfield, PA 19440-2401.
 1. Architect's Representative: Rick Stamper, RA, rick.stamper@kcba-architects.com
- D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
 1. Mechanical, Plumbing, Fire Protection, Electrical and Structural Engineering: CHA Consulting, Inc.
 - a. Representative: Doug Taylor, Director of Design Services
One East Broad Street, Suite 310
Bethlehem, PA 18018
Telephone: (610) 865-3000
DouglasTaylor@chasolutions.com
- E. Other Owner Consultants: Owner has retained the following design professionals who have helped prepare designated portions of the Contract Documents:
 1. Security Systems: Militia Hill Security, Inc. has assisted in the preparation of the following portions of the Contract Documents:
 - a. Security systems Representative: Kevin Lawrence;(610) 825-0892;
kevin@militiahillsecurity.com
 - b. Scope of Service: Security, Access Control, Video Surveillance and Fire Alarm Systems.
 2. Apparatus Bay Exhaust System: Air Cleaning Systems, Inc. has assisted in the preparation of the following portions of the Contract Documents:
 - a. ACS Representative: Anthony Milanese;800-247-1020; alm3@acleansystem.com
 - b. Scope of Service: Plymovent Exhaust System.
 3. Alerting System: APS Firehouse Alerting
 - a. APS Representative: Marc McNeal; (410)239-4644;
marcm@firehousealerting.com
 - b. Computer Aided Dispatch and associated systems:

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- F. Project Coordinator for Multiple Contracts: General Contractor shall serve as Project coordinator.
- G. Project Mechanical/Plumbing/Electrical Coordinator for Multiple Contracts: Mechanical Contractor shall serve as Mechanical/Plumbing/Electrical coordinator.
- H. Web-Based Project Software: Project software may be used with approval for purposes of managing communication and documents during the construction stage.
 - 1. See Section 013100 "Project Management and Coordination." for requirements for using web-based Project software if used.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
 - 1. The project consists of demolition of the existing fire house (adjacent to the Ambulance Corp building) and construction of a new two-story structure. The new structure is approximately 8,800 square feet of floor space and is classified as a Risk Category IV – Essential Facility. The building is Construction Type VB and will be fully sprinklered. The structure will be slab on grade with a structural steel frame, and steel stud walls. Work is to include all related site work, including demolition of various site elements and relocation/construction of new basketball courts that need to be relocated for the new entrance drive that wraps around the rear of the building. The current and new building will share a wall with the Plymouth Community Ambulance building, and as such, some work will involve coordination with Plymouth Community Ambulance, who are to remain in full operation for the duration of the project. It will also involve structural reinforcement of one bar joist in the Plymouth Ambulance Community building. And includes all other Work indicated in the Contract Documents.
- B. Type of Contract:
 - 1. Project will be constructed under coordinated, concurrent multiple contracts. See Section 011200 "Multiple Contract Summary" for a list of multiple contracts, a description of work included under each of the multiple contracts, and the responsibilities of Project coordinator.
 - 2. Contracts for this Project include the following:
 - a. General Construction Contract, GC.
 - 1) References to GC on Construction Documents and specifications shall also refer to this Contract.
 - b. Plumbing Contract, PC.
 - 1) References to PC on Construction Documents and specifications shall also refer to this Contract.
 - c. Mechanical Contract, MC.
 - 1) References to HC or MC on Construction Documents and specifications shall also refer to this Contract.
 - d. Electrical Contract, EC.
 - 1) References to EC on Construction Documents and specifications shall also refer to this Contract.

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1.6 **TIME OF COMPLETION**

- A. The Work shall be conducted in a single phase with the following limitations:
1. Notice to Proceed issued May 8th, 2025.
 2. Work shall be substantially complete and ready for occupancy by August 10th, 2026.
 3. With the following exceptions;
 - a. Plumbing Contractor is to submit shop drawings for Sprinkler System Hydraulic calculations within the first 20 days after the Notice to Proceed has been issued.
 - b. Enclosure of building envelope shall be complete on or before November 19th, 2025
 4. The Owner reserves the right to delay issuance of the Notice to Proceed beyond the date indicated above. The sole remedy available to the Contractor shall be extension of the Contract completion date and the building envelope enclosure deadline by the same number of days as the delay in issuance of the Notice to Proceed. No changes in the Contract sum will be permitted as a result of this delay.

1.7 **WORK UNDER OWNER'S SEPARATE CONTRACTS**

- A. Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.
- B. Concurrent Work: Owner has awarded separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
1. Security Systems: To Militia Hill Security, Inc. for installation of security system devices.
 2. Computer Aided Dispatch and associated systems: APS Firehouse Alerting
- C. Subsequent Work: Owner has awarded separate contract(s) for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract.
1. Apparatus Bay Vehicle Exhaust System.: To Air Cleaning Systems, Inc. for installation of existing and new Plymovent system components.

1.8 **OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS**

- A. Owner furnished products also includes existing items to be relocated by the Contractor (OFCR).
- B. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:
1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
 2. Provide for delivery of Owner-furnished products to Project site.

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3. Upon delivery, inspect, with Contractor present, delivered items.
 - a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

C. Contractor's Responsibilities: The Work includes the following, as applicable:

1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.
7. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

D. Owner-Furnished, Contractor Relocated Products; (OFCR):

1. Reuse of existing fire extinguishers.
2. Wall mounted AED.
3. Wall mounted bleed kit.
4. Memorial Plaque.

1.9 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Each Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated U.N.O.
 1. Limits on Use of Site: Confine construction operations to areas indicated and slated for work.
 - a. Some work involves impinging on the Plymouth Community Ambulance building and site. For all such work, coordination of such activities are to occur with a minimum of 72 hour advanced notice, and is not to proceed until terms of work are agreeable to all parties. In addition, any work that affects Plymouth Community Ambulance operations are to be held to a minimum time frame that is coordinated and agreed upon by Plymouth Community Ambulance.
 2. Driveways, Walkways and Entrances: Keep driveways and entrances serving the Plymouth Community Ambulance clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

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- a. Within the defined work zone, schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Within the defined work zone, schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. The entrance drive to Plymouth Valley Park is not to be blocked.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.10 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Plymouth Community Ambulance will occupy their portion of the site and the adjacent building during the entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
- 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.11 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
- 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to Sunset, Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
- 1. Weekend Hours: As needed and coordinated with Owner.
 - 2. Early Morning Hours: as noted above.
 - 3. Work in Existing Building: As coordinated with Owner in advance.
 - 4. Hours for Utility Shutdowns: As coordinated with Owner in advance.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:

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1. Notify Architect/Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Architect's/Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
1. Notify Architect/Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Architect/Owner written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.
- F. Inappropriate language, dress or conduct will not be tolerated on the construction site. Violations of the above shall be grounds for dismissal.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 49-division format and CSI/CSC's 2004 "MasterFormat" numbering system.
1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 3. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 4. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.

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- 5. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- C. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- D. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- E. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 011200 - MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements for Work of each contract are also indicated in individual Specification Sections and on Drawings.
- C. Related Requirements:
 - 1. Section 01 1000 "Summary" for the Work covered by the Contract Documents, restrictions on use of Project site, coordination with occupants, and work restrictions.
 - 2. Section 01 3100 "Project Management and Coordination" for general coordination requirements.
 - 3. Section 01 1500 "Temporary Facilities and Controls" for specific requirements for temporary facilities and controls.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, the condition at which roofing is insulated and weathertight; exterior walls are insulated and weathertight; and openings are closed with permanent construction or substantial temporary closures equivalent in weather protection to permanent construction.

1.4 PROJECT COORDINATOR

- A. Project coordinator shall be responsible for coordination between the General Construction Contract, Plumbing Contract, Sprinkler Contract, HVAC Contract, and Electrical Contract.
 - 1. General Construction Contractor shall act as and assume all responsibilities of the Project Coordinator.
- B. Mechanical/plumbing/sprinkler/electrical coordinator, who shall be under the direction of Project coordinator, shall be responsible for coordination between the Plumbing Contract, Sprinkler Contract, HVAC Contract, and Electrical Contract.

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1. HVAC Contractor shall act as mechanical/plumbing/electrical coordinator.

1.5 PROJECT COORDINATOR RESPONSIBILITIES

- A. Project Coordinator: Full-time Project shall be experienced in administration and supervision of building construction including mechanical and electrical work. Coordination activities of the Project coordinator shall include, but are not limited to, the following:

1. Provide typical overall coordination of the Work.
2. Coordinate shared access to workspaces.
3. Coordinate product selections for compatibility.
4. Provide overall coordination of temporary facilities and controls.
5. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
6. Coordinate construction and operations of the Work with work performed by each Contract and Owner's construction forces.
7. Prepare coordination drawings in collaboration with each contractor to coordinate work by more than one contract.
8. Coordinate sequencing and scheduling of the Work. Include the following:
 - a. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
 - b. Prepare combined Contractors' Construction Schedule for entire Project. Base schedule on preliminary construction schedule. Secure time commitments for performing critical construction activities from contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary sheet indicating combined construction activities of contracts.
 - 1) Submit schedules for approval.
 - 2) Distribute copies of approved schedules to contractors.
9. Provide all engineering and layout for his work. In addition, provide and maintain throughout the project all building corners and column centerlines. The Project Coordinator will provide layout for all walls and partitions. Each Trade Contractor shall be responsible for all other survey, engineering, layout, etc. required to execute their work. Each Trades Contractor, at his own expense is to provide all stakes, templates and labor required in laying out their work and is responsible for proper execution of the work to the lines and grades shown on the drawings or as indicated by the Architect/Engineer.
10. Provide photographic documentation when requested.
11. Provide quality-assurance and quality-control services specified in Section 014000 "Quality Requirements."
12. Provide project and progress meeting memos when required by Architect and as specified in Division 01 Section "Project Management and Coordination".
13. Schedule and conduct progress meetings as specified in Division 01 Section "Project Management and Coordination."
14. Schedule, conduct and record Coordination Meetings as specified in Division 01 Section "Project Management and Coordination."
15. Coordinate the selection and installation of firestopping products with the separate prime contractors.

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16. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
 17. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
 18. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
 19. Provide field surveys of in-progress construction and site work.
 20. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
 21. Coordinate cutting and patching.
 22. Coordinate protection of the Work.
 23. Coordinate firestopping.
 24. Coordinate the installation of concealed blocking or reinforcement and supports for work of all primes.
 25. Coordinate provision of openings/conduit required by MPE trades with concrete and masonry work.
 26. Coordinate the sequence of work to the benefit of the project schedule.
 27. Coordinate completion of interrelated punch list items.
 28. Coordinate completion of interrelated punch list items.
- B. Responsibilities of Project coordinator for temporary facilities and controls include, but are not limited to, the following:
1. Provide common-use field office for use by all personnel engaged in construction activities for meetings and for Architect's use. Office may be combined with Superintendent's work space.
 2. Provide furniture and equipment, power, telephone and janitor services for common-use facilities.
 3. Control and coordination of fire watch activities.
 4. Provide protection of existing finishes to remain.
 5. Coordinate installation, shared use and removal of temporary facilities.
- C. Mechanical/Plumbing/Sprinkler/Electrical Coordinator: Full-time Mechanical/Plumbing/Sprinkler/Electrical Coordinator shall be experienced in coordination of mechanical, plumbing, and electrical construction, including coordination of type of operations required for this Project. Coordination activities of mechanical/plumbing/electrical coordinator include, but are not limited to, the following:
1. Preparation of coordination drawings of ceiling cavities/spaces and mechanical rooms demonstrating the spatial relationship and necessary clearances within the available space above ceilings and within rooms for mechanical, plumbing and fire protection, electrical power and lighting systems and structural systems. Comply with the requirements for coordination drawings as specified in the Division 01 Section "Project Management and Coordination."
 2. Schedule and sequence mechanical, plumbing, fire protection and electrical activities.
 3. Coordinate sharing access to workspaces by mechanical, plumbing, fire protection and electrical contractors.
 4. Coordinate integration of mechanical, plumbing, fire protection and electrical work into limited spaces.
 5. Coordinate protection of mechanical, plumbing, fire protection, and electrical contractors' work.

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6. Coordinate cutting and patching for mechanical, plumbing, fire protection and electrical work.
7. Prepare mechanical, plumbing, fire protection and electrical coordination drawings.
8. Coordinate tests and inspections for mechanical, plumbing, fire protection and electrical work.
9. Coordinate mechanical, plumbing, fire protection and electrical temporary services and facilities.

1.6 GENERAL REQUIREMENTS OF CONTRACTS

- A. Extent of Contract: Unless the Agreement contains a more specific description of the Work of each Contract, requirements indicated on Drawings and in Specification Sections determine which contract includes a specific element of Project.
1. To the extent that the work of all of the contracts represents a complete and integrated whole, each prime contractor shall become thoroughly familiar with all of the construction documents. Work of a particular contract shall be substantially located on the documents referenced below, but such references do not relieve each contractor for responsibility to provide work in compliance with requirements of all of the documents as follows:
 - a. Information contained on any construction document shall be enforceable on each contractor as indicated on drawings, by reference to contractor designations (GC, PC, MC and EC).
 - b. Dimensional information on the Architectural drawings that relates to the work of a particular contract shall be the responsibility of that contractor to install the item where located.
 - 1) In the absence of specific dimensional information on the Architectural plans for exposed items provided by the Mechanical, Plumbing and Electrical Contracts, consult Architect for decisional requirements before installing exposed item.
 - c. In case of conflicts, assignment of responsibilities shall be at the sole interpretation of the Architects.
 2. Unless otherwise indicated, the work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
 3. Local custom and trade-union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
 4. Observe and comply with at all times all Federal and State laws and regulations, and Local bylaws, ordinances and regulations in any manner affecting the conduct of the work or applying to employees on the project, as well as all safety precautions and orders or decrees which have been promulgated or enacted, or which may be promulgated or enacted, by legal bodies or tribunals having authority or jurisdiction over the work, materials, equipment, employees, such observance and compliance shall be solely and without qualification the responsibility of this Trades Contractor without reliance on superintendence or direction by the Owner or their Representative. The duty of enforcement of all of said laws, ordinances, regulations, orders or decrees lies with the body of agency promulgating them, not with the Owner or their Representatives.

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5. Comply with all Occupational Health and Safety guidelines as outlined by OSHA the CDC (Center for Disease Control and Prevention) as well as health and safety guidelines established by the Commonwealth of Pennsylvania and Pennsylvania Department of Health (PA DOH). Include an infectious disease preparedness response plan in your company safety plan.
6. Provide safety and protection of persons and property per OSHA, Local and State requirements. Provide maintenance of all safety precautions throughout the work of this Contract. Each Contractor is to return the safety cables to an OSHA approved condition without slack. Provide protection at floor and roof penetrations not shown on the drawings but required for work of this Contract. Provide all safety signage required by OSHA for the work of this Contract. Furnish Company Health and Safety Plan, Hazard Communication Plan, MSDS information and other OSHA required documents to the “Project Coordinator” prior to the start of work.
7. Provide protection of existing roofing system, equipment, structure, finishes and landscaping from damage resulting from the work of this contract. Repair any damage promptly to the satisfaction of the Owner.
8. Trenches and other excavation inside the building footprint, or as otherwise indicated, for the work of each contract shall be the work of each contract for its own work. For all trenches and other excavation outside the building footprint, or as otherwise indicated, shall be by the General Contractor. Comply with Division 01 Section “Earth Moving” for excavation and trenches.
9. Concrete for the Work shall be provided by each contract for its own Work, except as noted otherwise. Comply with Division 03 Section “Cast-in-Place Concrete” for requirements.
10. Blocking, backing panels, sleeves, and metal fabrication supports for the work of each contract shall be the work of the General Construction Contract.
11. Furnishing of access panels for the work of each contract shall be the work of each contract for its own work. Installation of access panels shall be the work of the General Construction Contract.
12. Equipment pads for the work of each contract shall be the work of each contract for its own work.
13. Roof-mounted equipment curbs for the work of each contract shall be the work of each contract for its own work, except for future roof mounted equipment and unless noted otherwise.
14. Painting for the work of each contract shall be the work of the General Construction Contract.
15. Cutting and Patching: Provided under each contract for its own work. Comply with Division 01 Specifications for this work.
 - a. Cutting and patching of roof materials, including roof deck, as required for the implementation of work under the other prime contracts shall be performed under the General Construction Contract.
16. Support work as specified in Division 05 Section “Metal Fabrications” to connect work of each contract to the structural system shall be provided by each contract for its own work.
 - a. Support work shall include reinforcements welded within steel joists, as indicated on the structural drawings, for point loads on steel joists.
17. Through-penetration firestopping for the work of each contract shall be provided by the General Construction Contract. Comply with the Division 07 requirements for firestopping and fireblocking.

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18. Protection for the work of each contractor shall be provided by each contract for its own work. Comply with Division 01 Section "Temporary Facilities and Controls" and individual specification sections for protection requirements.
 19. Concealed sealants for the Work of each contract shall be provided by each contract for its own work. Comply with Division 07 Section "Joint Sealants" for requirements.
 20. Access doors and frames or panels for permanent access to work of each contract shall be furnished by each contract for its own work. Installation shall be by the trade in which the access panel and frame is being installed.
 21. Contractors' Startup Construction Schedule: Within five (5) working days after startup horizontal bar-chart-type construction schedule submittal has been received from Project coordinator, submit a matching startup horizontal bar-chart schedule showing construction operations sequenced and coordinated with overall construction.
 22. Project closeout requirements.
- B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the work.
1. Project coordinator shall coordinate substitutions.
- C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Section 015000 "Temporary Facilities and Controls," each contractor is responsible for the following:
1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 3. Generators for powering welders.
 4. Generators for equipment requiring three phase power. This shall also include temporary power for 3-phase permanent equipment that must be tested before connection to and /or availability of permanent power supply.
 5. Its own field office, complete with necessary furniture, utilities, and telephone service.
 6. Its own storage and fabrication sheds.
 7. Temporary enclosures for its own construction activities.
 8. Staging and scaffolding for its own construction activities.
 9. General hoisting facilities for its own construction activities. Prime contractor may provide its own hoisting facilities or may arrange with the General Contractor by separate agreement to provide hoisting facilities.
 10. Trash dumpsters and removal service, for demolition debris and waste as a result of the work of its own contract.
 - a. Including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
 11. Progress cleaning of work areas affected by its operations on a daily basis.
 12. Secure lockup of its own tools, materials, and equipment.
 13. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
 14. Protection of its own work including finishes.

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- D. Temporary Heating, Cooling, and Ventilation: The General Construction Contract is responsible for temporary heating, cooling, and ventilation, including utility-use charges, temporary meters, and temporary connections.
- E. Temporary Electric Power Service, Distribution and Lighting: Electrical Contractor is responsible for temporary electric power service, distribution and lighting systems. This applies to construction activities and support for all construction trailers. Utility-use charges shall be as specified below.
- F. Temporary Water Distribution Piping: Plumbing Contractor is responsible for temporary distribution piping from tanker or existing systems and public supply when available. Include connections to the public system, when available, and electric pumps to raise water to required levels from temporary tanker water source. Utility-use charges shall be as specified below.
- G. Temporary Water Service: General Construction Contractor is responsible for provision of truck mounted tank water supply until time that public water supply is available on site.
- H. Temporary Sanitary Facilities: General Construction Contractor is responsible for sanitary facilities, including toilets, wash facilities, and drinking water facilities, and including use, rental and maintenance charges.
- I. Telephone Service: General Construction Contractor is responsible for temporary telephone service throughout construction period for common-use facilities.
- J. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect. Contractor's cost or use charges as assigned below for temporary services or facilities will not be accepted as a basis of claim for an adjustment in the Contract Sum or Contract Time. Contractor's responsibility or cost and use charges extend from the time of installation of the temporary facility or service to no earlier than Substantial Completion for the entire work. Comply with the following:
 - 1. Sewer Service: Include the cost for sewer service use by all parties engaged in construction activities at Project site in the General Construction Contract.
 - 2. Water Service: Include the cost for water service, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site in the General Construction Contract.
 - 3. Electric Power Service: Include the cost for electric power service, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site in the General Construction Contract.
 - a. Each contractor must provide a portable generator for welding operations. Welding may not be connected to temporary or permanent power service.

1.7 GENERAL CONSTRUCTION CONTRACT

- A. Work in the General Construction Contract includes all labor, materials, equipment and services necessary for the architectural, civil and structural construction plus other activities traditionally recognized as general construction. Work shall be defined in the Civil (C-Series), Architectural (A-Series) and Structural (S-Series) drawings, and in the General Conditions and Specification Divisions 01 through 14, 22, 31, 32 and 34 of the specifications. Work includes Project

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Coordination and related administration responsibilities. Work of this contract includes, but is not limited to, the following:

1. Remaining work not identified as work under other contracts.
2. Site preparation, including clearing, building demolition and relocations, and earthwork. Include removal of asphalt off site.
3. Site improvements, including roadways, parking lots, pedestrian paving, site stairs and railings, flagpole, site development furnishings including bollards and equipment, and landscaping.
4. Site storm water management system including roof drainage conductors, related earthwork and appurtenances starting from a point five feet beyond building.
5. Site sanitary sewage system starting from a point five feet beyond building exterior wall.
6. Site water and fire protection distribution system and appurtenances starting from inside the building with a flanged and capped termination (coordinate exact location with PC). Includes testing and flushing.
7. Exterior fences and gates.
8. Trenching and backfill for gas distribution piping system on site.
9. Selective demolition.
10. Foundations, including excavation and construction of footings and foundation walls. Include disposal of soils on-site.
11. Slabs-on-grade, including earthwork, subdrainage systems, and insulation.
12. Below-grade building construction, including excavation, backfill, and insulation and waterproofing/dampproofing.
13. Superstructure, including floor and roof construction.
14. Exterior closure, including walls, parapets, doors, windows, entrance and storefront systems.
15. Exposed sealants.
16. Edge of slab fire-resistive joint systems.
17. Partition fire-resistive joint systems.
18. Firestopping for openings not related to work of other contracts.
19. Roofing, including roof insulation, coverings, flashings, downspouts, roof specialties, and roof accessories.
20. Rain water downspouts and connection to storm sewer.
21. Interior construction, including partitions, doors, interior glazed openings, and fittings.
22. Overhead garage doors and openers.
23. Fire doors.
24. Fire-protection specialties.
25. Stairs, including railings and finishes.
26. Interior finishes finish carpentry, architectural woodwork, interior specialties, and floor and ceiling finishes.
27. Miscellaneous items, including painting of mechanical and electrical work.
28. Equipment, including the following:
 - a. Residential appliances (Alternate #6).
 - b. Gear lockers.
29. Structural reinforcement of bar joist in the Plymouth Community Ambulance building, including disconnecting and reinstallation of equipment mounted to the bottom chord of the bar joist.
30. Furnishings, including casework, and window shades.

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- B. Temporary facilities and controls in the General Construction Contract include, but are not limited to, the following:
1. Temporary facilities and controls that are not otherwise specifically assigned to the Plumbing Contract, HVAC Contract, and Electrical Contract.
 2. Sediment and erosion control including assumption of Erosion and Sedimentation Pollution Control permit and responsibilities thereof.
 3. Temporary Heating and Dehumidifying Equipment.
 4. Unpiped sewers and drainage, including drainage ditches, and concrete washout area.
 5. Stormwater control.
 6. Unpiped temporary toilet fixtures, wash facilities, and drinking water facilities, including disposable supplies.
 7. Temporary enclosure for building exterior, except as indicated.
 8. Temporary provisions within the Work area needed to safely separate construction activities from the general public.
 9. Temporary roads and paved areas.
 10. Dewatering facilities and drains.
 11. Excavation support and protection, unless required solely for the Work of another contract.
 12. All hoisting requirements for its own construction activities and, where arranged by separate agreement, hoisting requirements for other prime contractors.
 13. Project identification and temporary signs.
 14. General waste disposal facilities for general cleaning of building and site.
 15. Maintenance of site shall include maintaining of vegetation within limits of construction.
 16. Pest control.
 17. Temporary stairs and/or access to second floor.
 18. Temporary fire-protection facilities.
 19. Barricades, warning signs, and lights.
 20. Site enclosure fence and gates.
 21. Temporary walkways.
 22. Project Sign and temporary signage.
 23. Security enclosure and lockup.
 24. Environmental protection.

1.8 PLUMBING CONTRACT

- A. Work in the Plumbing Contract shall include all labor, material, equipment and services necessary for the complete construction plumbing, drainage, and fire protection Work and work of other piped systems shown on the Plumbing (P-Series) and Fire Protection (FP-Series) drawings, and described in the General Conditions and Specification Divisions 01, 21 and 22. The Plumbing Contract includes, but is not limited to, the following:
1. Water supply distribution and Fire Protection system components within building connecting at capped flange termination at exterior wall (coordinate exact location with GC).
 2. Sanitary sewerage in the building to five feet beyond the exterior wall.
 3. Oil separators and pumps and all piping from building to and including the containers/devices even if located more than five feet beyond exterior wall.
 4. Site special plumbing systems.
 5. Plumbing fixtures.

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6. Domestic water distribution within building and ending with capped flange termination at exterior wall (coordinate exact location with GC).
 7. Fire-suppression system: Provide riser and components with distribution piping to all new sprinkler heads throughout new building.
 8. Natural gas distribution system downstream from the gas meter (meter by utility company).
 9. Sanitary waste within building.
 10. Stormwater drainage within building, including roof drains and conductors at low-slope roof areas and roof drainage conductors concealed within exterior walls. Work for these systems shall terminate at a point five feet beyond building.
 11. Roof drains – Provide to roofing subcontractor for installation. Connect to storm water system.
 12. Special plumbing systems, including the following:
 - a. Compressed air.
 - b. Natural gas.
 - c. Drinking fountains.
 13. Plumbing connections to equipment furnished by any other prime contracts.
 14. Installation of terminations of piping for future equipment.
- B. Temporary facilities and controls in the Plumbing Contract include, but are not limited to, the following:
1. Piped sewerage and drainage.
 2. Piped gas service.
 3. Piped water service.
 4. Piped wash facilities.
 5. Plumbing connections to existing systems and temporary facilities and controls furnished by any of the other prime contracts.

1.9 HVAC CONTRACT

- A. Work in the Mechanical Contract shall include all labor, material, equipment and services necessary for the complete construction of all heating, ventilating, and air conditioning Work and Work of other ducted systems shown on Mechanical (M-Series) drawings and described in the General Conditions and Specifications Divisions 01 and 23. Work in the Mechanical Contract includes, but is not limited to, the following:
1. Refrigerant and air conditioning piping and insulation.
 2. Radiant heaters.
 3. Split system heat pump equipment.
 4. Duct insulation.
 5. Piping insulation.
 6. Packaged gas/electric rooftop equipment.
 7. HVAC ductwork.
 8. Terminal heat.
 9. Exterior louvers.
 10. Grilles, registers and diffusers.
 11. HVAC systems and equipment.
 12. HVAC instrumentation and controls, including gas detection.
 13. HVAC testing, adjusting, and balancing. Coordinate with TAB contractor hired by Owner.

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14. HVAC commissioning.
15. General exhaust systems including associated power ventilators and ceiling fans.
16. Roof curbs.
17. Mechanical connections to equipment furnished by any other of the prime contracts.

1.10 ELECTRICAL CONTRACT

- A. Work in the Electrical Contract shall include all labor, material, equipment and services necessary for the complete construction of all electrical Work shown on the Electrical (E-Series) drawings, as specifically noted on the Civil (C-Series) drawings and described in the General Conditions and Specification Divisions 01, 26 through 28 and 31. Work in the Electrical Contract includes, but is not limited to, the following:
1. Site electrical distribution.
 2. Site lighting.
 3. Site communications and security.
 4. Electrical service and distribution.
 5. Exterior and interior lighting and light pole bases.
 6. Lighting control.
 7. Normal power distribution.
 8. Generator power distribution.
 9. Communication systems: boxes, conduit, wiring, equipment, and coordination with external specialty vendors..
 10. Safety and security systems: boxes, conduit, wiring, equipment, and coordination with external specialty vendors.
 11. Electrical connections to equipment furnished by any of the other prime contracts or the Owner.
- B. Temporary facilities and controls in the Electrical Contract include, but are not limited to, the following:
1. Electric power service and distribution.
 2. Lighting, including site lighting.
 3. Electrical connections to existing systems and temporary facilities and controls furnished by any of the other prime contracts.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011200

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SECTION 01 22 15 - UNIT PRICES AND ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices and allowances.
 - 1. Selected materials and equipment and their installation are listed in this section. Allowances have been established to address changes resulting from unforeseen conditions requiring field modifications or additional work. No allowances are to be utilized without approval from Owner's Representative. Quantity Allowances shall include the cost of the material, fabrication, shop finishing and installation. The allowances are to be based on the quantities listed in this section and the established unit prices elsewhere. Additional requirements, if necessary, will be issued by Change Order.
- B. Include in the Contract Sum quantity allowances specified herein.
 - 1. Quantity allowances shall cover the cost to the Contractor material and equipment delivered at the site and costs for related labor for unloading, handling, installation, overhead, profit and other expenses contemplated for the stated quantities.
 - 2. Whenever required quantities are less than or greater than the specified amount, the Contract Sum shall be adjusted by change order using appropriate unit prices.
- C. Types of allowances include the following:
 - 1. Quantity allowances.
- D. Related Sections include the following:
 - 1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Divisions 02 through 48 Sections for items of Work covered by unit prices and allowances.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 QUANTITY ALLOWANCES

- A. Use the quantity allowance only as directed by Architect for Owner's purposes and only by written authorization that indicates amounts to be charged to the allowance.

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- B. Contractor's overhead, profit, and related costs for products and equipment covered under the quantity allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Materials covered by quantity allowances may only be incorporated into the work by written authorization from the Owner's Representative. Value of unused quantities shall be returned to Owner by Change Order before substantial completion.

1.5 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

1.6 SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Coordinate and process submittals for quantity allowance items in same manner as for other portions of the Work.

1.7 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

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3.3 LIST OF UNIT PRICES AND ALLOWANCES FOR GENERAL CONSTRUCTION CONTRACT

A. Unit Price No. G-1: BULK ROCK EXCAVATION

1. Description: Provide removal of bulk rock in accordance with the classification of bulk rock in Division 31 Section "Earth Moving".
2. Unit of Measurement: Per Cubic yard, rock measured by differential volume before and after removal. No payment will be made for "lofted" volume of removed material.
3. Allowance Quantity: 50 cubic yards.

B. Unit Price No. G-2: TRENCH ROCK REMOVAL

1. Description: Provide removal of rock in trenches in accordance with the classification of rock in trenches in Division 31 Section "Earth Moving".
2. Unit of Measurement: Per Cubic yard, rock measured by differential volume before and after removal. No payment will be made for "lofted" volume of removed material.
3. Allowance Quantity: 25 cubic yards.

C. Unit Price No. G-3: AUTHORIZED SOIL EXCHANGE

1. Description: Provide removal and disposal of naturally occurring soils identified as unsuitable. Replace with compacted engineered fill according to Division 31 Section "Earth Moving."
 - a. No payment will be made for soils not maintained by contractor at optimum moisture content or not protected by contractor to maintain optimum moisture content.
 - b. No payment will be made for rock removal adjacent to or under unsuitable soils.
 - c. No payment will be made for removal of unsuitable soils above required subgrade.
2. Unit of Measurement: Per Cubic yard, measured in place by differential volume before and after removal. No payment will be made for "lofted" volume of removed material.
3. Allowance Quantity: 50 cubic yards.

D. Unit Price No. G-4: AUTHORIZED SOIL REMOVAL

1. Description: Provide excavation, removal, hauling, and legal disposal of unsuitable soil, as specified in Section 312000 "Earth Moving."
2. Unit of Measurement: Per cubic yard of unsuitable soil excavated, based on survey of in-place survey volumes of before and after removal.
3. Allowance Quantity: 50 cubic yards.

E. Unit Price No. G-5: IMPORT AND PLACE 2A STONE:

1. Description: Import and place one cubic yard of 2A stone for any soil at depths below proposed subgrades which was removed because it was classified as unsuitable by the Owner's geotechnical consultant. Price shall include furnishing, importing, placement and compaction.
2. Unit of Measurement: Per cubic yard, measured in place and verified by Architect or Owner's representative prior to and during placement.
3. Allowance Quantity: 25 Cubic Yards.

F. Unit Price No. G-6: COMPACTED BACKFILL.

1. Description: Provide compacted suitable soils at optimum moisture content in accordance with Division 31 Section "Earth Moving."

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2. Unit of Measurement: Per Cubic yard, measured in place by differential volume before and after removal.
 3. Allowance Quantity: 100 cubic yards.
- G. Unit Price No. G-7: LEAN CONCRETE FILL.
1. Description: Provide 1500 psi lean concrete fill, maximum aggregate size of 3/4-inch. Comply with Division 31 Section "Earth Moving".
 2. Unit of Measurement: Per Cubic yard, measured in place by differential volume before and after removal.
 3. Allowance Quantity: 5 cubic yards.
- H. Unit Price No. G-8: ASPHALT PAVING
1. Description: Provide additional 1.5" wearing course over 4" base course and 6" 2A stone subbase according to Drawing SP-13 and Division 32 Section "Asphalt Paving." Price shall include excavation, compaction, and stone base.
 2. Unit of Measurement: Per square foot.
 3. Allowance Quantity: 500 square feet.
- I. Unit Price No. G-9: MISCELLANEOUS STRUCTURAL STEEL.
1. Description: Provide one pound of fabricated, detailed, and installed miscellaneous steel with a primer painted finish. This unit forms the basis for pricing, executed changes based on this unit price may vary in dimension and complexity as may be necessary. Comply with Division 05 Section "Structural Steel".
 2. Unit of Measurement: Per 1,000 pounds/1ton weight of fabricated steel.
 3. Allowance Quantity: 1,000 pounds.
- J. Unit Price No. G-10: ADDITIONAL ROOM SIGNS:
1. Description: Furnish and install additional room signs (Type 1) as specified in Division 10 Section "Signage"
 2. Unit of Measurement: Per sign.
 3. Allowance Quantity: 10 Signs
- K. Unit Price No. G-11: GENERAL LABORER:
1. Description: Provide a general laborer for the Owner's use for work as directed by the Architect and at his discretion:
 2. Unit of Measure: Per Man-hour
 3. Quantity Allowance: Include 20 man-hours.
- L. Unit Price No. G-12: JOURNEYMAN PAINTER CLASS 2 LABOR:
1. Description: Provide a journeyman painter for Owner's use for work as directed by the Architect and at his discretion:
 2. Unit of Measure: Per Man-hour
 3. Quantity Allowance: Include 15 man-hours.

3.4 SCHEDULE OF UNIT PRICES AND ALLOWANCES FOR PLUMBING CONTRACT

- A. Unit Price No. P-1: 1/2" DOMESTIC WATER PIPE.
1. Description: Provide 1/2" type 'L' hard drawn copper tubing above ceiling, including removal and reinstallation of ceiling, pipe hangers and insulation. Comply with Division 22 Section "Domestic Water Piping".

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2. Unit of Measurement: Per linear foot.
 3. Allowance Quantity: 100 linear feet.
- B. Unit Price No. P-2: ADDITIONAL 1" BALL VALVE:
1. Description: furnish and install additional 1" ball valve in existing copper water pipe and insulate fitting in accordance with the applicable Division 22 Sections.
 2. Unit of Measurement: Per assembly
 3. Quantity Allowance: Include 4 assemblies.
- C. Unit Price No. P-3: COMPRESSED AIR PIPE.
1. Description: Provide 3/4" schedule 40 black steel pipe above ceiling including removal and reinstallation of ceiling and pipe hangers. Comply with Division 22 Section "General Service Compressed - Air Piping".
 2. Units of Measurement: Per linear foot.
 3. Allowance Quantity: 60 lineal feet.
- D. Unit Price No. P-4: GAS PIPING.
1. Description: Provide 2" schedule 40 black steel pipe above ceiling including removal and reinstallation of ceiling pipe hangers and/or roof supports. Comply with Division 22 Section "Facility Natural-Gas Piping".
 2. Unit of Measurement: Per linear foot.
 3. Allowance Quantity: 40 lineal feet.
- E. Unit Price No. P-5: JOURNEYMAN PLUMBER LABOR:
1. Description: Provide a journeyman Plumber for Owner's use for work as directed by the Architect and at his discretion.
 2. Unit of Measure: Per Man-hour
 3. Quantity Allowance: Include 20 man-hours.

3.5 SCHEDULE OF UNIT PRICES AND ALLOWANCES FOR HVAC CONTRACT

- A. Unit Price No. H-1: SHEET METAL:
1. Description: Provide one pound of galvanized sheet metal ductwork, fabricated in nominal 48" x 24" x 48" sections, low pressure, insulated and installed according to Division 23 Section "Metal Ducts".
 2. Unit of Measurement: Per Pound (lb.).
 3. Allowance Quantity: 100 pounds.
- B. Unit Price No. H-2 AUTOMATIC TEMPERATURE CONTROLS:
1. Description: Provide one room temperature/humidity/carbon dioxide sensor, with guard, wired and installed in accordance with Division 23 Section "Instrumentation and Controls".
 2. Unit of Measurement: Per Unit.
 3. Allowance Quantity: 2 units.
- C. Unit Price No. H-3: DIFFUSERS:
1. Description: Provide one 6" x 6" supply air diffusers including 6" diameter by 10'-0" long galvanized sheet metal branch ductwork, insulated and installed in accordance with Division 23 Section "Diffusers, Registers, and Grilles".

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2. Unit of Measurement: Per Unit.
 3. Allowance Quantity: 5 units.
- D. Unit Price No. H-4: FIRE DAMPERS:
1. Description: Provide one 1hour rated Type B duct fire dampers, nominal 12" x 12", including cutting and patching of existing wall construction and installed in accordance with Division 23 Section "Duct Accessories".
 2. Unit of Measurement: Per Unit.
 3. Allowance Quantity: 2 units.
- E. Unit Price No. H-5: ADDITIONAL COPPER PIPE:
1. Description: Provide additional 5/8" diameter ACR copper pipe including insulation and hangers in accordance with the applicable Division 23 Sections. Include one coupling and one 90 elbow per 20'-0" length.
 2. Unit of Measurement: Per linear foot
 3. Quantity Allowance: Include 50 linear feet.
- F. Unit Price No. H-6: JOURNEYMAN SHEET METAL WORKER LABOR:
1. Description: Provide a journeyman sheet metal worker for Owner's use for work as directed by the Construction Manager and at his discretion:
 2. Unit of Measure: Per Man-hour
 3. Allowance Quantity: Include 15 man-hours.
- G. Unit Price No. H-7: JOURNEYMAN PIPEFITTER LABOR:
1. Description: Provide a journeyman sheet metal worker for Owner's use for work as directed by the Architect and at his discretion:
 2. Unit of Measure: Per Man-hour
 3. Allowance Quantity: Include 15 man-hours.
- 3.6 SCHEDULE OF UNIT PRICES AND ALLOWANCES FOR ELECTRICAL CONTRACT
- A. Unit Price No. E-1: CONDUIT
1. Description: Provide additional 3/4" EMT according to Division 26 Section "Raceways and Boxes for Electrical Systems."
 2. Unit of Measurement: Per Linear foot.
 3. Allowance Quantity: 300 lineal feet.
- B. Unit Price No. E-2: WIRE
1. Description: Provide additional #10 wire according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
 2. Unit of Measurement: Per Linear foot.
 3. Allowance Quantity: 100 lineal feet.
- C. Unit Price No. E-3: CABLE
1. Description: Provide additional MC cable with 2#12 & #12 ground according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
 2. Unit of Measurement: Per Linear foot.
 3. Allowance Quantity: 300 lineal feet.

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D. Unit Price No. E-4: DISCONNECT SWITCHES

1. Description: Provide an additional 208V, 100/3 fused safety switch according to Division 26 Section "Enclosed Switches and Circuit Breakers," including 100/3 feeder circuit breaker, 4#2 & #8 ground and 100' one-way circuit distance.
2. Unit of Measurement: Per Unit.
3. Allowance Quantity: 2 units.

E. Unit Price No. E-5: RECEPTACLES

1. Description: Provide an additional duplex receptacle and 20A circuit, including 20/1 circuit breaker, box, faceplate and 100' one-way circuit distance according to Division 26 Section "Wiring Devices."
2. Unit of Measurement: Per Unit.
3. Allowance Quantity: 10 units.

F. Unit Price No. E-6: DATA JACKS

1. Description: Provide an additional Category 6 data jack, according to Division 27 Section "Communications Horizontal Cabling," including box, faceplate and 200' cable length.
2. Unit of Measurement: Per Unit.
3. Allowance Quantity: 10 units.

G. Unit Price E No. -7: EXIT SIGN & WIRING:

1. Description: Provide an additional exit sign assembly (luminaire type E) including appropriate mounting equipment, ¾" conduit/raceway with 2, #10 conductors and 1, #12 ground wire, necessary wall penetration cutting and patching, terminations and connections. Connect to closest normal/emergency "Exit Sign" circuit. Perform in accordance with applicable Division 26 Sections and Drawing requirements for similar work.
2. Unit of Measurement: Per assembly
3. Maximum Distance: 50 feet
4. Quantity Allowance: Include 2 assemblies.

H. Unit Price No. E-8: SMOKE DETECTORS

1. Description: Provide an additional system heat or smoke detector consisting of detector of type required for application, appropriate backbox (as applicable) and mounting equipment, cabling, conduit, necessary wall penetration cutting and patching, terminations, connections to fire alarm system and programming required according to Division 28 Section "Digital, Addressable Fire-Alarm System."
2. Unit of Measurement: Per Unit.
3. Allowance Quantity: 2 units.

I. Unit Price No. E-9: JOURNEYMAN ELECTRICIAN LABOR:

1. Description: Provide a journeyman electrician laborer for Owner's use for work as directed by the Architect and at his discretion.
2. Unit of Measurement: Per Man-hour
3. Quantity Allowance: Include 40 man-hours.

END OF SECTION 01 22 15

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SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 TIMING

- A. Selected alternates shall be accomplished within the same time frames established for the Work as defined in the Division 01 Section "Summary".
- B. Some alternates may be selected after contract award. For each alternate, include costs necessary to hold the alternate price for time period of 18 months. Agreement shall include provision to allow Owner to elect, and include in Contract sum by Change Order, such alternates within time limits indicated.

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

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1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.
- E. Each prime contractor shall consider each alternate and provide a response on the bid form as indicated on the bid form and instructions to bidders. If a bidder indicates “Not Applicable” and the Owner accepts that alternate, the prime contractor indicating “Not Applicable” shall support the alternate scope without change in contract sum or time.
- F. GC shall include in his base bid, any administrative and overhead costs (including project management and scheduling work) for the largest and most expansive scope as defined by any combination of Alternates. This includes any Alternates for MC or EC work that is exclusive of General Construction work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Second Floor Fit-out
 1. Base Bid: Construct first and second floor as indicated on the drawings as a complete finished assembly, including all mechanicals, plumbing and electrical systems and devices.
 2. Alternate Bid: Remove “Fit-out” of second floor.
 3. Scope: Provide all structure for second floor, including all columns, beams, joists, decking, elevated concrete slab, and interior stair. Including items and elements necessary for the operation of the first floor. This would include full fit-out of IT 208, along with any chases and chase openings required elsewhere. Remove any walls, finishes, HVAC, Plumbing and Electrical systems/items serving the second floor. Provide railing as indicated around all open sides of second floor deck.
 4. As defined by the construction documents and any reference to Alternate #1.

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B. Alternate No. 2: Concrete Apron

1. Base Bid: Provide concrete apron on both sides of apparatus bays as indicated on the civil drawings.
2. Alternate Bid: Heavy duty asphalt paving in lieu of concrete aprons.
3. Scope: In lieu of the concrete aprons, provide heavy duty asphalt paving as specified on civil drawings in location where concrete aprons are scheduled.
4. As defined by the construction documents and any reference to Alternate #2.

C. Alternate No. 3: Exterior balcony and stair.

1. Base Bid: Construct exterior stairs and balcony assembly as indicated on the drawings.
2. Alternate Bid: No exterior balcony and stairs.
3. Scope: Remove exterior balcony, ladder to roof, stair and railings, and roof structure on rear side of building, and any electrical items connected to the stair structure as indicated on the drawings. Door 202 and windows to remain. Footings to remain.
4. As defined by the construction documents and any reference to Alternate #3.

D. Alternate No. 4: Curb and sidewalk.

1. Base Bid: Construct sitework as indicated on the civil drawings
2. Alternate: Construct curb and sidewalk along Germantown Pike as indicated on the drawings.
3. Scope: Remove existing sidewalk and curbs to the extent shown on the civil drawings and replace with new curbing and sidewalk as described by civil drawings.
4. As defined by the construction documents and any reference to Alternate #4.

E. Alternate No. 5: Finish flooring.

1. Base Bid: Provide flooring as indicated in the construction documents.
2. Alternate: Provide alternate floor finishes as indicated in the finish schedule and finish plan.
3. Scope: In areas indicated on the finish schedule, provide stained concrete in lieu of sealed concrete.
4. As defined by the construction documents and any reference to Alternate #5.

F. Alternate No. 6: Appliances.

1. Base Bid: Provide all power, vents and plumbing required for scheduled appliances.
2. Alternate: Provide appliances as indicated.
3. Scope: Provide refrigerator, microwave, range and stacked washer/dryer where indicated.
4. As defined by the construction documents and any reference to Alternate #6.

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G. Alternate No. 7: Post and Rail wood fence.

1. Base Bid: Existing post and rail wood fence to remain.
2. Alternate: Replace existing post and rail wood fence with new matching post and rail wood fence.
3. Scope: Remove existing fence in its entirety. Replace in kind with new fence. In addition, extend new fence to the end of the new parking area (approximately 3 parking spaces).
4. As defined by the construction documents and any reference to Alternate #7.

H. Alternate No. 8: New Gas Line.

1. Base Bid: Provide gas service as indicated on the plans.
2. Alternate: Provide new gas service that taps into gas main in Germantown Pike. Run to new gas meter in location indicated on plan. Obtain all necessary permits.
3. Scope: Provide new gas services to gas main in street following Alternate route indicated. Maintain required clearances and separation from electrical lines. Provide structure as required for mounting gas meter and two bollards to provide protection from vehicles. Run line from meter into building where indicated.
4. As defined by the construction documents and any reference to Alternate #8.

END OF SECTION 012300

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 2. Section 012215 "Unit Prices and Allowances" for administrative requirements governing the use of unit prices and Allowances.
 - 3. Section 01 29 00 "Payment Procedures"
 - 4. Section 01 32 00 "Construction Progress Documentation"
 - 5. Section 01 78 00 "Project Record Documents" for recording changes in the work.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 10 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

Project Name

- b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 - 7. Proposal Request Form: Use form acceptable to Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
 - 1. CASH Allowances are not included.
 - 2. Material Allowance Adjustment: If a material allowance is included in the work, prior to performing any work included in a material allowance, the Contractor shall review the work with the Architect. No work shall be performed without prior approval of the Architect. The Architect will verify and adjust material allowance amounts, based on the quantity of work required and by final measurement of work-in-place. The Contractor shall provide the Architect with the following information:
 - a. Include installation costs in purchase amount only where indicated as part of the allowance.
 - b. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - c. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - d. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

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- B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. Owner and Architect will sign and date the Construction Change Directive as authorization for the Contractor to proceed with the changes.
 - 2. Contractor shall sign and date the Construction Change Directive to indicate agreement with the terms herein.
 - 3. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

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SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 3. Section 012215 "Unit Prices and Allowances" for administrative requirements governing the use of unit prices and Allowances.
 - 4. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 5. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.

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2. Submit the schedule of values to Architect at earliest possible date, but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Arrange schedule of values consistent with format of AIA Document G703.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five (5) percent of the Contract Sum.
 4. No separate itemization will be permitted for shop drawing preparation. Administrative costs shall be distributed amongst each unit of work.
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site that have been approved, in advance, for payment. Include bill of sale and evidence of insurance or bonded warehousing.
 7. Quantity Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 8. Temporary facilities and other major cost items that are not direct cost of actual work-in-place shall be shown as a separate line item in the Schedule of Values including, but not limited to the following:
 - 1) project supervision,
 - 2) mobilization and de-mobilization,
 - 3) Project Identification Sign,
 - 4) final cleanup for Owner occupancy.
 9. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

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1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
 - 1. Submit draft copy of Application for Payment seven (7) days prior to due date for review by Architect.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit electronic copy signed and notarized of each Application for Payment to Architect. Include copy of waivers of lien and similar attachments as required.

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1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors, manufacturers, fabricators, suppliers and installers.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction conference.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.

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2. General Contractor shall include certification letter, endorsed by surveyor registered in the state of Pennsylvania, that work has been located on site in accordance with the Contract Documents.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
 - 2. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 3. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 4. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

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1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory (if being used), and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Coordination: Each contractor shall cooperate with Project coordinator who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- C. Claims resulting from improper coordination are limited to additional time. Refer to General Conditions.

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- D. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- E. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors and direction of Project coordinator to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such

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conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

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- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 2. File Submittal Format: Submit or post coordination drawing files using PDF format.
 3. BIM File Incorporation: May be used if desired. Contractors responsibility at no additional cost.
 4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Revit 2024.
 - c. Contractor shall execute a data licensing agreement in the form of Electronic Data Transfer Release – Reference Section 01 3100.10 for form.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

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- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: As provided by Architect.
- 1. Attachments shall be electronic files in PDF format.
 - 2. Identify each page of attachments with the RFI number and sequential page number.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
- 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within ten (10) days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly (to be updated at each construction meeting, and as noted below). Include the following:
- 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were returned without action or withdrawn.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

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- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven (7) days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Digital Drawing Software Program: Contract Drawings are available in Revit 2024.
 4. Contractor shall execute a data licensing agreement in the form of Electronic Data Transfer Release – Reference Section 01 3100.10 for form.
 - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Electronic Data Transfer Release – Reference Section 01 3100.10 for form.
- B. Web-Based Project Software: Web-based Project software site for purposes of hosting and managing Project communication and documentation until Final Completion may be used by General Contractor if approved by Architect. In order to be considered, it must meet the following requirements:
1. Web-based Project software site includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.
 - i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.

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2. Provide up to seven (7) web-based Project software user licenses for use of Owner, Architect, and Architect's consultants. Provide eight (8) hours of software training at Architect's office for web-based Project software users.
 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: Architect will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Participants and others involved, and individuals whose presence is required, will be notified/invited prior to the meeting.
 2. Agenda: Will be distributed to all invited attendees.
 3. Minutes: Architect will record significant discussions and agreements achieved and will distribute the meeting minutes to all involved parties within five (5) days of the meeting.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.

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- l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - 1) Limitations on substitutions.
 - n. Preparation of Record Documents.
 - o. Use of the premises.
 - p. Work restrictions.
 - q. Working hours.
 - r. Owner's occupancy requirements.
 - s. Responsibility for temporary facilities and controls.
 - t. Procedures for moisture and mold control.
 - u. Procedures for disruptions and shutdowns.
 - v. Construction waste management and recycling.
 - w. Parking availability.
 - x. Office, work, and storage areas.
 - y. Equipment deliveries and priorities.
 - z. First aid.
 - aa. Security.
 - bb. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.
 - k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.

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- s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Architect will conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than sixty (60) days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements.
 - n. Installation of Owner's furniture, fixtures, and equipment.
 - o. Responsibility for removing temporary facilities and controls.
 - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

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- E. Progress Meetings: Architect will conduct progress meetings at biweekly intervals, or at intervals necessary for work being performed.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Status of Grant requirements and documentation.
 - 6) Deliveries.
 - 7) Off-site fabrication.
 - 8) Access.
 - 9) Site use.
 - 10) Temporary facilities and controls.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Status of ASIs.
 - 16) Status of RFIs.
 - 17) Status of Proposal Requests.
 - 18) Pending changes.
 - 19) Status of Change Orders.
 - 20) Pending claims and disputes.
 - 21) Documentation of information for payment requests.
 3. Minutes: Architect will record and distribute to Owner's representative, all Prime Contractors and the attendees at the meeting.
 - a. When required by the Architect, Project Coordinator shall record and distribute minutes to all prime contractors and the attendees at the meeting.
 - b. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

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- c. **Schedule Updating:** Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. **Coordination Meetings:** Project Coordinator will conduct Project coordination meetings at weekly intervals. Conduct Project coordination Meetings at no greater than biweekly intervals, but in no case less than a frequency as required by the progress of the work. Where possible, schedule coordination meetings on alternate weeks as progress meetings. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. **Attendees:** In addition to representatives of Owner, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. **Agenda:** Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. **Combined Contractor's Construction Schedule:** Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. **Schedule Updating:** Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. **Review present and future needs of each contractor present, including the following:**
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Status of ASIs.
 - 15) Status of RFIs.
 - 16) Proposal Requests.
 - 17) Change Orders.
 - 18) Pending changes.

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3. Reporting: Record meeting results and distribute copies to everyone in attendance, to others affected by decisions or actions resulting from each meeting, the Owner and Architect.
- G. Warranty Meeting: Prior to the expiration of the one (1) year project warranty, Architect will conduct and Contractor shall attend a meeting with the Owner to review the facility operations and performance.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

ELECTRONIC DATA TRANSFER RELEASE AND LICENSE FORM

TO		ATTENTION	
		DATE	
		PROJECT	

TERMS AND CONDITIONS

- The files which are the subject of this License Form is/are not copy protected. You are not purchasing the files and this transaction shall not be considered a sale of the files or the data on the files. Payment of **\$0** per file is merely reimbursement for the media and the cost of transferring the data to the media. You may make backup copies for your own use. IT IS ILLEGAL TO GIVE OR SELL COPIES OF THE FILES OR ANY OF THE DATA ON THE FILES TO ANOTHER PERSON OR BUSINESS OR TO USE THE FILES OR THE DATA ON THE FILES FOR ANY PURPOSE OTHER THAN AS AUTHORIZED BY THIS FORM WITHOUT THE EXPRESSED WRITTEN CONSENT OF KELLY CLOUGH BUCHER and ASSOCIATES, INC. (KCBA INC.).
- To the best of KELLY CLOUGH BUCHER AND ASSOCIATES Inc.'s knowledge, no computer viruses, adware, spyware or other malicious files have been detected on these files. However, Recipient is solely responsible for analyzing the files contained thereon for the presence of any virus, adware, spyware or other malicious files and releases KELLY CLOUGH BUCHER AND ASSOCIATES Inc. and its employees from any liability for any damage which may be caused by the presence of such files.
- The Word Files are supplied in the following format: Microsoft Word 365 MSO. KELLY CLOUGH BUCHER AND ASSOCIATES INC. makes no representation as to the compatibility of the Files with any hardware or software.
- Since the information set forth on the Files can be modified unintentionally or otherwise, KELLY CLOUGH BUCHER AND ASSOCIATES INC. reserves the right to remove all indicia of its ownership and/or involvement from each electronic display.
- All information added to the documents contained in Files by the Recipient shall be in a distinctively heavier pen weight and different font, such that all Recipient supplied information can be clearly distinguished from the data on the Files & as delivered to Recipient.
- Any information added by the Recipient, which represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation. This License Form does not authorize any changes to the original design. Modifications to the design required the written authorization of the Architect before they can be implemented.
- The Files and all information on the Files shall be considered instruments of service of the Architect and its consultants solely for use in connection with this Project and only for the limited purpose for which the license is granted. The Architect and its consultants are the authors of their respective instruments of service and retain all common law, statutory and other reserved rights including the copyright. Upon payment of the sums due as described in paragraph 1 and compliance with all of the terms and conditions of this Form, Architect grants recipient a non-exclusive license to use the Files for its convenience for the purpose of preparing submittals required for the Project. Payment of any fee due and the Recipient's compliance with all of the terms and conditions of this License Form are a condition precedent to the existence and continued viability of the license herein granted.
- KELLY CLOUGH BUCHER AND ASSOCIATES Inc. makes no representation regarding the accuracy, completeness, or permanence of Files, nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the Files may not have been incorporated. It is the Recipient's responsibility

to determine if any conflicts exist. The Files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction and any Supplemental Conditions. **IT IS SPECIFICALLY AGREED BY THE RECIPIANT THAT THERE ARE NO WARRANTIES OF ANY KIND IN THE FILES OR IN THE MEDIA IN WHICH THEY ARE CONTAINED, EITHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS. RECIPIANT EXPRESSLY WAIVES ANY SUCH WARRANTIES.**

9. The use of Files prepared by the Architect shall not relieve Recipient of any of its obligations under any contract entered into with regard to Project. Furthermore, if Recipient is a contractor, the use of the Files does not in any way negate the Contractor's responsibility for coordination with other trades or for the proper checking and coordination of information as required to facilitate complete and accurate documents.
10. The Recipient releases KELLY CLOUGH BUCHER AND ASSOCIATES Inc. and its employees from any and all claims, demands or liabilities arising from Recipient's use of the Files and covenants not to sue or bring, maintain or participate in any action or suit against KELLY CLOUGH BUCHER AND ASSOCIATES Inc. or its consultants or and of their employees arising from the use of Files. Furthermore, the Recipient shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect and its consultants and each of their shareholders, partners, members, directors, officers and employees from and against any and all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the Files by the Recipient, or by third party recipients of the Files from the Recipient.
11. KELLY CLOUGH BUCHER AND ASSOCIATES Inc. believes that no licensing or copyright fees are due to others on account of this license for the use of the Files, but to the extent any are, the Recipient will pay the appropriate fees and hold KELLY CLOUGH BUCHER AND ASSOCIATES Inc. harmless from such claims as may arise.
12. Any purchase order number provided by the Recipient is for Recipient's accounting purposes only. Recipient's purchase order terms and conditions are void and are not a part of this license.
13. Payment of the service fee is due upon delivery of the files.
14. This License shall be governed by the laws of the principal place of business of the Architect. Recipient agrees that notwithstanding this License, the Recipient and Architect are not in privity for purposes of the economic loss doctrine as it applies to any claims that arise out of this Project.

Please endorse one copy of this License Form and return it to KELLY CLOUGH BUCHER AND ASSOCIATES Inc. as your acknowledgment of receipt of this data and acceptance of the terms outlined herein. Use in any form of the electronic data provided shall constitute acknowledgment of receipt and acceptance of the terms outlined herein.

RECIPIENT SIGNATURE _____ **DATE** _____

PRINT NAME AND TITLE _____

KELLY CLOUGH BUCHER AND ASSOCIATES INC.

AUTHORIZED SIGNATURE _____ **DATE** _____

PRINT NAME AND TITLE _____

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SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Unusual event reports.
- B. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for preparing a combined Contractor's Construction Schedule.
 - 2. Section 012900 "Payment Procedures" for submitting the Schedule of Values.
 - 3. Section 013100 "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 4. Section 013300 "Submittal Procedures" for submitting schedules and reports.
 - 5. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Major Area: A story of construction, a separate building, or a similar significant construction element.

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- C. Milestone: A key or critical point in time for reference or measurement.
- D. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF file.
- B. Startup construction schedule.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.
 - 1. When requested by another prime contractor, the Architect, or the Owner, provide construction schedule (preliminary, coordination version or final) in non-proprietary electronic data format, Data shall be exported in sufficient detail to permit replication of schedule and underlying assumptions in the same program or other programs of similar sophistication.
- D. Daily Construction Reports: Submit at weekly intervals.
- E. Material Location Reports: Submit at monthly intervals.
- F. Site Condition Reports: Submit at time of discovery of differing conditions.
- G. Unusual Event Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, area separations, and interim milestones.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review submittal requirements and procedures.
 - 7. Review time required for review of submittals and resubmittals.
 - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 9. Review time required for Project closeout and Owner startup procedures.
 - 10. Review and finalize list of construction activities to be included in schedule.

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11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

1.7 SCHEDULE, GENERAL

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules, that is acceptable to the Architect.

- B. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than twenty (20) days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

- a. Structural Steel Products.
- b. Institutional Casework.
- c. Elevator.
- d. Mechanical equipment.
- e. Electrical switchgear and panels.
- f. Other items requiring longer than 90 day lead time.

3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.

4. Startup and Testing Time: Include no fewer than fifteen (15) days for startup and testing.

5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

6. Punch List and Final Completion: Include not more than thirty (30) days for completion of punch list items and final completion.

- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work under More Than One Contract: Include a separate activity for each contract.

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2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Uninterruptible services.
 - b. Use-of-premises restrictions.
 - c. Seasonal variations.
 - d. Environmental control.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, final completion, and the following interim milestones:
1. Building envelope enclosure and space conditioning.
- F. Upcoming Work Summary: Prepare a separate summary report indicating activities scheduled to occur or commence prior to the next scheduled job meeting. Summarize the following issues:
1. Activities scheduled on day-to-day basis.
 2. Items that need coordination of different trades.
 3. Critical or special activities that require other parties awareness.
 4. Unresolved issues.
 5. Unanswered Requests for Information.
 6. Rejected or unreturned submittals.
 7. Notations on returned submittals.
 8. Pending modifications affecting the Work and the Contract Time.
- G. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule three (3) days before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. Revise schedule for each proposed contract modification that affects time and show how the proposed change affects the overall project schedule.
 4. As the Work progresses, indicate final completion percentage for each activity.
- H. Recovery Schedule: When periodic update indicates the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- I. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

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1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within fifteen (15) days of date established for commencement of the Work.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in ten (10) percent increments within time bar.

1.9 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Testing and inspection.
 8. Accidents.
 9. Meetings and significant decisions.
 10. Unusual events.
 11. Stoppages, delays, shortages, and losses.
 12. Meter readings and similar recordings.
 13. Emergency procedures.
 14. Orders and requests of authorities having jurisdiction.
 15. Change Orders received and implemented.
 16. Construction Change Directives received and implemented.
 17. Services connected and disconnected.
 18. Equipment or system tests and startups.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
 1. Material stored prior to previous report and remaining in storage.

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2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Submittal schedule requirements.
- 2. Administrative and procedural requirements for submittals.

- B. Related Requirements:

- 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
- 2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
- 3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
- 5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 7. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- 8. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

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1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Architect.
 4. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
 - a. Reference attached Electronic Shop Drawing Naming Convention document.
 5. Category and type of submittal.
 6. Submittal purpose and description.
 7. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 8. Drawing number and detail references, as appropriate.
 9. Indication of full or partial submittal.
 10. Location(s) where product is to be installed, as appropriate.
 11. Other necessary identification.
 12. Remarks.
 13. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

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1. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using AIA Document G810 transmittal form.
- D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number. Do not include extraneous information that is not applicable to project. If product information has multiple options, clearly identify the options being selected as part of the submission.
- E. Submittals for Web-Based Project Software (if being used): Prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
 2. Web-Based Project Software (if being used): Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

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1. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow fifteen (15) days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow twenty one (21) days for initial review of each submittal.
 - a. Stormwater system.
 - b. Domestic water service components.
 - c. Fire suppression water service components.
 - d. Door hardware.
 - e. Exposed terminal heating and cooling equipment including grilles, registers and diffusers.
 - f. Lighting fixtures.
 - g. Fire suppression system.
 - h. Other components requiring review by authorities having jurisdiction.
 - i. Other components requiring review by utility providers.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.

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- f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
- 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 - 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
 - 4. Web-Based Project Software (if being used): Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 - 5. Paper Transmittal: Include paper transmittal to accompany physical samples including complete submittal information indicated.

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6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
7. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two (2) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, will return submittal with options selected.
8. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three (3) sets of Samples. Architect will retain two (2) Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- F. Certificates:
 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

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2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

G. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

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1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp (or indication in web-based Project software). Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval, or that clearly indicate that a thorough review was not completed.
 - 2. Any markups made by the Contractor are to be in a contracting color, other than red.

1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
 - 1. PDF Submittals: Architect will indicate, via markup/stamp on each submittal, the appropriate action.
 - 2. Submittals by Web-Based Project Software (if used): Architect will indicate, on Project software website, the appropriate action. However, Architect will still apply a stamp with the action to be taken. This stamp takes priority over any project software action indicated when submittal is returned.

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- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

1.11 ARCHITECT'S/ ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architects notations will be made in the color red, so it will be easily distinguishable from original submittal. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. Final Unrestricted Release: Where submittal is marked "**NO EXCEPTIONS TAKEN**" the Work covered by the submittal may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.
 - 2. Final-but-Restricted Release: Where submittal is marked "**FURNISH AS CORRECTED**," the work covered by the submittal may proceed provided it complies with both Architect's notations and corrections on the submittal and the Contract Documents. Final acceptance will depend on that compliance.
 - 3. Restricted Release: Where submittal is marked "**FURNISH AS CORRECTED/RESUBMIT**," the work covered by the submittal may proceed expeditiously, provided it complies with both Architect's notations and corrections on the submittal and the Contract Documents. Revise submittal for record according to Architect's notations and corrections and resubmit for Architect's action. Final acceptance will depend on final unrestricted release action and compliance stated above. Where noted additionally as "**FOR RECORD ONLY**," provide record copy of submittal revised according to Architect's notations. Architect's action in requesting record copy shall be Final-But-Restricted Release, as noted above.
 - 4. Returned for Resubmittal: Where submittal is marked "**REVISE AND RESUBMIT**," do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise or prepare a new submittal according to Architect's notations and corrections.
 - 5. Rejected: Where the submittal is marked "**REJECTED/RESUBMIT**," do not proceed with the Work covered by the submittal. Prepare a new submittal for a product or system that complies with the Contract Documents.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

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SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

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1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
 - D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 1. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements or as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
 - E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
 - F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
 - G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
 - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
 - I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
 - J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.
- 1.4 DELEGATED-DESIGN SERVICES
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

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1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups.
 - 1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

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- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within ten (10) days of Notice of Award and not less than five (5) days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.

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3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.

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- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329 and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

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- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
 - 2. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. **Mockups:** Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups of size indicated.
 - 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 - 3. Notify Architect seven (7) days in advance of dates and times when mockups will be constructed.
 - 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
 - 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.
 - a. Allow seven (7) days for initial review and each re-review of each mockup.

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7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
8. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.

1.11 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made by the Owner.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least twenty four (24) hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

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1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.

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1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

- B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.

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4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.
 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

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- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
 - 8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org
 - 9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 11. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 12. AGA - American Gas Association; www.aga.org.
 - 13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 - 14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 - 15. AI - Asphalt Institute; www.asphaltinstitute.org.
 - 16. AIA - American Institute of Architects (The); www.aia.org.
 - 17. AISC - American Institute of Steel Construction; www.aisc.org.
 - 18. AISI - American Iron and Steel Institute; www.steel.org.
 - 19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
 - 20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 - 21. ANSI - American National Standards Institute; www.ansi.org.
 - 22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
 - 23. APA - APA - The Engineered Wood Association; www.apawood.org.
 - 24. APA - Architectural Precast Association; www.archprecast.org.
 - 25. API - American Petroleum Institute; www.api.org.
 - 26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
 - 27. ARI - American Refrigeration Institute; (See AHRI).

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28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CE - Conformite Europeenne; <http://ec.europa.eu/growth/single-market/ce-marking/>
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.pbmdf.com.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - Canadian Standards Association; www.csa.ca.
65. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.

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71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
74. ECIA - Electronic Components Industry Association; www.eciaonline.org.
75. EIA - Electronic Industries Alliance; (See TIA).
76. EIMA - EIFS Industry Members Association; www.eima.com.
77. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
81. EVO - Efficiency Valuation Organization; www.evo-world.org.
82. FCI - Fluid Controls Institute; www.fluidcontrolsintstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
85. FM Approvals - FM Approvals LLC; www.fmglobal.com.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
87. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
88. FSA - Fluid Sealing Association; www.fluidsealing.com.
89. FSC - Forest Stewardship Council U.S.; www.fscus.org.
90. GA - Gypsum Association; www.gypsum.org.
91. GANA - Glass Association of North America; www.glasswebsite.com.
92. GS - Green Seal; www.greenseal.org.
93. HI - Hydraulic Institute; www.pumps.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
96. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
97. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
98. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
99. IAS - International Accreditation Service; www.iasonline.org.
100. IAS - International Approval Services; (See CSA).
101. ICBO - International Conference of Building Officials; (See ICC).
102. ICC - International Code Council; www.iccsafe.org.
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
106. IEC - International Electrotechnical Commission; www.iec.ch.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
108. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
112. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
113. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.com.
114. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.

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115. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
116. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
117. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
118. ISO - International Organization for Standardization; www.iso.org.
119. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
120. ITU - International Telecommunication Union; www.itu.int/home.
121. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
122. LMA - Laminating Materials Association; (See CPA).
123. LPI - Lightning Protection Institute; www.lightning.org.
124. MBMA - Metal Building Manufacturers Association; www.mbma.com.
125. MCA - Metal Construction Association; www.metalconstruction.org.
126. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
127. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
128. MHIA - Material Handling Industry of America; www.mhia.org.
129. MIA - Marble Institute of America; www.marble-institute.com.
130. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
131. MPI - Master Painters Institute; www.paintinfo.com.
132. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
133. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
134. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
135. NADCA - National Air Duct Cleaners Association; www.nadca.com.
136. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
137. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
138. NBI - New Buildings Institute; www.newbuildings.org.
139. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
140. NCMA - National Concrete Masonry Association; www.ncma.org.
141. NEBB - National Environmental Balancing Bureau; www.nebb.org.
142. NECA - National Electrical Contractors Association; www.necanet.org.
143. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
144. NEMA - National Electrical Manufacturers Association; www.nema.org.
145. NETA - InterNational Electrical Testing Association; www.netaworld.org.
146. NFHS - National Federation of State High School Associations; www.nfhs.org.
147. NFPA - National Fire Protection Association; www.nfpa.org.
148. NFPA - NFPA International; (See NFPA).
149. NFRC - National Fenestration Rating Council; www.nfrc.org.
150. NHLA - National Hardwood Lumber Association; www.nhla.com.
151. NLGA - National Lumber Grades Authority; www.nlga.org.
152. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
153. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
154. NRCA - National Roofing Contractors Association; www.nrca.net.
155. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
156. NSF - NSF International; www.nsf.org.
157. NSPE - National Society of Professional Engineers; www.nspe.org.
158. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
159. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.

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160. NWFA - National Wood Flooring Association; www.nwfa.org.
161. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
162. PDI - Plumbing & Drainage Institute; www.pdionline.org.
163. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); <http://www.plasa.org>.
164. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
165. RFCI - Resilient Floor Covering Institute; www.rfci.com.
166. RIS - Redwood Inspection Service; www.redwoodinspection.com.
167. SAE - SAE International; www.sae.org.
168. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
169. SDI - Steel Deck Institute; www.sdi.org.
170. SDI - Steel Door Institute; www.steeldoor.org.
171. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
172. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
173. SIA - Security Industry Association; www.siaonline.org.
174. SJI - Steel Joist Institute; www.steeljoist.org.
175. SMA - Screen Manufacturers Association; www.smainfo.org.
176. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
177. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
178. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
179. SPIB - Southern Pine Inspection Bureau; www.spib.org.
180. SPRI - Single Ply Roofing Industry; www.spri.org.
181. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
182. SSINA - Specialty Steel Industry of North America; www.ssina.com.
183. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
184. STI - Steel Tank Institute; www.steeltank.com.
185. SWI - Steel Window Institute; www.steelwindows.com.
186. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
187. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
188. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
189. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
190. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
191. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
192. TMS - The Masonry Society; www.masonrysociety.org.
193. TPI - Truss Plate Institute; www.tpinst.org.
194. TPI - Turfgrass Producers International; www.turfgrasssod.org.
195. TRI - Tile Roofing Institute; www.tilerroofing.org.
196. UL - Underwriters Laboratories Inc.; <http://www.ul.com>.
197. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
198. USAV - USA Volleyball; www.usavolleyball.org.
199. USGBC - U.S. Green Building Council; www.usgbc.org.
200. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
201. WASTEC - Waste Equipment Technology Association; www.wastec.org.
202. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
203. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.

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204. WDMA - Window & Door Manufacturers Association; www.wdma.com.
 205. WI - Woodwork Institute; www.wicnet.org.
 206. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
 207. WWPA - Western Wood Products Association; www.wwpa.org.
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
 2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 3. ICC - International Code Council; www.iccsafe.org.
 4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; www.usace.army.mil.
 2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
 3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
 4. DOD - Department of Defense; www.quicksearch.dla.mil.
 5. DOE - Department of Energy; www.energy.gov.
 6. EPA - Environmental Protection Agency; www.epa.gov.
 7. FAA - Federal Aviation Administration; www.faa.gov.
 8. FG - Federal Government Publications; www.gpo.gov/fdsys.
 9. GSA - General Services Administration; www.gsa.gov.
 10. HUD - Department of Housing and Urban Development; www.hud.gov.
 11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
 12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 13. SD - Department of State; www.state.gov.
 14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
 15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
 17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
 18. USP - U.S. Pharmacopeial Convention; www.usp.org.
 19. USPS - United States Postal Service; www.usps.com.
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.

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2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS; California Department of Health Services; (See CDPH).
 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 6. DEP; Commonwealth of Pennsylvania Department of Environmental Protection/southeast region www.depweb.state.pa.us/southeastro
 7. PDE; Pennsylvania Department of Education www.pde.state.pa.us
 8. PaDL&I; Pennsylvania Department of Labor and Industry www.dli.pa.us
 9. PADOT Pennsylvania Department of Transportation www.dot.state.pa.us/
 10. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
 11. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservation.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

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SECTION 01 4339 - MOCKUPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior mockups.

B. Related Requirements:

1. Section 014000 "Quality Requirements" for quality assurance requirements for aesthetic and workmanship mockups specified in other Sections.

1.2 DEFINITIONS

- A. Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements, or as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, and installers of major systems whose Work is included in exterior mockups.
2. Review locations and extent of mockups.
3. Review and finalize schedule for mockups, and verify availability of materials, personnel, equipment, and facilities needed to complete mockups and maintain schedule for the Work.

1.4 ACTION SUBMITTALS

A. Shop Drawings: For exterior mockups.

1. Include plans, elevations, sections, and mounting, attachment, and support details.
2. Indicate manufacturer and model number of individual components, subassemblies, and assemblies.
3. Include site location drawing indicating orientation or proposed location of mockup.
4. Revise and resubmit Shop Drawings to reflect approved modifications in details and component interfaces resulting from changes made during testing procedures.

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1.5 QUALITY ASSURANCE

A. Build mockups to do the following:

1. Verify selections made under Sample submittals.
2. Demonstrate aesthetic effects.
3. Demonstrate the qualities of products and workmanship.
4. Demonstrate acceptable coordination between components and systems.

B. Fabrication: Before fabricating or installing portions of the Work requiring mockups, build mockups for each form of construction and finish required. Use materials and installation methods as required for the Work.

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Protect accepted mockups from the elements with weather-resistant membrane.
7. Demolish and remove mockups when directed unless otherwise indicated.

C. Notifications:

1. Notify Architect seven (7) days in advance of the dates and times when mockups will be constructed.
2. Allow seven (7) days for initial review and each re-review of each mockup.

D. Approval: Obtain Architect's approval of mockups before starting fabrication or construction of corresponding Work.

1. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
2. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 COORDINATION

A. Coordinate schedule for construction of mockups, so construction, testing, and review of mockups do not impact Project schedule.

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PART 2 - PRODUCTS

2.1 EXTERIOR MOCKUPS

- A. Construct exterior mockups according to approved mockup Shop Drawings. Construct mockups to demonstrate constructability, coordination of trades, and sequencing of Work; and to ensure materials, components, subassemblies, assemblies, and interfaces integrate into a system complying with indicated performance and aesthetic requirements.
- B. Design mockups such that they are self-supporting or become part of the final construction.
- C. Build exterior mockups using installers and construction methods that will be used in completed construction.
- D. Use specified products that have been approved by Architect. Coordinate installation of materials and products specified in individual Specification Sections that include Work included in exterior mockups.
- E. Exterior Wall Mockup: Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups approximately 4'-0" x 4'-0" in area, of the configuration directed by Architect.
 - 2. Build mockup for exterior masonry wall construction as indicated, in full thickness including face and backup wythes and accessories.
 - a. Masonry Veneer Wall: Brick veneer complete with metal studs, sheathing, air and weather barrier membrane, thermal insulation, veneer ties, drainage material, flashing, and weep holes.
 - b. Include through-wall flashing installed the length of mockup approximately 12 inches from bottom of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - c. Include window head and sill conditions.
 - d. Include metal coping and fascia at least 24 inches long.
 - e. Include sealant-filled joint at least 48 inches long.
 - f. Clean exposed faces of mockups with masonry cleaner as specified.
 - 3. Build mockup of metal wall panel construction as indicated, in full thickness including accessories with associated closure trims and outside corner condition.
 - a. Metal panel wall Type 1 (on studs): complete with metal studs, sheathing (insulated nail base), air and weather barriers, base flashings, and fasteners.
 - 1) Include door head and jamb conditions.
 - 2) Include metal fascia and interface with roofing membrane.
 - b. Metal panel wall Type 2 (on cmu): complete with air and weather barriers, base flashings, thermal insulation z-furring and fasteners.
 - 1) Include metal fascia and interface with roofing membrane.
- F. Roof mockups includes, but is not limited to, the following (may be incorporated into wall mockups):
 - 1. Roofing Membrane.
 - 2. Roofing Insulation.
 - 3. Required Blocking and roof edge base flashing.
 - 4. Termination bars.

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5. Joint sealants.
6. The above-described mockup may be built in place using approved submittal products and become part of the overall final construction. Mockup is intended as the opportunity for Architect to review installation of materials and relationship of components prior to the whole roof assembly being installed. Coordinate mockup location with Architect before beginning any work.

G. Retain approved mockups constructed in place. Incorporate fully into the Work.

PART 3 - EXECUTION (Not used)

END OF SECTION 014339

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service and distribution.
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 3. Heating and cooling facilities.
 - 4. Ventilation.
 - 5. Electric power service.
 - 6. Lighting.
 - 7. Telephone service.
 - 8. Data Services
- C. Support facilities include, but are not limited to, the following:
 - 1. Temporary roads.
 - 2. Dewatering facilities and drains.
 - 3. Project identification and temporary signs.
 - 4. Waste disposal facilities.
 - 5. Field offices.
 - 6. Storage and fabrication sheds.
 - 7. Lifts and hoists.
 - 8. Temporary stairs/access to second floor.
 - 9. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Tree and plant protection.
 - 4. Site enclosure fence.
 - 5. Security enclosure and lockup.
 - 6. Barricades, warning signs, and lights.
 - 7. Temporary enclosures.

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8. Surface protection.
9. Fire protection.
10. Fire Watch.

E. Related Sections include the following:

1. Section 011000 "Summary" for limitations on utility interruptions and other work restrictions.
2. Section 011200 "Multiple Contract Summary" for division of responsibilities for temporary facilities and controls.
3. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
4. Division 01 Section "Execution" for progress cleaning requirements.
5. Divisions 02 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
6. Section 312000 "Earth Moving" for disposal of ground water at Project site.
7. Section 312319 "Dewatering" for disposal of ground water at Project site.
8. Division 32 Section "Asphalt Paving" for construction and maintenance of asphalt paving for temporary roads and paved areas.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer, Water, and Electric Power Service: Use charges are specified in Division 01 Section "Multiple Contract Summary."
- C. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- D. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

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1.5 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within fifteen (15) days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. HVAC system isolation schematic drawing.
 - 2. Location of proposed air-filtration system discharge.
 - 3. Waste-handling procedures.
 - 4. Other dust-control measures.

1.6 QUALITY ASSURANCE

- A. Temporary Heat and Dehumidifying Equipment Supplier Qualifications: Engage a supplier experienced in supplying temporary heating and dehumidifying equipment and with the engineering and testing capabilities to recommend equipment sizes, predict fuel loads, predict humidity levels and test indoor air quality.
- B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- D. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.7 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

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1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities. Temporary use of permanent facilities shall not shorten Owner's warranty or correction period.
2. Permanent Facilities Permitted for Temporary Use:
 - a. Power Distribution System, subject to use that does not overload system.
 - b. Water Distribution System, only from janitor's closets and mechanical rooms.
 - c. Permanent Lighting, only after completion of painting, do not remove dust covers until substantial completion. Where dust covers create fire hazard, do not use fixtures.
 - d. No other permanent facilities are permitted to be used.

1.8 SEQUENCING

- A. Obtain permits for and install site identification signs no later than 15 days after notice to proceed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials except where recycled materials are permitted or required. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Pavement: Comply with Division 32 Section "Asphalt Paving."
- C. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts[, with 1-5/8-inch- (42-mm-) OD top rails.
- D. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.
- E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches (914 by 1524 mm).
- G. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."

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- H. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- I. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- J. Paint: Comply with requirements in Division 09 painting Sections.
- K. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

2.2 SURFACE PROTECTION MATERIALS

- A. For Exterior Surfaces: Self adhesive film products designed for application to-, protection of-, and easy removal from storefront, curtain wall, windows, glass and other pre-finished metal. Film shall be U.V. stable for no less than 180 days.
 - 1. Self Adhesive Surface Protection Products: As manufactured by Protect Associates, Inc. (www.pro-tect.com). Provide the following:
 - a. “Windows 180”
- B. For New Interior Finished Traffic Surfaces: Self-adhesive film products designed for application to-, protection of-, and easy removal from- traffic surfaces.
 - 1. Self Adhesive Surface Protection Products: Provide products manufactured by Protective Products International (www.protectiveproducts.com) and as listed below or equivalent products by Protect Associates, Inc.
 - a. “Carpet Protection” for carpets.
 - b. “Floor Protection” for hard surfaced floors except hardwood.
 - c. “Hardwood Protection” for wood floors.
 - d. “Dura Runner Plus” for very heavy traffic areas.
 - e. “Trim Protection” for thresholds and expansion joints at floors.

2.3 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, exterior electrical disconnect, access steps and landing, temperature controls, and foundations adequate for normal loading. Units shall be sized at the discretion of the Contractor. Units shall be kept clean, orderly and in good shape.
 - 1. Each Contractor must be equipped with and maintain their own field office with the following minimum capabilities:
 - a. Telephone service with automated answering capabilities. Superintendent’s cellular phone service may serve this purpose.
 - b. Facsimile machine with telephone service.
 - c. Internet Access with email account for site superintendent.

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- 1) Provide separate phone line for Internet access.
 - d. Include internal electrical distribution system terminating at an exterior mounted weatherproof heavy duty NEMA 3R disconnect.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
1. Size Common Use Office to accommodate the furniture and equipment specified below but in no case less than 240 square feet. A single field office for contractor and common-use is acceptable if it meets requirements of each.
 - a. One 5-foot desk with filing drawers and chair, one 5 drawer vertical filing cabinet. One drawing rack with 5 drawing holders, and one conference table and chairs of sufficient size, to accommodate 12 adults.
 2. Furniture and Equipment for Common Use Office: Provide the following:
 - a. One 5-foot desk with swivel chair.
 - b. One drawing table no less than 40 inches deep by 48 inches wide.
 - c. One 5 drawer vertical file.
 - d. One plan rack with 5 plan holders.
 - e. Conference table(s) for 12.
 - f. Seating for 20.
 - g. One 30 inch high by 48 inch wide tack board.
 - h. Extension cords as necessary to extend power to desk.
 - i. Plain paper, ink jet facsimile machine with integral phone.
 - 1) Include replenishment of consumable supplies.
 - j. Telephone service: Provide two telephone lines.
 - 1) Project Coordinator shall be responsible for telephone use charges and shall marshal common office phone use. No payment shall be made by Owner or Architect for phone use.
 - k. Include internal electrical distribution system terminating at an exterior mounted weatherproof heavy duty NEMA 3R disconnect.
 3. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 4. Conference room of sufficient size to accommodate meetings of 12 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
 6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
 7. Provide pressure treated exterior stairs and railings for access to office.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Notify Architect if such a need exists, and coordinate proposed location, such that location is acceptable to Owner and does not interfere with other construction activities.
 2. Store combustible materials apart from building.

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2.4 EQUIPMENT

- A. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Coordinate location and receive approval of proposed location prior to placement.
- B. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
 - 1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F .
- C. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- D. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.
- E. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- F. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

2.5 TEMPORARY HEATING AND DEHUMIDIFYING EQUIPMENT

- A. Permanent systems may not be used.
- B. Equipment Supplier: Provide systems from qualified supplier including, but not limited to the following:
 - 1. Temp-Air (Temp-Heat, Temp-Cool).
 - 2. Topp Construction Services, Inc.
- C. Temporary Heating Equipment: Provide system engineered by temporary equipment supplier for expected conditions and interior environment requirements specified. Provide one of the following types:
 - 1. Vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 2. Direct fired, makeup air, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control. System shall achieve one complete air change in space at a frequency no less than one air change every two hours. System shall not raise CO and CO₂ levels above those mandated by OSHA for worker safety. System shall not raise

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humidity level above specified range. System shall not recycle heated air into building, only fresh outside air shall be taken up by system for heating.

- a. Include daily measurement of interior humidity, CO and CO₂ levels. Report excessive humidity ,CO and CO₂ levels to equipment supplier and arrange immediate remedy.
 3. Use of gasoline-burning space heaters, open-flame heaters, salamander-type heating or other recirculating and non-vented heating units is prohibited.
 4. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- D. Temporary Dehumidifying Equipment: Provide system engineered by temporary equipment supplier for expected conditions and interior environment requirements specified. Provide self-contained, recirculating refrigeration units with water collection and filtration capabilities.
1. Equipment shall be sized with sufficient moisture extraction capabilities to maintain ambient interior air within specified relative humidity range.
 2. Cooling Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
 3. Provide generators sized to power equipment were temporary electric service is of insufficient capacity.
 4. Provide collection and/or drainage capabilities to prevent condensate from re-evaporating in conditioned space or from spilling on floors.
- E. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of (8) eight at each return-air grille in system and remove at end of construction, and clean HVAC system as required in Section 017700 "Closeout Procedures."

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

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1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.
- B. Drainage: Provide temporary utilities to remove storm water.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
 1. Provide rubber hoses as necessary to serve Project site.
 2. As soon as water is required at each level, extend service to form a temporary water-and fire-protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot hose. Provide one hose at each outlet.
 3. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
 4. Provide pumps to supply a minimum of 30-psi static pressure at highest point. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at reasonable pressures.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 1. Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.
- G. Ventilation and Humidity Control: Provide temporary ventilation and humidity control required by construction activities for curing or drying of completed installations or for protecting

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installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Humidity Range: Beginning from the earliest time of installation of casework, architectural woodwork or finishes, maintain between 25 and 55 percent relative humidity.
 2. Maintain interior relative humidity levels before this time as required to promote drying of concrete and concrete masonry substrates so that they achieve low enough moisture content and vapor emission levels to permit timely installation of finishes.
- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
1. Install electric power service overhead unless otherwise indicated.
 2. Retain subparagraph below if Owner is willing to permit use of building's existing electric service.
 3. Install power distribution wiring overhead and rise vertically where least exposed to damage. Lines are not to interfere with access to site and any work activities.
 4. Connect temporary service to Owner's existing power source as directed by Owner.
 5. If Owner's available electric service is insufficient, connect temporary service to closest Utility Company service location nearest site. Pay connection and use costs for service.
- J. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
1. Include distribution of power, including final connection, to exterior disconnect at each Contractor's and Common Use Field office.
 2. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
 3. Provide warning signs at power outlets other than 110 to 120 V.
 4. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
 5. Provide metal conduit enclosures or boxes for wiring devices.
 6. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
- K. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Provide one 100-W incandescent lamp per 500 sq. ft., uniformly distributed, for general lighting, or equivalent illumination.
 3. Provide one 100-W incandescent lamp every 50 feet in traffic areas.

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4. Provide one 100-W incandescent lamp per story in stairways and ladder runs, located to illuminate each landing and flight.
 5. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed. Include exterior-yard flood lighting with photo cell (dusk to dawn) control for security.
- L. Telephone Service: Provide temporary telephone service in all field offices for use by all construction personnel. Install WiFi cell phone access equipment and two (2) land-based telephone line(s) for each field office.
1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.
- M. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
1. Processor: Intel Core i5 or i7.
 2. Memory: 4 gigabyte.
 3. Disk Storage: 500 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
 4. Display: 24-inch (610-mm) LCD monitor with 256-Mb dedicated video RAM.
 5. Full-size keyboard and mouse.
 6. Network Connectivity: 10/100BaseT Ethernet.
 7. Operating System: Microsoft Windows 7 Professional or later.
 8. Productivity Software:
 - a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
 - b. Adobe Reader 11.0 or higher.
 - c. WinZip 7.0 or higher.
 9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
 10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 1.0 Mbps upload and 15 Mbps download speeds at each computer.
 11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
 12. Backup: External hard drive, minimum 2 terabyte, with automated backup software providing daily backups.

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3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Project Coordinator shall designate field office locations based on areas indicated on plans.
 - a. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access and to not interfere with the scheduling and progress of the Work.
2. Provide construction for temporary offices, shops, and sheds located within construction area or in locations indicated on drawings.
3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Parking areas for construction personnel will be located off site. Parking on site will be limited to construction vehicles required for the work. Parking areas adjacent to the site are not property of the fire department. Workers are not to park in these lots. Designated parking area for workers will be located across from the tennis courts in the gravel lot (reference site plan). Workers parking outside of these areas may be subject to being towed.

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- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- G. Project Identification and Temporary Signs: Provide Project identification and other signs with 8 foot wide by 4 feet high faces. Install signs where indicated to inform public and individuals seeking entrance to Project. Do not permit installation of unauthorized signs.
1. Include three single faced signs to be attached to temporary construction fence. Locate signs conspicuously at location directed by Architect, but do not obstruct traffic sight lines. Comply with local requirements.
 - a. Signs to be made out of twin walled corrugated plastic sheets with imaging directly applied to surface. Secure to fence as recommended by sign manufacturer.
 - b. Design/format for sign is in the construction documents. Submit final sign layout for approval.
 - c. Signs to be installed within two weeks from any on site activity taking place.
 2. Include permits and fees for signs.
 3. Engage an experienced sign maker to apply graphics for Project identification signs. Comply with details as indicated, or when not indicated, as provided by Architect.
 4. Provide temporary, directional signs for construction personnel and visitors.
 5. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 6. Maintain and touch up signs so they are legible at all times.
- H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Coordinate placement of containers with construction team. Comply with progress cleaning requirements in Section 017300 "Execution."
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

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1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Comply with authorities having jurisdiction, and requirements specified in Section 311000 "Site Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and authorities having jurisdiction.
 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- H. Site Enclosure Fence: Before construction operations begin furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 1. Extent of Fence: As required to enclose portion of Project site determined sufficient to accommodate construction operations, as indicated on Drawings.
 2. Fence location may need to change during different phases of the work and should be adjusted accordingly.
 3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

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- J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- K. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Provide temporary enclosures as required to meet criteria for permanent enclosure no later than the beginning of any of the following Work:
 - a. Interior finishes, including gypsum wallboard finishing, painting and wall coverings.
 - b. Architectural woodwork
 - c. Institutional casework.
 - 2. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - a. Install temporary enclosures before time frames stated above when necessary to maintain interior relative humidity levels and temperatures as required to promote drying of concrete and concrete masonry substrates so that they achieve low enough moisture content and vapor emission levels to permit timely installation of finishes.
 - 3. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
 - 4. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
 - 5. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
 - 6. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant-treated material for framing and main sheathing.
- M. Exterior Surface Protection:
 - 1. Where sequence of operations expose exterior finished materials including, but not limited to factory finished metal, anodized metal, glass and the like, to mortars, grouts, alkalis, acids, strong detergents or other materials that may cause damage to adjacent finishes, provide surface protection materials completely over surface to be protected.
 - 2. Comply with surface protection material manufacturer's recommendations. Do not leave materials in place beyond maximum time limit.
 - 3. Remove protection materials completely when at-risk work is complete.
- N. Traffic Surface Protection:
 - 1. New Finished Traffic Surfaces: From the time of installation to just before inspection for substantial completion overlay traffic surfaces with traffic protection products as recommended by manufacturer for substrates to be protected. Replace traffic protection products when damaged. Where specified products do not meet construction traffic

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demands or when required by the Architect or Resident Project Engineer, provide more substantial protection as specified below for existing traffic surfaces to remain.

- O. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
- P. Fire Watch: Provide adequate number of- and properly trained personnel to provide fire watch in accordance with NFPA 51B “Standard for Fire Protection During Welding, Cutting and Other Hot Work 1999 Edition, NFPA 101 “Life Safety Code”, articles 9.6.1.8 and 9.7.6.1 (including appendix) and as follows:
1. Fire Watch personnel shall be trained and provide services in compliance with NFPA 601 “Standard for Security Services in Fire Loss Prevention” and shall be acceptable to the Authorities Having Jurisdiction.
 2. The responsible party for Fire Watch Services as defined in Division 01 Section “Multiple Contracts Summary” shall be considered “Management” for the purposes of complying with the referenced standards.
 3. Fire Watch personnel shall be provided with portable communications to permit immediate communication with authorities, contractors and public emergency services.
 4. Conduct a coordination meeting in advance of the earliest requirement for Fire Watch with the Owner, respective Project Coordinators, Authority Having Jurisdiction and Architect.
 - a. Develop an emergency response plan for risks associated with construction. Coordinate with Owner’s existing security and emergency response plan.
 - b. Establish the lines of- and order of- communications based on each anticipated risk type.
 - c. Project Coordinators shall record and transmit minutes of the meeting to attendees and to Fire Watch personnel.
 5. Fire Watch shall be provided at the Work by respective responsible entity as defined in Division 01 Section “Multiple Contract Summary” and at the following times:
 - a. When hot work is being conducted.
 - b. When fire alarm is not in operation in occupied areas for time greater than 4 hours.
 - c. When fire suppression system is not in operation in occupied areas for time greater than 4 hours.

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3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 3. Indicate methods to be used to avoid trapping water in finished work.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for forty eight (48) hours are considered defective and require replacing.

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- b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for forty eight (48) hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
- c. Remove and replace materials that cannot be completely restored to their manufactured moisture level immediately, or in a time frame that does not delay any work.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

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SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 012300 "Alternates" for products selected under an alternate.
 - 3. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 4. Section 014200 "References" for applicable industry standards for products specified.
 - 5. Section 017700 "Closeout Procedures" for submitting warranties for Contract closeout.
 - 6. Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type,

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function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.
- D. "Proposed" Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Bidder. Comply with the requirements as indicated in the Instructions to Bidders.
- E. "Product" Substitutions: Product substitutions, whether named or unnamed manufactured products or materials are those proposed for use by the Contractor typically when the specified product, including a Basis of Design product, is not available or utilized.
- F. Proprietary Specifications: Where Specifications name a single product and manufacturer or where the product is accompanied by the words "no substitutions" or where the Specifications otherwise offer no alternative choices, provide the named product that complies with requirements.

1.4 ACTION SUBMITTALS

- A. Pre-Bid Substitution Requests: Refer to the Instructions to Bidders for requirements pertaining to pre-bid substitutions.
- B. Post-Bid Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Provision only applies to products that are no longer available or cannot be provided in time to meet the schedule requirements.
 - 2. Substitution Request Form: Use CSI Form 13.1A. Sample included with Document 00 6300.
 - 3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - b. Statement indicating why specified material or product cannot be provided.
 - c. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

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- d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution. Separate prime contractors shall verify and co-sign the list of changes or modifications or indicate that their Work is not affected.
 - e. Cost information, including a proposal of change, if any, in the Contract Sum. Include signed statements from separate prime contractors whether or not there are changes to the Contract Sum.
 - f. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery. Separate prime contractors shall verify and co-sign the changes or modifications to the schedule or indicate that their schedule is not affected.
 - g. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - h. Samples, where applicable or requested.
 - i. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - j. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
- a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- C. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
- 1. Provide the following:
 - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - b. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as

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- performance, weight, size, durability, visual effect, and specific features and requirements indicated.
- c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
- d. Samples, where applicable or requested.
- e. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
- 2. Where products or manufacturers are specified as “Basis-of-Design” product(s), and the Contractor chooses to provide a comparable product by one of the other named manufacturers, Contractor shall comply with the requirements for “post-bid substitutions”.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
 - a. Form of Architect's Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- D. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.

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- c. Capacity.
 - d. Speed.
 - e. Ratings.
3. See individual identification sections in Divisions 21, 22, 23, and 26 for additional identification requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Store cementitious products and materials on elevated platforms.
 - 5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 7. Protect stored products from damage and liquids from freezing.
 - 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

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1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 7. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.
- B. Product Selection Procedures:

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1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: ..."
2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: ..."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: ..."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
 - a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: ..."
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: ..."
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: ..."
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers.

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Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- a. Claims for additional time or cost relative to Architect's rejection of a comparable product submittal will be rejected.
 - b. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
1. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 2. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing:
1. Proposed Pre-bid Substitutions: Comply with the requirements as indicated in the Instructions to Bidders. Post-bid Proposed Substitutions will not be allowed.
 2. Post-bid Product Substitutions:
 - a. Post-bid Product Substitutions will not be allowed except when, through no fault of the Contractor, a specified product is no longer available. Product substitutions shall be considered "Comparable Products" for the purpose of submitting similar alternative products or materials for Architect's review.
- B. Post-Bid Product Substitution Conditions: Architect will consider Contractor's request for product substitution when post-bid product substitutions are permitted or become necessary and the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect

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for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
 - a. Any claims from other contractors resulting from an approved substitution will be deducted by Change Order from contractor who proposed substitution.

2.3 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 2. Evidence that proposed product provides specified warranty.
 3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 4. Samples, if requested.
- B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000



ELECTRONIC SHOP DRAWING: NAMING CONVENTION

Electronic Shop Drawing File Example:

05-1200_100-3.PDF

CSI Number:

05-1200_100-3.PDF

The CSI number will be the first six (6) numbers on every electronic shop drawing file.

Submittal Number:

05-1200_100-3.PDF

This number represents the submittal type or shop drawing sheet number. The numbering convention for Submittal types is as follows:

05-1200_100-3.PDF	Product Data
05-1200_200-3.PDF	Shop Drawings (unless sheet numbers are used)
05-1200_300-3.PDF	Certifications
05-1200_400-3.PDF	Calculations
05-1200_500-3.PDF	LEED
05-1200_600-3.PDF	Testing
05-1200_700-3.PDF	U.L. Assembly
05-1200_800-3.PDF	Color Samples
05-1200_900-3.PDF	Warranty

Resubmission Number:

05-1200_100-3.PDF

This number represents the resubmittal number. In this case the number represents the third submission. There were two resubmissions after the first submission.

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 015000 "Temporary Facilities and Controls" for addition requirements for protection of work in place.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 INFORMATIONAL SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

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1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 3. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 4. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Fire separation assemblies.
 - b. Plumbing piping systems.
 - c. Electrical wiring systems.
 5. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 6. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before

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fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."
- E. Review of Available Project Information and Geotechnical Data: Review Owner's information including geotechnical conditions of site and environmental conditions in building.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and layout site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

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3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two (2) permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

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- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or

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adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete[and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 2. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

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3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

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3.9 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.
- D. Protection and Multiple Contracts: Each contractor shall protect the work of that contract.
 - 1. This protection shall include monitoring the activities of other contractors that may cause damage to the installing contractor's work.
 - 2. In the case of damage to work, except as covered by cutting and patching, the installing contractor shall repair the work to the same condition as required by the contract documents.
 - 3. Installing contractor shall recover the costs of repair directly from the contractor responsible for the damage.
 - a. In the absence of clear documentation by the contractor responsible for protection as to which contractor was responsible for the damage, the costs for the damage shall be paid by the contractor responsible for protection.

3.11 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. The following must be replaced (repair is not acceptable):

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1. Damaged surfaces exposed to view which cannot be repaired without visible evidence of repair.
 2. Components which cannot be repaired to proper operating condition.
 3. Chipped and broken glass.
 4. Scratched transparent materials.
 5. Scratched reflective surfaces.
- C. Repair or Replace:
1. Components which do not operate properly.
 2. Surfaces exposed to view which cannot be cleaned to original condition.
 3. Permanent facilities used during construction.
 4. Other defective work.
- D. Acceptable Repair Methods:
1. Replacing parts.
 2. Refinishing.
 3. Touching up with matching materials. (repair is inconspicuous)
 4. Proper adjustment of equipment.
- E. When it is necessary to deviate from the contract documents in order to accomplish corrective action, submit a field correction request.
- F. Restore permanent facilities used during construction to their specified condition.

END OF SECTION 017300

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SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 2. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

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1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
 - 6. Advise Owner of changeover in utility services.

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7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - a. If more than one reinspection is required for Substantial Completion, the Owner will deduct from the Contract Sum, the Architects fees for additional services.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - a. If more than one reinspection is required for Final Completion, the Owner will deduct from the Contract Sum, the Architects fees for additional services.

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1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in one of the following format:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. PDF electronic file. Architect will return annotated file.
 - c. Web-based project software upload (if being used). Utilize software feature for creating and updating list of incomplete items (punch list).
 - d. Or three (3) paper copies. Hand written punch lists are unacceptable. Architect will return two (2) copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit on digital media acceptable to Architect, or by uploading to web-based project software site (if being used).
- E. Warranties in Paper Form:

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1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.

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- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - 1) Use sweeping compounds to control dust.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.

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Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace LED bulbs/fixtures that are defective.

END OF SECTION 017700

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SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for coordinating operation and maintenance manuals covering the Work of multiple contracts.
 - 2. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 3. Section 017700 "Closeout Procedures" for submitting operation and maintenance manuals.
 - 4. Section 017839 "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 5. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

DEFINITIONS

- C. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- D. Subsystem: A portion of a system with characteristics similar to a system.

1.3 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

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1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit on digital media acceptable to Architect, or by uploading to web-based project software site (if being used). Enable reviewer comments on draft submittals.
 - 2. Or Submit three (3) paper copies. Architect will return two (2) copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least twenty (20) days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least fifteen (15) days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within fifteen (15) days of receipt of Architect's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

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1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Architect.

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7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

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1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:

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1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent,

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and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

- D. **Manufacturers' Maintenance Documentation:** Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. **Maintenance Procedures:** Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. **Maintenance Service Contracts:** Include copies of maintenance agreements with name and telephone number of service agent.
- I. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

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- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

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SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
1. Record Drawings.
 2. Record Specifications.
 3. Record Product Data.
 4. Miscellaneous record submittals.
- B. Related Requirements:
1. Section 011200 "Multiple Contract Summary" for coordinating project record documents covering the Work of multiple contracts.
 2. Section 017700 "Closeout Procedures" for general closeout procedures.
 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 4. Section 017900 "Demonstration and Training" for manufacturer's instruction for the care, maintenance and repair of products, materials and finishes.
 5. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
1. Number of Copies: Submit one (1) set of marked-up record prints.
 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one (1) paper-copy set of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints and one (1) of file prints.
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

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b. Final Submittal:

- 1) Submit three (3) paper-copy set(s) of marked-up record prints.
- 2) Submit PDF electronic files of scanned record prints and three (3) set(s) of file prints.
- 3) Print each drawing, whether or not changes and additional information were recorded.

- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit PDF electronic files and directories of each submittal.
- E. Reports: Submit written report indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.

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- h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
- 1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 - 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Format: Annotated PDF electronic file.
 - 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
- 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

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2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file and one (1) paper copy.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- C. Format: Submit record Product Data as **annotated PDF electronic file** and one (1) **paper copy**.
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file and one (1) paper copy.
1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

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- B. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017839

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SECTION 017900 - DEMONSTRATION AND TRAINING

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment and for care, maintenance and repair of products, materials and finishes.
- B. Related Sections include the following:
 - 1. Division 01 Section "Multiple Contract Summary" for coordination of demonstration and training involving two or more Contractors.
 - 2. Division 01 Section "Project Management and Coordination" for requirements for pre-instruction conferences.
 - 3. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator or instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

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1.4 CLOSEOUT SUBMITTALS

1. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections and as follows:
 1. Motorized sectional overhead doors.
 2. Equipment.
 3. Fire-protection systems, including fire alarm, and fire-extinguishing systems.
 4. HVAC systems, including air-handling equipment, air distribution systems, and terminal equipment and devices.
 5. HVAC instrumentation and controls.
 6. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies and motor controls.
 7. Lighting equipment and controls.
 8. Communication systems (other than vendor supplied systems & equipment).

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1.8 PREPARATION

- A. Assemble educational materials necessary for instruction.
- B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner with at least seven (7) days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

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SECTION 02 4116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of buildings and structures.
 - 2. Demolition and removal of site improvements adjacent to a building or structure to be demolished.
 - 3. Removing below-grade construction.
 - 4. Disconnecting, capping or sealing, and removing site utilities.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary": Site restrictions.
 - 2. Division 01 Section "Temporary Facilities and Controls": Temporary construction, protection facilities, and environmental-protection measures for building demolition operations.
 - 3. Division 31 Section "Site Clearing": Site clearing and removal of above-grade improvements not part of building demolition.
 - 4. Division 31 Section "Site Clearing": Site stripping, removal of plants and trees, and protection of plants and trees indicated to remain

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

1.3 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during building demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.4 SUBMITTALS

- A. Qualification Data: For demolition firm.
- B. Proposed Environmental-Protection, Dust-Control, and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and

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proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

- C. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.
 - 2. Interruption of utility services.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Locations of temporary protection and means of egress.
 - 5. Coordination of Owner's continuing occupancy of adjacent building and partial use of premises.
- D. Inventory: After building demolition is complete, submit a list of items that have been removed and salvaged.
- E. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by building demolition operations. Submit before Work begins.
- F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes. Maintain disposal receipts for all other non-hazardous regulated waste.

1.5 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to building demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be demolished.
 - 2. Review structural load limitations of existing structures.
 - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review and finalize protection requirements.

1.6 PROJECT CONDITIONS

- A. Building to be demolished will be vacated and its use discontinued before start of Work.
- B. Owner will occupy another building off site, however, the adjacent building (shared fire wall) will remain occupied and in full operation. Conduct building demolition so adjacent operations will not be disrupted.
 - 1. Provide not less than 3 days notice to Owner of activities that will affect any operations.
 - 2. Maintain access to existing walkways, exits, and other adjacent occupied or used facilities.

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- a. Do not close or obstruct walkways, exits, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for buildings and structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical and as noted below.
 - a. Please note that fire company would like to use the building for various training exercises. These exercises will be destructive in nature but will not compromise the structural integrity of the building. These exercises will be completed just prior to the scheduled demolition.
 - b. All items of value will be removed prior to demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work (see referenced report in information available to bidders).
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Suspect materials will be tested to determine if in fact they are hazardous. Any such materials found to be hazardous materials will be removed by Owner under a separate contract.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. Storage or sale of removed items or materials on-site is not permitted.

1.7 COORDINATION

- A. Arrange demolition schedule so as not to interfere with adjacent Owner's on-site operations.

PART 2 - PRODUCTS (Not Used)

2.1 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Division 31 Section "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of building demolition required.
- B. Inventory and record the condition of items to be removed and salvaged.
- C. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Architect.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

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3.2 PREPARATION

- A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
 - 1. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If utility services are required to be removed, relocated, or abandoned, before proceeding with building demolition provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - 5. Remove refrigerant from air-conditioning equipment before starting demolition.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.

3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, apparatus bays, building entries, and other building facilities during demolition operations.
- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during demolition and cleaned and reinstalled in their original locations after demolition operations are complete.
- C. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
 - a. Provide at least 3 days notice to Owner if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 1 Section "Temporary Facilities and Controls."
 - 1. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 2. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 - 3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 4. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - 5. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.

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3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated existing buildings, structures and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 2. Maintain adequate ventilation when using cutting torches.
 - 3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Engineering Surveys: Perform surveys as the Work progresses to detect hazards that may result from building demolition activities.
- C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

3.5 MECHANICAL DEMOLITION

- A. Remove buildings, structures and site improvements intact when permitted by authorities having jurisdiction.
- B. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- C. Remove debris from elevated portions by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact or dust generation.
- D. Use caution when removing building and foundations from party/common wall with Plymouth Community Ambulance. This is a structural wall supporting parts of the Ambulance building and needs to remain undisturbed (except as noted otherwise).
- E. Concrete: Cut concrete full depth at junctures with construction indicated to remain, using power-driven saw, then remove concrete between saw cuts.
- F. Masonry: Cut masonry at junctures with construction indicated to remain, using power-driven saw, then remove masonry between saw cuts.
- G. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished at junctures with construction indicated to remain, then break up and remove.

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- H. Below-Grade Construction: Demolish foundation walls and other below-grade construction that is within 5 feet outside of footprint indicated for new construction. Abandon below-grade construction outside this area.
 - 1. Remove below-grade construction, foundation walls, and footings, completely unless otherwise indicated.
- I. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within 5 feet outside of footprint indicated for new construction. Abandon utilities outside this area.
 - 1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Division 2 Section "Earthwork."
- J. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures to extent indicated in the construction documents.

3.6 EXPLOSIVE DEMOLITION

- A. Explosives: Use of explosives is not permitted.

3.7 SITE RESTORATION

- A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Division 2 Section "Earthwork."
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.8 REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by building demolition operations.
- B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.9 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

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3.10 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 02 4116

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SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Harmonville Fire House – Plymouth Valley Station 904 Germantown Pike, Plymouth Meeting, PA 19462.

1. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction contraction and isolation joints.
 - c. Steel-reinforcement installation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is shown on SLAB PLAN 1 on drawing S2.02.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Statements: testing and inspection agency.

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- B. Field quality-control reports.
- C. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.
 - 1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- C. Mechanical Splice Couplers: ACI 318, same material of reinforcing bar being spliced; tension-compression type.
- D. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508 inch in diameter.

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2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
 - 2. Stagger splices in accordance with ACI 318.
 - 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
 - 4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.

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2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement.
 2. Continue reinforcement across construction joints unless otherwise indicated.
 3. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 1. Steel-reinforcement placement.
 2. Steel-reinforcement mechanical splice couplers.

END OF SECTION 032000

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SECTION 033000 - CAST-IN-PLACE CONCRETE

1.1 SUMMARY

A. Section Includes:

1. Concrete standards.
2. Concrete materials.
3. Admixtures.
4. Vapor retarders.
5. Floor and slab treatments.
6. Liquid floor treatments.
7. Curing materials.
8. Accessories.
9. Repair materials.
10. Concrete mixture materials.
11. Concrete mixture class types.
12. Concrete mixing.

B. Related Requirements:

1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
2. Section 033300 "Architectural Concrete" for general building applications of specially finished formed concrete.
3. Section 033543 "Polished Concrete Finishing" for concrete floors scheduled to receive a polished concrete finish.
4. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.
5. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement or blended hydraulic cement alone or in combination with one or more of the following:

1. Fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cementitious Materials (w/cm) Ratio: The ratio by weight of mixing water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Harmonville Fire House – Plymouth Valley Station 904 Germantown Pike, Plymouth Meeting, PA 19462.

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1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for inspections and acceptance testing of concrete at Project site.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
2. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction joints, control joints, isolation joints, and joint-filler strips.
 - c. Semirigid joint fillers.
 - d. Vapor-retarder installation.
 - e. Anchor rod and anchorage device installation tolerances.
 - f. Cold- and hot-weather concreting procedures.
 - g. Concrete finishes and finishing.
 - h. Curing procedures.
 - i. Forms and form-removal limitations.
 - j. Methods for achieving specified floor and slab flatness and levelness.
 - k. Floor and slab flatness and levelness measurements.
 - l. Concrete repair procedures.
 - m. Concrete protection.
 - n. Initial curing of standard-cured and field curing of field-cured test cylinders (ASTM C31/C31M.)
 - o. Protection of field cured field test cylinders.
 - p. Distribution of test reports.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Portland cement.
2. Blended hydraulic cement.
3. Performance-based hydraulic cement.
4. Fly ash.
5. Slag cement.
6. Silica fume.
7. Natural or other pozzolans.
8. Aggregates.
9. Ground calcium carbonate and aggregate mineral fillers.
10. Admixtures:
 - a. Include limitations of use. Admixtures that do not comply with reference ASTM International requirements must be submitted with test data for approval.
11. Color pigments.

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12. Vapor retarders.
13. Floor and slab treatments.
14. Liquid floor treatments.
15. Curing materials.

16. Joint fillers.
17. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Compressive strength at 28 days or other age as specified.
3. Compressive strength required at stages of construction.
4. Durability exposure classes for Exposure Categories F, S, W, and C.
5. Maximum w/cm ratio.
6. Slump or slump flow limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Intended placement method.
10. Submit adjustments to design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant changes.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

D. Samples: For vapor retarder.

E. Concrete Schedule: For each location of each class of concrete indicated in "Concrete Mixture Class Types" Article, including the following:

1. Concrete class designation.
2. Location within Project.
3. Exposure class designation.
4. Formed surface finish designation and final finish.
5. Final finish for floors.
6. Floor treatment, if any.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Testing Agency: Include documentation indicating compliance with ASTM E329 or ASTM C1077 and copies of applicable ACI certificates for testing technicians or ACI Concrete Construction Special Inspector - MH, ASCC.

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B. Material Certificates: For each of the following:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.

C. Material Test Reports: For the following:

1. Portland cement.
2. Blended hydraulic cement.
3. Performance-based hydraulic cement.
4. Fly ash.
5. Slag cement.
6. Silica fume.
7. Natural or other pozzolans.
8. Aggregates.
9. Ground calcium carbonate and aggregate mineral filler.
10. Admixtures.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances in accordance with ACI 117 and in compliance with ASTM E1155.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder, showing compliance with ICC's Acceptance Criteria AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified Installer who employs Project personnel qualified as an ACI-certified Concrete Flatwork Associate and Concrete Flatwork Finisher and a supervisor who is a certified ACI Advanced Concrete Flatwork Finisher/Technician or an ACI Concrete Flatwork Finisher with experience installing and finishing concrete.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

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- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing that performs duties on behalf of the Engineer.
1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Level 1. Testing agency laboratory supervisor tests to be an ACI-certified Concrete Laboratory Testing Technician, Level 2.
- D. Field Quality-Control Testing Agency Qualifications: An independent agency, acceptable to Pennsylvania, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
1. Personnel conducting field tests on plastic concrete properties are to be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with policies from ACI CPP 610.1 or an equivalent certification program.
- E. Mockups: Cast concrete slab-on-ground panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship. Provide up to two batches of concrete to demonstrate the number of required mockups.
1. Slab-on-Ground: Build panel in the location indicated or, if not indicated, as directed by Architect.
 - a. Divide panel into four equal panels to demonstrate saw joint cutting.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
1. Include the following information in each test report:
 - a. Admixture dosage rates.
 - b. Slump.
 - c. Air content.
 - d. Seven-day compressive strength.
 - e. 28-day compressive strength.
 - f. Evaluation of permeability-reducing admixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 as follows:

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1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When air temperature has fallen to, or is expected to fall below 40 deg F during the protection period, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder material and accessories for sheet vapor retarder and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE STANDARDS

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150, Type I and Type II, gray.
2. Performance-Based Hydraulic Cement: ASTM C1157: Type GU, general use,—Type MS, moderate sulfate resistance, Type MH, moderate heat of hydration. In subparagraphs below, retain supplementary cementing materials, fly ash, and slag cement or pozzolanic materials to achieve later strength, reduced permeability, and improved durability.
3. Pozzolans: ASTM C618, Class C, F, or N.
4. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

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C. Normal-Weight Aggregates:

1. Coarse Aggregate: ASTM C33, Class 3M.
2. Maximum Coarse-Aggregate Size: 1 inch nominal.
3. Fine Aggregate: ASTM C33.

2.3 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260/C260M.

B. Chemical Admixtures: Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Admixtures with special properties, with documentation of claimed performance enhancement, ASTM C494/C494M, Type S.

C. Mixing Water for Concrete Mixtures and Water Used to Make Ice: ASTM C1602. Include documentation of compliance with limits for alkalis, sulfates, chlorides, or solids content of mixing water from Table 2 in ASTM C1602.

2.4 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A. Include manufacturer's recommended thickness and adhesive or pressure-sensitive tape.

2.5 FLOOR AND SLAB TREATMENTS

A. Provide treatments appropriate for each type of scheduled floor finish.

2.6 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

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C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

- a. Ambient Temperature Below 50 deg F (10 deg C): Black.
- b. Ambient Temperature between 50 and 85 deg F (10 and 29 deg C): Any color.
- c. Ambient Temperature Above 85 deg F (29 deg C): White.

D. Curing Paper: 8 ft. wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

E. Water: Potable water that does not cause staining of the surface.

F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B.

H. Clear, Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating.

I. Clear, Solvent-Borne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

J. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.8 ACCESSORIES

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

- 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Floor Slab Protective Covering: 8 ft wide cellulose fabric.

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2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.

2.10 CONCRETE MIXTURE MATERIALS

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland or hydraulic cement in concrete assigned to Exposure Class F3 as follows:
1. Fly Ash or Other Pozzolans: 25 percent by mass.
 2. Slag Cement: 50 percent by mass.
 3. Silica Fume: 10 percent by mass.
 4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
 5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

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1. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

D. Color Pigment: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.11 CONCRETE MIXTURE CLASS TYPES

A. Class A: Normal-weight concrete used for footings.

1. Exposure Class: ACI 318 Class F2.
2. Retain strength from first five options in "Minimum Compressive Strength" Subparagraph below or revise to suit Project. Coordinate compressive strength with w/cm ratio based on assigned exposure classes in accordance with ACI 318. The age for strength acceptance can be later based on anticipated loading and can support sustainability goals.
3. Minimum Compressive Strength: 3000 psi at 28 days.
4. Maximum w/cm Ratio: 0.45.
5. Slump Limit: 3 inches, plus or minus 1 inch.
6. Air Content:
 - a. Exposure Classes F2: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.
7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cementitious materials.

B. Class B: Normal-weight concrete used for foundation walls.

1. Exposure Class: ACI 318 Class F2.
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Maximum w/cm Ratio: 0.45.
4. Slump Limit: 3 inches, plus or minus 1 inch for concrete.
5. Air Content:
 - a. Exposure Classes F2: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

C. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 Class F2.
2. Minimum Compressive Strength: 4500 psi at 28 days.
3. Maximum w/cm Ratio : 0.45.
4. Slump Limit: 3 inches, plus or minus 1 inch for concrete.
5. Air Content:
 - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

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6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Class D: Normal-weight concrete used for interior suspended slabs.

1. Exposure Class: ACI 318 Class F1.
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Maximum w/cm Ratio: 0.45.
4. Air Content:
 - a. Total air content must not exceed 3 percent for concrete used in trowel-finished floors.
5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Class I: Normal-weight concrete used for interior metal pan stairs and landings:

1. Exposure Class: ACI 318 Class F2.
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Maximum w/cm Ratio: 0.45.
4. Maximum Size Aggregate: 1/2 inch.
5. Slump Limit: 3 inches, plus 1 inch or minus 2 inches.
6. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery.
7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

F. Class J: Normal-weight concrete used for exterior retaining walls.

1. Exposure Class: ACI 318 Class F2 .
2. Minimum Compressive Strength 4000 psi at 28 days.
3. Maximum w/cm Ratio: 0.45.
4. Slump Limit: 3 inches, plus or minus 1 inch for concrete.
5. Air Content:
 - a. Exposure Classes F2: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 and furnish delivery ticket.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 TOLERANCES

A. Comply with ACI 117.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install reglets to receive waterproofing and through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.5 INSTALLATION OF VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.

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3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides and sealing to vapor retarder.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

3.6 INSTALLATION OF CAST-IN-PLACE CONCRETE

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Water addition in transit or at the Project site must be in accordance with ASTM C94 and must not exceed the permitted amount indicated on the concrete delivery ticket.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
 2. Deposit concrete to avoid segregation.
 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

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1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 INSTALLATION OF JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth depth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

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1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.8 APPLICATION OF FINISHING FLOORS AND SLABS

A. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth, as specified by flooring material manufacturer, in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings and at exterior balcony.

B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.
3. Apply float finish to surfaces with no scheduled flooring product.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface. Use of an approved finishing aid is acceptable.
5. Do not apply troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view and to be covered with carpet, and quarry tile set over a waterproof membrane.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:

a. Slabs on Ground:

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- 1) Specified overall values of flatness, F_F 25; and of levelness, F_L 20; with minimum local values of flatness, F_F 17; and of levelness, F_L 15. Applies to carpeted floors.
- 2) Specified overall values of flatness, F_F 35; and of levelness, F_L 25; with minimum local values of flatness, F_F 24; and of levelness, F_L 17. Applies to thin floor coverings and exposed finish concrete.

b. Suspended Slabs:

- 1) Specified overall values of flatness, F_F 25; and of levelness, F_L 20; with minimum local values of flatness, F_F 17; and of levelness, F_L 15. Applies to carpeted floors.
- 2) Specified overall values of flatness, F_F 35; and of levelness, F_L 20; with minimum local values of flatness, F_F 24; and of levelness, F_L 15. Applies to exposed concrete areas.

D. Trowel and Fine-Broom Finish: First apply a trowel finish to surfaces quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with a fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, and ramps, as indicated on Drawings.

1. Apply in accordance with manufacturer's written instructions and as follows:
 - a. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate over surface in one or two applications.
 - b. Tamp aggregate flush with surface, but do not force below surface.
 - c. After broadcasting and tamping, apply float finish.
 - d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.9 APPLICATION OF FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
 - b. Remove projections larger than 1 inch.

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- c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117, Class D.
 - e. Apply to concrete surfaces for metal lap pan deck formed surfaces and those surfaces that are buried or covered with subsequent installed surfaces.
2. ACI 301 (ACI 301M) Surface Finish SF-3.0:
- a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
 - b. Remove projections larger than 1/8 inch (3 mm).
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 (ACI 117M) Class A.
 - e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

B. Rubbed Finish: Apply the following to as-cast surface finishes where exposed to view:

1. Smooth-Rubbed Finish:
- a. Perform no later than one day after form removal.
 - b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
 - c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.

3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling in:

- 1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
- 2. Mix, place, and cure concrete, as specified, to match color and texture with in-place construction exposed to view.
- 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

- 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
- 2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
- 3. Minimum Compressive Strength: 4000 psi at 28 days.
- 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.

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5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

3.11 APPLICATION OF CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305R, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing after finishing concrete.

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2. Interior Concrete Floors:

- a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following not in cold weather:
 - a) Water.
 - b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.

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- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- d. Floors To Receive Chemical Stain:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
 - 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
 - 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
 - 4) Leave curing paper in place for duration of curing period, but not less than 28 days.
- e. Floors To Receive Curing Compound:
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Maintain continuity of coating, and repair damage during curing period.
 - 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
- f. Floors To Receive Curing and Sealing Compound:
 - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.

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- 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.
 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Do not apply to concrete that is less than 14 days' old.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
 4. Rinse with water; remove excess material until surface is dry.
 5. Apply a second coat in a similar manner if surface has received a float finish or abrasive surface preparation.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.13 INSTALLATION OF JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 INSTALLATION OF CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
 1. Repair and patch defective areas when approved by Architect.
 2. Remove and replace concrete that cannot be repaired and patched to meet specification requirements.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks in excess of 0.01 inch spalls, air bubbles exceeding surface finish limits, honeycombs, rock pockets, fins and other projections on the surface exceeding surface finish limits, and stains and other discolorations that cannot be removed by cleaning.

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1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
 - a. Limit cut depth to 3/4 inch.
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and match surrounding surface.
3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance, as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
 - a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by adding patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
 - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - b. Feather edges to match adjacent floor elevations.
6. Correct other low areas scheduled to remain exposed with repair topping.
 - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

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7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
 - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
 8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
 - b. Dampen cleaned concrete surfaces and apply bonding agent.
 - c. Place patching mortar before bonding agent has dried.
 - d. Compact patching mortar and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Delivery Tickets: comply with ASTM C94.
- C. Inspections:
1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
 5. Batch Plant Inspections: On a random basis, as determined by Architect.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172 to be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 150 cu. yd. or fraction thereof.

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- a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing is to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143:
 - a. One test at point of delivery for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests as needed.
3. Slump Flow: ASTM C1611:
 - a. One test at point of delivery for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests as needed.
4. Air Content: ASTM C231 pressure method, for normal-weight concrete.
 - a. One test for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064:
 - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample when strength test specimens are cast.
6. Concrete Density: ASTM C138:
 - a. One test for each composite sample when strength test specimens are cast.
7. Compression Test Specimens: ASTM C31:
 - a. Cast and standard cure two sets of three 6 inches by 12-inches cylindrical specimens for each composite sample.
 - b. Cast, and field cure two sets of three standard cylindrical specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39.
 - a. Test one set of three standard cured specimens at seven days and one set of two specimens at 28 days.
 - b. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests of standard cured cylinders equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or

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no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:
 - a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.7.6.3.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.16 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using floor slab protective covering.

END OF SECTION 033000

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SECTION 033053 - CAST-IN-PLACE CONCRETE FOR UTILITIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes, for non-critical applications of concrete and for projects using small quantities of concrete.
 - 1. Work involves cast-in-place concrete associated with site utility installation including:
 - a. Base slabs.
 - b. Encasements.
 - c. Miscellaneous.
 - d. Other Work as indicated on the drawings.
- B. Related Sections include the following:
 - 1. Division 01 Section "Construction Waste Management."

1.3 SUBMITTALS

- A. General: In addition to the following, comply with submittal requirements in ACI 301.
- B. Product Data: For each type of product indicated.
- C. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer shall be PennDOT approved.
- B. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- C. Comply with ACI 301, "Specification for Structural Concrete," including the following sections, unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."

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2. "Formwork and Formwork Accessories."
3. "Reinforcement and Reinforcement Supports."
4. "Concrete Mixtures."
5. "Handling, Placing, and Constructing."
6. "Lightweight Concrete."

- D. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and formwork accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
1. Class AA: Concrete Curb, Sidewalk, Utility Pads
 - a. 28 day compressive strength: 3750 psi
 - b. Slump: 1 to 3 inches.
 - c. Air entrain as specified below.
 2. Flowable Fill: Encasements
 - a. 28 day compressive strength: 125 psi
 - b. Slump: 8 inches max.
 - c. Air entrain as specified below.
- B. Air Content for Exterior Concrete Elements Subject to Freezing: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1 percent, unless otherwise indicated:
1. Air Content: 6 percent plus or minus one percent for 3/4-inch-nominal maximum aggregate size.
- C. Cement Factor and Maximum Water-Cement Ratio conforming to Table A, Section 704.1[b], Publication 408 Specifications.

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- D. Water: ASTM C 94/C 94M; potable.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. The contractor, subcontractors, and their personnel shall follow the procedures and practices for waste separation, collection and transport as defined in the contractor's "Waste Management Plan" as required by Division 01 Section 'Construction Waste Management.'

3.2 FORMWORK

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.3 STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 CONCRETE PLACEMENT

- A. Comply with ACI 301 for measuring, batching, mixing, transporting, and placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. Do not add water to concrete during delivery, at Project site, or during placement.
- D. Consolidate concrete with mechanical vibrating equipment.

3.5 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

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3.7 REPAIRS

- A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 033053

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SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Split-face decorative concrete masonry units.
3. Datestone
4. Mortar and grout materials.
5. Reinforcement.
6. Masonry-joint reinforcement.
7. Ties and anchors.
8. Embedded flashing materials.
9. Miscellaneous masonry accessories.

B. Products Installed, but Not Furnished, under This Section:

1. Steel lintels and steel shelf angles in accordance with Section 055000 "Metal Fabrications" in concrete unit masonry.
2. Wood nailers and blocking built into unit masonry specified in Division 06 Section "Rough Carpentry."

C. Related Requirements:

1. Division 01 Section "Mockups" Information on constructing Mock-up wall.
2. Division 07 Section "Water Repellents": Clear penetrating treatment of exterior masonry walls.
3. Division 07 Section "Thermal Insulation": For cavity wall insulation.
4. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
5. Division 07 Section "Metal Flashing and Trim: Metal counterflashing inserted in flashing receivers embedded in masonry walls.
6. Division 07 Section "Penetration Firestopping": Firestopping at openings in masonry walls.
7. Division 07 Section "Fire-Resistive Joint Systems": Firestopping at tops of masonry walls.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.
- C. Exposed: Weather-exposed side of a constructed wall.

1.3 ACTION SUBMITTALS

A. Product Data:

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1. For each type of product.
- B. Shop Drawings: For the following:
1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 2. Cast Stone Date Stone: Show size and lettering.
 3. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
 4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
1. Architectural CMUs, in the form of small-scale units.
 2. Colored mortar.
 3. Cast stone trim samples not less than 6 inches in length, showing the full range of colors and textures expected in the finished product.
 4. Weep holes/vents.
- D. Samples for Verification: For each type and color of the following:
1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
 3. Weep holes/vents in color to match mortar color.
 4. Accessories embedded in the masonry.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
1. Masonry units.
 - a. Include data on material properties, material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 2. Integral water repellent used in CMUs, if not surface treated.
 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 4. Mortar admixtures.
 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 6. Grout mixes. Include description of type and proportions of ingredients.
 7. Reinforcing bars.
 8. Joint reinforcement.
 9. Anchors, ties, and metal accessories.

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- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 - 2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 402/602.
- E. Weather Procedures:
 - 1. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.
 - 2. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.5 QUALITY ASSURANCE

- A. Project team craftworkers of the Masonry Contractor assigned to Project will be required to have the International Masonry Institute - Flashing Training or equal and to provide evidence of certificate or a letter of the firm's commitment to enroll key project personnel in the training program prior to the start of Project.
- B. Project team craftworkers of the Masonry Contractor assigned to Project will be required to have the International Masonry Institute - Grouting and Reinforcing Training or equal and to provide evidence of certificate or a letter of the firm's commitment to enroll key project personnel in the training program prior to the start of Project.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Cast Stone Manufacturer Qualifications: A firm experienced in manufacturing cast stone units similar to those indicated for this Project and with a record of successful in-service performance.
- E. Reference Standards: For cast stone trim, comply with applicable provisions and recommendations of Cast Stone Institute Standard Specification 04435.

1.6 MOCKUPS

- A. Wall Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for installation. See Section 01 4339 "Mockups" for additional construction requirements for integrated exterior mockups.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

- A. Cast Stone Coordination: Coordinate production and delivery of cast stone with unit masonry work to minimize the need for on-site storage and to avoid delaying the Work.
- B. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- C. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- E. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 402/602.

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1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- F. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Source Limitations for Integral Water Repellent: Obtain integral water-repellent units from CMU and mortar manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops 2500 psi net-area compressive strengths at 28 days.
 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) in accordance with Tables 1 and 2 in TMS 402/602.
- B. Regulatory Requirements: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:
 1. TMS 402/602:
 - a. Maintain one copy of the standard in Project field office at all times during construction. Contractor's supervisory personnel are to be thoroughly familiar with this material as it applies to Project.

2.3 CONCRETE UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 402/602 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work .

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- C. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- D. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing in accordance with ASTM E119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- E. Integral Water Repellent: Provide units made with liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of the test specimen.
 - 1. Applications: Provide concrete masonry units with integral water repellent in fire separation wall.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dry-Block; GCP Applied Technologies.
 - b. Rheopel; Master Builders.

2.4 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows:
 - 1. Provide special shapes for lintels, corners, jambs, sills, sash, control joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners, unless indicated as bullnose.
- B. Standard CMUs: Non-load-bearing ASTM C129.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2500 psi.
 - 2. Density Classification: Normal weight.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
 - 4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
- C. Split-Face Decorative Concrete Masonry Units: ASTM C 90 and as follows:
 - 1. Weight Classification: Normal weight, unless otherwise indicated.
 - 2. Size: Manufactured to dimensions indicated for nondecorative units.
 - 3. Finish: Exposed faces matching color, pattern, and texture of basis-of-design product.
 - 4. Basis-of-Design Products:
 - a. Split-Face Masonry for Walls (CM-1): F-89; Fizzano Bros. Inc.
 - b. Smooth infill units between windows (CM-2): F-66; Fizzano Bros. Inc.
 - 1) Smooth units to be standard molded block that is not split.

2.5 CAST STONE DATE STONE

- A. Cast Stone Materials: ASTM C 1364 and as follows:

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1. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
 2. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures..
 3. Fine Aggregates: Manufactured or natural sands complying with ASTM C 33, gradation as needed to produce required textures.
 4. Air-Entraining Admixture: ASTM C 260, certified by the manufacturer to be compatible with other admixtures used. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 5 to 7 percent.
 5. Reinforcement: Deformed steel bars, ASTM A 615/A 615M, with galvanized coating complying with ASTM A 767/A 767M.
 6. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 276 or ASTM A 666, Type 304.
- B. Cast Stone Units: complying with ASTM C 1364.
1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.
 2. Reinforce units as indicated and as required by ASTM C 1364.
 3. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
 4. Cure and finish units as follows:
 - a. Cure units in totally enclosed curing room under dense fog and water spray at 95 percent relative humidity for 24 hours.
 - b. Yard cure units until the sum of the mean daily temperatures for each day equals or exceeds 350 deg F.
 - c. Acid etch units to remove cement film from surfaces indicated to be finished.
 5. Colors and Textures:
 - a. Provide units with fine-grained texture and buff color resembling Indiana limestone.
 6. Size: 16" wide x 8" high x 4" deep.
 7. Manufacturers: Subject to compliance with requirements, provide cast stone by one of the following:
 - a. Architectural Concrete Co., Inc.
 - b. Continental Cast Stone Manufacturing, Inc.
 - c. Edwards Precast Concrete Co.
 - d. Sun Precast Co., Inc.

2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
1. For pigmented mortar, use a colored cement formulation as required to produce the color indicated or, if not indicated, as selected from manufacturer's standard formulations.
 - a. Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.

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2. Basis-of-Design Product: 5326; Lehigh Custom Color Portland/Lime; Lehigh Heidelberg Cement Co. or matching comparable product by one of the following:
 - a. Color Mortar Blend; Glen-Gery Corporation.
 - b. Rainbow Mortamix Custom Color Cement/Lime; Holcim.
 - c. Centurion Colorbond PL; Lafarge Corporation.
 - d. Spec Mix Custom Color
- D. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. True Tone Mortar Colors; Davis Colors.
 - b. Centurion Pigments; Lafarge Corporation.
 - c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Accelguard 80; Euclid Chemical Co.
 - b. Morseled; GCP Applied Technologies.
- G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units containing integral water repellent. Provide water-repellent by the same manufacturer.
 1. Applications: Provide water repellent admixture for mortar in single-wythe exterior concrete masonry walls, in locations where concrete masonry is exposed to weather above grade, and in other locations where masonry units are specified with integral water-repellent.
- H. Water: Potable.

2.7 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A615 or ASTM A996, Grade 60 .
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A951.
 1. Exterior Walls: Hot-dip galvanized carbon steel.
 2. Wire Size for Side Rods: 0.148-inch diameter.
 3. Wire Size for Cross Rods: 0.148-inch diameter.
 4. Spacing of Cross Rods: Not more than 16 inches o.c.
 5. Provide in lengths of not less than 10 ft., with prefabricated corner and tee units.

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2.8 TIES AND ANCHORS

- A. General: Ties and anchors extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
 - 2. Galvanized-Steel Sheet: ASTM A653, Commercial Steel, G60 zinc coating.
 - 3. Steel Plates, Shapes, and Bars: ASTM A36.
- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
 - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, Mill-galvanized wire may be used at interior walls unless otherwise indicated.
 - 3. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153.

2.9 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:
 - 1. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
- B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
 - 1. Anchor Section: Sheet metal plate, 1-1/4 inches (32 mm) wide by 6 inches (150 mm) long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch (16 mm) wide by 3-5/8 inches (92 mm) long, stamped into center to provide a slot between strap and plate for inserting wire tie.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) DA 210; Dur-O-Wal, Inc.
 - 2) DW 10HS Anchor, Hohmann & Barnard Inc.
 - 3) No 315D, Heckman Building Products, Inc..
 - 2. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches (32 mm) wide by 6 inches (150 mm) long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch (16 mm) wide by 6 inches (150 mm) long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) DA 210X; Dur-O-Wal, Inc.
 - 2) X-Seal Anchor, Hohmann & Banard.

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3. Anchor Section: Sheet metal back plate, sized to accommodate up to 3 inches insulation, with screw holes top and bottom and leg for attachment of pintle.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) DA 213; Dur-O-Wal, Inc.
 - 2) HB-200-X Anchor, Hohmann & Barnard Inc.
 - 3) No 213/282, Heckman Building Products, Inc..
 4. Wire Tie Section: Triangular shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
 5. Fabricate sheet metal anchor sections and other sheet metal parts from 0.0677-inch-thick, steel sheet, galvanized after fabrication.
 6. Fabricate wire tie sections from 0.1875-inch-diameter, hot-dip galvanized steel wire.
- C. Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange by not less than 3 exposed threads, and with the following corrosion protective coating:
1. Organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dril-Flex; Elco Industries, Inc.
 - b. Traxx; ITW-Buildex.

2.10 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: At 2-part counterflashing locations indicated on Drawings, fabricate embedded flashing, including through-wall flashing and receivers for counterflashing, from the following metal complying with requirements specified in Division 07 Section "Metal Flashing and Trim" and below:
1. Stainless Steel: 0.0156 inch thick.
 2. Fabricate through-wall metal flashing embedded in masonry from sheet metal indicated above and with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
 3. Fabricate metal flashing terminations from sheet metal indicated above. Extend through complete thickness of outer wythe and turn up rear edge at least 3 inches vertically into wall cavity. Extend front edge out to exterior face of wall. At exterior face of wall, bend metal back on itself to form a hemmed reglet to receive counterflashing. Counterflashing shall be of same material as metal flashing.
 4. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cheney Flashing Company, Inc. Sawtooth Flashing.
 - b. Hohmann & Barnard Inc.; STF Sawtooth Flashing.
 - c. Krando Metal Products; Mechanically Keyed Flashing
- B. Flexible Flashing: For flashing partly exposed to the exterior, use metal flashing specified above. For flashing not exposed to the exterior, use the following:
1. Stainless steel core with polymer fabric laminated to one stainless steel face with non-asphalt adhesive.
 - a. Stainless steel type: 304, ASTM A167
 - b. Fabric: polymer fabric; laminated to back face of stainless steel core.
 - c. Size: Manufacturer's standard width rolls.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. York Manufacturing, Inc.; Multi-Flash SS

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- b. Illinois Products, Inc.; IPCO Stainless Steel Fabric Flashing
 - c. Prosoco, Inc.; R-Guard SS ThruWall
 - d. STS Coating, Inc.; Gorilla Flash Stainless Fabric
 - e. TK Products, Inc.; TK TWF
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Laminated Flashing: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.
- E. Termination Bars for Flexible Flashing: Stainless steel bars 1/8 inch by 1 inch.
- F. Drip Edges: Hemmed units with turn down edge designed to be exposed at exterior of masonry. Unit shall include factory installed 1/8" compressible foam seal on the underside and adhesive strip on topside to bond to flashing and to seal at lap joints and prefabricated inside and outside corners.
- 1. Basis-of-Design Product: Hohmann & Barnard, Inc., "FTSA Drip Plate".
 - a. Provide Hohmann & Barnard, Inc., "FTSA-LB Drip Plate" at lip brick conditions.
 - 2. Drip Edge Material: Stainless steel, 22 gage (0.0312 inch thick).
 - 3. Finish: Mill.
- G. Application: Unless otherwise indicated, use the following:
- 1. Where embedded flashing is indicated to receive counterflashing, use Metal Flashing.
 - 2. Where embedded flashing is partly exposed and is indicated to terminate at the wall face, use Flexible Flashing with a metal drip edge.
 - 3. Where embedded flashing is fully concealed, use Flexible Flashing.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from or PVC.
- B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- 1. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation 2AA-805.
 - a. Interior Wall: DA2001, Dur-O-Wall.
 - b. Exterior Wall: DA 2003-2006, Dur-O-Wall.
 - c. RS Series, Hohmann & Barnard, Inc.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).
- D. Plastic Weep Hole/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, designed to fill head joint with outside face held back 1/8 inch from exterior face of masonry; in color approved by Architect to match that of mortar.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Mortar Maze Weep Vent; Advanced Building Products, Inc.
 - b. Cell Vent; DA1006, Dur-O-Wal, Inc.
 - c. QV Quadro-Vent, Hohmann & Barnard, Inc.

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- E. Cavity Drainage Material: Free-draining mesh made from polyethylene strands, thickness of cavity, geometric, multi-level, and shaped to avoid being clogged by mortar droppings.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Mortar Break DT; Advanced Building Products, Inc.
 - b. Mortar Net; Mortar Net USA, Ltd.
 - c. Mortar Net; DA1008, Dur-O-Wall.
 - d. Mortar Net; Hohmann & Barnard, Inc.
 - e. Masonry Mat MDCCD; CavClear
- F. Masonry Cleaners:
- G. Provide masonry cleaning products or solutions, either detergent or acidic types, as recommended by masonry product manufacturers.
 - 1. Submit manufacturers' written recommendations for cleaners.
 - 2. Verify suitability for masonry types and for pigmented mortar joints by obtaining manufacturer's recommendations and by applying cleaner to exposed faces of sample panels or mockups.

2.12 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. For exterior masonry, use mortar cement mortar.
 - 3. For reinforced masonry, use mortar cement mortar.
 - 4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
 - 2. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
 - 3. Type S: For reinforced masonry and typical locations unless otherwise indicated.
 - 4. Type N: For interior non-load-bearing walls.
 - 5. Type N: For masonry veneer.
- D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color to match Architect's sample. For glazed concrete masonry units, match color of glazed facing unless otherwise indicated, as approved by Architect. Limit pigments to the following percentages of cement content by weight:
 - 1. For mineral-oxide pigments and portland cement-lime mortar, not more than 10 percent.
 - 2. For carbon-black pigment and portland cement-lime mortar, not more than 2 percent.

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E. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 402/602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured in accordance with ASTM C143.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Exposed Masonry: Mix units to product uniform blend of colors and textures.
- E. Where existing masonry occurs, match coursing, bonding, color, and texture of existing masonry.
- F. Temperature Control: Perform temperature-sensitive construction procedures while masonry Work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 deg F.

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1. 40 to 32 Deg F (4 to 0 Deg C):
 - a. Mortar: Heat mixing water to produce mortar temperature between 40 and 120 deg F.
 - b. Grout: Follow normal masonry procedures.
 2. 32 to 25 Deg F (0 to Minus 4 Deg C):
 - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F; maintain temperature of mortar on boards above freezing.
 - b. Grout: Heat grout materials to 90 deg F to produce in-place grout temperature of 70 deg F at end of workday.
 3. 25 to 20 Deg F (Minus 4 to 7 Deg C):
 - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F; maintain temperature of mortar on boards above freezing.
 - b. Grout: Heat grout materials to 90 deg F to produce in-place grout temperature of 70 deg F at end of workday.
 - c. Heat both sides of walls under construction using salamanders or other heat sources.
 - d. Use windbreaks or enclosures when wind is in excess of 15 mph.
 4. 20 Deg F (Minus 7 Deg C) and Below:
 - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F.
 - b. Grout: Heat grout materials to 90 deg F to produce in-place grout temperature of 70 deg F at end of workday.
 - c. Masonry Units: Heat masonry units so that they are above 20 deg F at time of laying.
 - d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40 deg F for 24 hours after laying units.
 5. Do not heat water for mortar and grout to above 160 deg F.
- G. Masonry Protection: Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.
1. 40 to 32 Deg F (4 to 0 Deg C): Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.
 2. 32 to 25 Deg F (0 to Minus 4 Deg C): Completely cover masonry with weather-resistive membrane for at least 24 hours.
 3. 25 to 20 Deg F (Minus 4 to 7 Deg C): Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.
 4. 20 Deg F (Minus 7 Deg C) and Below: Except as otherwise indicated, maintain masonry temperature above 32 deg F (0 deg C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry, maintain heated enclosure to 40 deg F (4 deg C) for 48 hours.

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3.3 TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 - 1. Running bond with vertical joint in each course centered on units in courses above and below.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- E. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated. Fill cores a minimum of 8" above and below to both sides of attachments to CMU walls, including TV brackets supports. Grout foundation walls solid to first floor finished slab elevation.

3.5 SETTING DATESTONE

- A. Provide temporary infill at datestone opening, consisting of masonry matching adjacent material, until ready for datestone installation. Remove temporary infill and set datestone in final position.

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- B. Set stone to comply with requirements indicated on Drawings and final shop drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure datestone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

3.6 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Where applicable, set masonry trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 2. Wet joint surfaces thoroughly before applying mortar.
 - 3. Rake out mortar joints for pointing with sealant.
- D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
 - 1. Cut joints flush for masonry walls to receive roofing membrane, and direct-applied finishes (other than paint), unless otherwise indicated.

3.7 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at corners by using prefabricated L-shaped units.

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- D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.9 CONTROL JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. If not indicated, provide control joints at a maximum of 20'-0" o.c. Architect reserves the right to approve or locate control joints not shown. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement. Provide movement joints where wall bearing varies in type or elevation.
- B. Form control joints in concrete masonry as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
- C. Form control joints in decorative cmu as follows:
 - 1. Construct joints by inserting compressible filler of width indicated, but not less than 3/8 inch north and east facing walls, and 1/2 inch south and west facing walls and of depth to allow installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."
- D. Form open joint for building expansion joints full depth of face masonry in width indicated and strike head joints flush for installation of precompressed joint filler specified in Division 07 Section "Joint Sealants".
- E. Build in horizontal, pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants."
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

3.10 FLASHING, WEEP HOLES, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and

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cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

C. Install flashing as follows:

1. At multiwythe masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through outer wythe, turned up a minimum of 4 inches and through inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through inner wythe and turn flashing up approximately 2 inches, unless otherwise indicated.
2. At masonry-veneer walls with sheathing, extend flashing from exterior face of veneer, through veneer, up face of sheathing at least 8 inches, and behind air-infiltration barrier or building paper.
3. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end.
4. At heads and sills, extend flashing 4 inches at ends and turn flashing up not less than 2 inches to form end dams.
5. Flashing should be longitudinally continuous or terminated with an end dam.
6. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
7. Install metal drip edges and sealant stops with sawtooth sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
8. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
9. Extend laminated flashing at least 1-1/2 inches beyond face of masonry wall. Cut laminated flashing off flush with face of wall after masonry wall construction is completed.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Use plastic weep hole/vents to form weep holes.
2. Space open weep holes 24 inches o.c.
3. Place cavity drainage material immediately above flashing in cavities.
4. Provide vents aligned horizontally within 24 inches of top of wall and in line with weeps below.

E. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 REINFORCED UNIT MASONRY

A. Placing Reinforcement: Comply with requirements in TMS 402/602.

B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 402/602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

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3.12 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform field quality-control testing indicated below.
 - 1. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense, as follows:
 - a. Prism Test: For in-place construction, masonry prisms will be tested per ASTM C1532 and ASTM C1587.
 - b. Cutting and Patching: Sawcut masonry wall and remove sample for prism test as directed by Architect. Patch cut area to blend with adjacent construction and surfaces.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed before construction, and during construction for each 5000 sq. ft. (including openings) of wall area or portion thereof.
- C. Grout will be sampled and tested for compressive strength per ASTM C 1019.
- D. Prism Test: For each type of construction provided, per ASTM C 1314 at 7 days and at 28 days.

3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as Work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid-strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 08-04A.

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3.14 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042200

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SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural-steel materials.
2. Shrinkage-resistant grout.
3. Architecturally Exposed Structural Steel Framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
2. Section 099133 "Painting".

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Anchor rods.
4. Threaded rods.
5. Forged-steel hardware.
6. Shop primer.
7. Galvanized-steel primer.
8. Etching cleaner.
9. Galvanized repair paint.

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10. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members not to be shop primed.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1 for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand-critical welds.

D. Delegated Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, shop-painting applicators, testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural-steel materials, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control reports.

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1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 341.
3. ANSI/AISC 360.
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Design connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer. Member reinforcement at connections is indicated on Drawings.
 - a. Use Load and Resistance Factor Design; data are given at factored-load level.

C. Moment Connections: Type PR, partially restrained.

D. Construction: Moment frame

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2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992, Grade 50.
- B. Channels, Angles: ASTM A36.
- C. Plate and Bar: ASTM A36.
- D. Cold-Formed Hollow Structural Sections: ASTM A500, Grade C structural tubing.
- E. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959, Type 325-1 compressible-washer type with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125, Grade A490, Type 1, heavy-hex steel structural bolts, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
- C. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip or mechanically deposited zinc coating.
 - 2. Direct-Tension Indicators: ASTM F959, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Mechanically deposited zinc coating.

2.4 RODS

- A. Headed Anchor Rods: ASTM F1554, Grade 55, weldable, straight.
 - 1. Nuts: ASTM A563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A36 carbon steel.
 - 3. Washers: ASTM F436, Type 1, hardened carbon steel.
 - 4. Finish: Plain, Hot-dip zinc coating, ASTM A153, Class C.

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B. Threaded Rods: ASTM A36, ASTM A572, Grade 50.

1. Nuts: ASTM A63 hex carbon steel.
2. Washers: ASTM F436, Type 1, hardened carbon steel.
3. Finish: Plain, Hot-dip zinc coating, ASTM A153, Class C.

2.5 PRIMER

A. Steel Primer:

1. Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
2. SSPC-Paint 23, latex primer.
3. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanized-Steel Primer: MPI#26.

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: MPI#18 or SSPC-Paint 20. ASTM A780.

2.6 SHRINKAGE-RESISTANT GROUT

A. Non-Metallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, non-metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel in accordance with ASTM A6 and maintain markings until structural-steel framing has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

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- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 2.
- F. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.
- G. Welded-Steel Door Frames: Build up welded-steel doorframes attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated on Drawings.
- H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- I. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.
 - 1. Level 1 designation for any steel exposed to view, both interior and exterior.
 - 2. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
 - 3. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Slip critical.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123.

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- B. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
- C. Revise locations below where galvanizing is required to suit Project. Subparagraph below is an example only; delete and indicate items to be galvanized on Drawings if preferred.
- D. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Galvanized surfaces unless indicated to be painted.
 - 5. Surfaces enclosed in interior construction.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
 - 1. SSPC-SP 2.
- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 - 2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

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3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
4. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

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- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
 - 1. Joint Type: Slip critical.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780.
- B. Touchup Painting:
 - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

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2. Cleaning and touchup painting are specified in Section 099133.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1 and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200

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SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. K-series steel joists.
 - 2. Steel joist accessories.

1.2 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product.
- B. Shop Drawings:
 - 1. Include layout, designation, number, type, location, and spacing of joists.
 - 2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer, professional engineer.
- B. Welding certificates.
- C. Manufacturer certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Mill Certificates: For each type of bolt.

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- F. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications".
 - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.7 SEQUENCING

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. New Millennium
- B. Vulcraft
- C. Canam Steel

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated on Drawings.
 - 1. Use ASD; data are given at service-load level.
 - 2. Design special joists to withstand design loads with live-load deflections no greater than the following:
 - a. Floor Joists: Vertical deflection of 1/360 of the span.
 - b. Roof Joists: Vertical deflection of 1/240 of the span.

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2.3 STEEL JOISTS

- A. K-Series Steel Joist: Manufactured steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
1. Joist Type: K-series steel joists.
 2. Provide holes in chord members for connecting and securing other construction to joists.
 3. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated on Drawings, complying with SJI's "Specifications."
 4. Do not camber joists.
 5. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

- A. Primer:
1. SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.5 STEEL JOIST ACCESSORIES

- A. Bridging:
1. Provide bridging anchors and number of rows of horizontal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction.
1. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated on Drawings.
 2. Finish: Plain
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
1. Finish: Plain.
- D. Welding Electrodes: Comply with AWS standards.
- E. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

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2.6 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2.
- B. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.
- C. Shop priming of joists and joist accessories is specified in Section 099133 "Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications, joist manufacturer's written instructions, and requirements in this Section."
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 - 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.
- C. Bolt joists to supporting steel framework using carbon-steel bolts.
- D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after installation, clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, abutting structural steel, and accessories.

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- a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - b. Apply a compatible primer of same type as primer used on adjacent surfaces.
2. Cleaning and touchup painting are specified in Section 099133 "Painting".

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Visually inspect field welds according to AWS D1.1/D1.1M.
- C. Visually inspect bolted connections.
- D. Prepare test and inspection reports.

END OF SECTION 052100

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SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Composite floor deck.
3. Noncomposite form deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight structural concrete fill over steel deck.
2. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Roof deck.
2. Composite floor deck.
3. Noncomposite form deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Test and Evaluation Reports:

1. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - a. Power-actuated mechanical fasteners.

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2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.

D. Field Quality-Control Submittals:

E. Qualification Statements: For welding personnel.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.3/D1.3M.

B. Steel deck assembly designed to meet structural design criteria indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

2.2 ROOF DECK

A. Vulcraft.

B. Canam Steel

C. New Millennium

D. Fabrication of Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:

1. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33, zinc coating.
2. Galvanized- and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33], zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

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- a. Color: Gray.
3. Deck Profile: As indicated, Type WR, wide rib.
4. Profile Depth: 1-1/2 inches.
5. Design Uncoated-Steel Thickness: 0.0358 inch.
6. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
7. Span Condition: Triple span or more.
8. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 COMPOSITE FLOOR DECK

- A. Vulcraft.
- B. Canam Steel
- C. New Millennium
- D. Fabrication of Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with SDI C, with the minimum section properties indicated, and with the following:
 1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), G50 zinc coating.
 2. Profile Depth: 1-1/2 inches.
 3. Design Uncoated-Steel Thickness: 0.0358 inch.
 4. Span Condition: Triple span or more.

2.4 NONCOMPOSITE FORM DECK

- A. Vulcraft
- B. Canam Steel
- C. New Millennium
- D. Fabrication of Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite deck panels used as a form to comply with SDI NC, with the minimum section properties indicated, and with the following:
 1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 60 minimum, with underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 2. Profile Depth: 9/16 inch.
 3. Design Uncoated-Steel Thickness: 0.0179.
 4. Span Condition: Triple span or more.
 5. Side Laps: Overlapped or interlocking seam at Contractor's option.

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2.5 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 60,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi of same material and finish as deck, and of thickness and profile recommended by SDI standards for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch diameter.
- I. Flat Sump Plates: Single-piece steel sheet, 0.0358 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- J. Galvanizing Repair Paint: ASTM A780
- K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.

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- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: 5/8 inch, nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space 6 inches at lap and ends and 12 inches between laps as indicated.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 24 inches and as follows:
 - 1. Mechanically fasten with self-drilling, No. 12 diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2 inch long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 6 inches apart with at least one fastener at each corner.

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1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure. Do not use at fire rated walls.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in Section 07 2100 – Thermal Insulation.

3.4 INSTALLATION OF FLOOR DECK

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 1. Weld Diameter: 5/8 inch nominal.
 2. Weld Spacing:
 - a. Weld edge ribs of panels at each support. Space additional welds an average of 16 inches apart, but not more than 18 inches apart.
 - b. Space and locate welds as indicated.
 3. Fasten with a minimum of 1-1/2-inch long welds.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:
 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 2. Mechanically clinch or button punch.
 3. Fasten with a minimum of 1-1/2-inch- long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 1. End Joints: Lapped.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure in accordance with SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, in accordance with SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Install piercing hanger tabs at 24 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

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3.5 REPAIR

A. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099133 "Painting".
4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099133 "Painting" .

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.
 - a. Field welds will be subject to inspection.
2. Steel decking will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 053100

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SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Load-bearing wall framing.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing.
4. Ceiling joist framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 092118 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
3. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Load-bearing wall framing.
3. Exterior non-load-bearing wall framing.
4. Interior non-load-bearing wall framing.
5. Vertical deflection clips.
6. Single deflection track.
7. Drift clips.
8. Ceiling joist framing.
9. Soffit framing.
10. Post-installed anchors.
11. Power-actuated anchors.
12. Sill sealer gasket.
13. Sill sealer gasket/termite barrier.

B. Shop Drawings:

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1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- C. Delegated Design Submittal: For cold-formed steel framing.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.
- D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
1. Steel sheet.
 2. Expansion anchors.
 3. Power-actuated anchors.
 4. Mechanical fasteners.
 5. Vertical deflection clips.
 6. Horizontal drift deflection clips
 7. Miscellaneous structural clips and accessories.
- E. Research Reports:
1. For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
 2. For sill sealer gasket/termite barrier, showing compliance with ICC-ES AC380.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Clark Dietrich Metal Framing
- B. MarinoWare Industries
- C. Nucor Building Systems

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on Drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Load-Bearing Wall Framing: Horizontal deflection of $1/600$ of the wall height.
 - b. Interior Load-Bearing Wall Framing: Horizontal deflection of $1/360$ of the wall height under a horizontal load of 5 lbf/sq. ft.
 - c. Exterior Non-Load-Bearing Framing: Horizontal deflection of $1/600$ of the wall height.
 - d. Interior Non-Load-Bearing Framing: Horizontal deflection of $1/240$ of the wall height under a horizontal load of 5 lbf/sq. ft.
 - e. Ceiling Joist Framing: Vertical deflection of $1/120$ of the span for live loads and $1/240$ for total loads of the span.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of $L/600$.
 - 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

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- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and AISI S240.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Framing Members, General: Comply with AISI S240 for conditions indicated.
- B. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60 or equivalent.
- C. Steel Sheet for Vertical Deflection Drift Clips: ASTM A653, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: 33 or as required by structural performance.
 - 2. Coating: G60.

2.4 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch.
 - 2. Flange Width: 2 inches min.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
 - 2. Flange Width: 1-1/2 inches min.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch.
 - 2. Flange Width: 2 inches.

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2.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
 - 2. Flange Width: 2 inches
- C. Vertical Deflection Clips, Exterior: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Clark Dietrich Metal Framing
- E. MarinoWare Industries
- F. Nucor Building Systems
- G. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Flange Width: 1 inch plus twice the design gap for other applications.
- H. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.6 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch.
 - 2. Flange Width: 1-3/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
 - 2. Flange Width: 1-1/4 inches.

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- C. Vertical Deflection Clips, Interior: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Clark Dietrich Metal Framing
- E. MarinoWare Industries
- F. Nucor Building Systems
- G. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Flange Width: 1 inch plus twice the design gap for other applications.
- H. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.7 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with standard holes with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: **[0.0329 inch (0.84 mm)] [0.0428 inch (1.09 mm)] [0.0538 inch (1.37 mm)] [0.0677 inch (1.72 mm)] [0.0966 inch (2.45 mm)]** as required for each condition.
 - 2. Flange Width: **[1-5/8 inches (41 mm)] [2 inches (51 mm)] [2-1/2 inches (63 mm)]** as required for each condition.

2.8 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers and knee braces.
 - 9. Hole-reinforcing plates.

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10. Backer plates.

2.9 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.
- B. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC508 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Uses: Securing cold-formed steel framing to structure.
 - 2. Type: Torque-controlled adhesive anchor.
 - 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
- C. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.10 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780.
- B. Shims: Load-bearing, high-density or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- C. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.11 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

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- a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
- 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

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1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF LOAD-BEARING WALL FRAMING

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 1. Anchor Spacing: To match stud spacing and As shown on Shop Drawings.
- B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch between the end of wall-framing member and the web of track.
 1. Fasten both flanges of studs to top and bottom tracks.
 2. Space studs as follows:
 - a. Stud Spacing: 16 inches As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

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- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
 - 2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 8 inches deep.
- J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

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- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Connect vertical deflection clips to infill studs and anchor to building structure.
 - 3. Connect drift clips to cold-formed steel framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at centers indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches as indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Connect vertical deflection clips to studs and anchor to building structure.
 - 3. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

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- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

- 1. Install solid blocking at centers indicated on Shop Drawings.

- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.7 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

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SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Steel ladders.
 - 2. Loose bearing and leveling plates.
 - 3. Loose steel lintels.
 - 4. Steel framing and supports for overhead doors.
 - 5. Steel framing and supports for countertops.
 - 6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 7. Metal angle corner guards.
 - 8. Abrasive Metal Nosings for stair treads.
 - 9. Metal downspout boots.
 - 10. Miscellaneous metal trim.
 - 11. Pipe bollards.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-In-Place Concrete": Requirements for concrete fill.
 - 2. Division 05 Section "Structural Steel Framing": Structural-steel framing system components and elevator machine beams.
 - 3. Division 05 Section "Metal Stairs": Steel-framed stairs with metal pan treads.
 - 4. Division 05 Section "Metal Railings": Metal handrails and railings.
 - 5. Division 06 Section "Rough Carpentry": Plywood backing panels for sheet metal fabrications.
 - 6. Division 09 Section "Painting and Coating": Painting requirements for exposed metal fabrications.
 - 7. Division 12 Section "Manufactured Laminate-Clad Casework"
 - 8. Division 32 Section "Chain Link Fences and Gates": Metal fences and gates.
 - 9. Division 34 Section "Vehicle Guide Rails": Formed galvanized steel guard rail for vehicular traffic.

1.2 SUBMITTALS

- A. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 1. Provide erection plan for loose steel lintels, separate from structural steel submittals, and submit before structural steel shop drawings.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
- B. Welding Certificates: Copies of certificates for welding procedures and personnel.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

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1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
 - 4. AWS D1.6, "Structural Welding Code--Stainless Steel."
 - 5. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.5 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
- C. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.
- D. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

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- E. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch-wide slotted holes in webs at 2 inches o.c.
 - 1. Width of Channels: 1-5/8 inches.
 - 2. Depth of Channels: 1-5/8 inches, unless otherwise indicated or required to support loads.
 - 3. Metal and Thickness: Galvanized steel complying with ASTM A 653, structural quality, Grade 33, with G90 coating; 0.108-inch nominal thickness.
 - 4. Finish: Hot-dip galvanized after fabrication.
 - 5. Manufacturer: Unistrut Corporation or approved equal.
- F. Malleable-Iron Castings: ASTM A 47, Grade 32510.
- G. Gray-Iron Castings: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.
- H. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153.
- I. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 ALUMINUM

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
 - 1. Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

2.4 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FASTENERS

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

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- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
 - C. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Anchor Bolts in Concrete and Masonry: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated.
 - a. Where in contact with ACQ preservative-treated wood, provide stainless steel bolts and washers complying with ASTM A 276 or ASTM A 666, Type 304; and stainless steel nuts complying with ASTM F 594, Alloy Group 1, CW.
 - D. Machine Screws: ASME B18.6.3.
 - E. Lag Bolts: ASME B18.2.1.
 - F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
 - G. Plain Washers: Round, carbon steel, ASME B18.22.1.
 - H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
 - I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.
- 2.6 GROUT
- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- 2.7 CONCRETE
- A. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
- 2.8 FABRICATION, GENERAL
- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
 - B. Shear and punch metals cleanly and accurately. Remove burrs.

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- C. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - D. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
 - G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
 - H. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
 - I. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 - J. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
 - K. Remove sharp or rough areas on exposed traffic surfaces.
 - L. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- 2.9 STEEL LADDERS
- A. General: Fabricate ladders for locations shown, with dimensions, spacings, details, and anchorages as indicated.
 - 1. Comply with ANSI A14.3, unless otherwise indicated.
 - 2. For elevator pit ladders, comply with ASME A17.1.
 - B. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges, spaced 16 inches apart.
 - C. Bar Rungs: 3/4-inch-diameter steel bars, spaced 12 inches o.c.

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- D. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
- F. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
- G. Galvanize ladders, including brackets and fasteners, in exterior locations.

2.10 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates after fabrication.

2.11 LOOSE STEEL LINTELS

- A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches, unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls after fabrication and assembly.

2.12 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B. Fabricate units from structural-steel shapes, plates, bars, and tubes of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4 inch thick by 8 inches long at 24 inches o.c., unless otherwise indicated.
 - 2. Furnish inserts if units must be installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports in exterior locations and where indicated.

2.13 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

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- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.
- C. Galvanize miscellaneous steel trim in exterior locations.

2.14 ABRASIVE METAL NOSINGS

- A. Cast-Metal Units: Cast iron with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Safety Tread Co., Inc. (Basis of Design Style 3511)
 - b. Balco Inc.
 - c. Barry Pattern & Foundry Co., Inc.
 - d. Granite State Casting Co.
 - e. Safe-T-Metal Company, Inc.
 - f. Wooster Products Inc.
 - 2. Provide at all exterior concrete steps including steps under alcove.

2.15 METAL DOWNSPOUT BOOTS

- A. Provide downspout boots made from cast iron with inlets of size and shape to suit downspouts.

2.16 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 40 steel pipe.
 - 1. Pipe Diameter: 6 inches, unless otherwise indicated.
 - 2. Provide curved U-shaped bollards where indicated.
- B. Bollard Caps: Provide caps for bollards as follows:
 - 1. Flat Plate: 1/4 inch minimum steel plate of same diameter as pipe, welded to top of bollard.
- C. Fabricate anchorage for bollard from not less than four 8-inch long sections of No. 4 steel reinforcing bar, welded to sides of pipe at bottom of bollard, and projecting into concrete footing.

2.17 STEEL AND IRON FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153, for galvanizing steel and iron hardware.

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- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- E. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.18 ALUMINUM FINISH

- A. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written specifications for cleaning, conversion coating, and painting.
 - 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 603.8 except with a minimum dry film thickness of 1.5 mils, medium gloss.
 - 2. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

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- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 SETTING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonshrink, nonmetallic grout unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

3.4 INSTALLING PIPE BOLLARDS

- A. Anchor bollards in concrete with anchorage devices fabricated from steel reinforcing bars into concrete.
- B. Anchor internal sleeves for removable bollards in concrete by inserting into pipe sleeves preset into concrete. After internal sleeves have been inserted, fill annular space between sleeves solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward internal sleeve.
- C. Fill bollards solidly with concrete.
 - 1. Weld caps to pipe bollards after installation, of type specified in Part 2.

3.5 INSTALLING NOSINGS

- A. Center nosings on tread widths unless otherwise indicated.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079200 "Joint Sealants" to provide a watertight installation.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

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- C. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.
- D. Protect factory-applied finishes from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 05 5000

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SECTION 05 5100 - METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Preassembled steel stairs with concrete-filled treads.
 - 2. Industrial stairs with steel grating treads.
 - 3. Detailing and engineering metal stairs to fulfill performance requirements and conform to design intent indicated on Drawings.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete": Concrete fill for stair treads and platforms.
 - 2. Division 05 Section "Steel Decking": Steel deck for stair landings.
 - 3. Division 05 Section "Metal Railings": Requirements for metal handrails and railing systems.
 - 4. Division 09 Section "Resilient Flooring": Resilient stair treads and risers.
 - 5. Division 09 Section "Resilient Base and Accessories": Resilient stair treads and risers.
 - 6. Division 09 Section "Painting and Coating": Field painting exposed portions of stairs.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft.
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to $L/360$ or 1/4 inch, whichever is less.

1.3 SUBMITTALS

- A. Product Data: For metal stairs, paint products and grout.
- B. Shop Drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

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1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.
- C. Fabricator Qualifications: A firm experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."

1.5 COORDINATION

- A. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

- A. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.
- D. Steel Bars for Gratings: ASTM A 36/A 36M.
- E. Wire Rod for Grating Crossbars: ASTM A 510.
- F. Uncoated, Cold-Rolled Steel Sheet: Commercial quality, complying with ASTM A 366; or structural quality, complying with ASTM A 611, Grade A, unless another grade is required by design loads.

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- G. Uncoated, Hot-Rolled Steel Sheet: Commercial quality, complying with ASTM A 569; or structural quality, complying with ASTM A 570, Grade 30, unless another grade is required by design loads.
- H. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.2 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Machine Screws: ASME B18.6.3.
- D. Lag Bolts: ASME B18.2.1.
- E. Plain Washers: Round, carbon steel, ASME B18.22.1.
- F. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.3 GROUT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 CONCRETE FILL AND REINFORCING MATERIALS

- A. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 3000 psi, unless higher strengths are indicated.
- B. Welded Wire Fabric: ASTM A 185, 6 by 6 inches--W1.4 by W1.4, unless otherwise indicated.

2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding, unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.

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- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - 1. Architectural class.
- C. Shop Assembly: Preassemble stairs in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.
- E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously, unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface. All exposed welds shall be continuous except where permitted otherwise by specified class.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- H. Entire stair assembly is to be galvanized. All major framing members to be welded in the shop and then hot-dip galvanized. Coordinate assembly of various components to minimize field welds. If field welds are unavoidable, prep surface after welding and apply galvanized paint. Any hot dip galvanized surfaces are to have all drips, protrusions, etc. smoothed to be uniform in appearance and touch.

2.6 STEEL-FRAMED STAIRS

- A. Stair Framing: Fabricate stringers of structural-steel tubes (exterior stairs), channels (interior stairs), plates, or a combination of both, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural-steel tubes headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers.
- B. Metal Risers, Subtread Pans, and Subplatforms: Form to configurations shown from steel sheet of thickness necessary to support indicated loads, but not less than 0.0677 inch.
 - 1. Steel Sheet: Galvanized cold-rolled steel sheet, unless otherwise indicated.
 - 2. Directly weld metal pans to stringers; locate welds on side of subtreads to be concealed by concrete fill. Do not weld risers to stringers.

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3. Shape metal pans to include nosing integral with riser.
 - a. Form riser and nosing to comply with Accessibility Guidelines.
 - b. Form nosing to radius not less than 3/4 inch.
 4. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
- C. Floor Grating Treads and Platforms for exterior stairs: Form to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual for Steel Stainless Steel, and Aluminum Gratings and Stair Treads."
1. Fabricate treads and platforms from welded steel grating with 1-1/4-by-3/16-inch bearing bars at 15/16 inch o.c. and crossbars at 4 inches o.c., NAAMM designation: W-15-4 (1-1/4 x 3/16) STEEL.
 2. Surface: Serrated.
 3. Finish: Galvanized.
 4. Fabricate grating treads with integral nosing formed from steel floor plate or cast abrasive material, with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers by welding or with bolts.
 5. Fabricate grating platforms with nosing matching that on grating treads. Weld grating to platform framing.
 6. Provide vertical riser closure piece minimum 1/8" thick galvanized metal plate for full height of riser.

2.7 STAIR HANDRAILS AND RAILINGS

- A. General: Comply with applicable requirements in Division 05 Section "Metal Railings" for handrails and railings, and as follows:
1. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

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- F. Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface. All exposed welds shall be continuous except where permitted otherwise by specified class.
 5. Apply galvanized paint to all weld locations.

3.2 ADJUSTING AND CLEANING

- A. Touchup Painting/Finishing: Immediately after erection, clean field welds, bolted connections, and apply galvanized paint to any areas where base metal is exposed. Sand and/or file any imperfections protrusions, burs, etc. and/or polish surfaces as required such that entire assembly has a uniform appearance and feel.

END OF SECTION 05 5100

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SECTION 05 5200 - METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Galvanized Steel railings for exterior and interior applications.
 - 2. Galvanized Wire mesh infill panels for guards.
 - 3. Detailing and engineering metal railings to fulfill performance requirements and conform to design intent indicated on Drawings.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete": Construction of exterior and interior stairs and ramps with metal railings.
 - 2. Division 05 Section "Metal Stairs": Steel-framed stairs for railings.

1.2 PERFORMANCE REQUIREMENTS

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Stainless Steel: 60 percent of minimum yield strength.
 - 2. Steel: 72 percent of minimum yield strength.
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

- A. Product Data: For grout, anchoring cement, and paint products.

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- B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.
- B. Storage: Store handrails and railings in a dry, well-ventilated, weathertight place.
- C. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- D. Coordination: Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- E. Scheduling: Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:
 - 1. Pipe: ASTM A 53/A 53M, Type S, Grade A, Standard Weight (Schedule 40) unless another grade and weight are required by structural loads.
 - a. Provide galvanized finish for exterior installations and where indicated.
 - 2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
 - a. Provide galvanized finish for all stair applications.
 - 3. Steel Plates, Shapes, and Bars: ASTM A 36.
 - 4. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510; or gray iron complying with ASTM A 48, Class 30.
- C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

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- D. Handrail Brackets: steel units of size or with extenders to provide required clearance between handrail and wall or post and other obstructions; and with exposed square edges machine ground to produce eased edges.
1. Brackets for Wall-Mounted and Post-Mounted Handrails: With round flange with tapped hole for mounting.
 - a. Product: Julius Blum & Company; Model No. 1306 or equal.

2.2 WIRE MESH PANELS

- A. Wire Mesh for Infill Panels: Square pattern fabricated from 0.135-inch-diameter, welded steel wire woven into 2-inch pattern, inserted through frame holes and welded into frame. Vertical wires are plumb, and horizontal wires are perpendicular to vertical wires.
1. Vertical and Horizontal Panel Framing: 1" galvanized U-channel edging welded to HSS tubes. Provide weep holes on bottom channel of exterior stairs.
 2. Interior and Exterior Locations: Provide steel mesh and framing with hot-dipped galvanized finish.
 3. Basis-of-Design Manufacturer: McNichols item number 34B21350SA.

2.3 WELDING MATERIALS, FASTENERS, AND ANCHORS

- A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
1. For aluminum handrails and railings, use fasteners fabricated from Type 304 or Type 316 stainless steel.
 2. For stainless-steel handrails and railings, use fasteners fabricated from Type 304 or Type 316 stainless steel.
 3. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
- D. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
1. Cast-in-place anchors.
 2. Epoxy adhesive anchors.
 - a. Products: Subject to compliance with requirements, provide Hilti HVA System; or comparable product by Rawl.

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2.4 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.5 FABRICATION

- A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Form changes in direction of members as detailed, or if not detailed, by radius bends, by mitering at elbow bends, or by insertion of prefabricated flush elbow fittings.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- E. Welded Connections: Fabricate handrails and railings for connecting members by welding, unless otherwise indicated. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
 - 5. Welded Joints; All welding shall comply with the National Ornamental and Miscellaneous Metals Association for Finish No. 2.
- F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
- G. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

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- H. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- I. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- J. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- K. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- L. Fabricate joints that will be exposed to weather in a watertight manner.
- M. Close exposed ends of handrail and railing members with prefabricated end fittings.
- N. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch or less.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance of handrails and railings.

2.7 STEEL FINISHES

- A. General: Provide shop-applied finishes for ferrous metal as follows:
 - 1. Interior and Exterior Railing Assemblies: Galvanized.
- B. Galvanized Handrails and Railings: Hot-dip galvanize interior and exterior steel and iron handrails and railings to comply with ASTM A 123. Hot-dip galvanize hardware for exterior steel and iron handrails and railings to comply with ASTM A 153.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153, for galvanizing steel and iron hardware.
- D. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

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- E. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
 - 1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components, unless otherwise indicated. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:
 - 1. Nonshrink, nonmetallic grout or anchoring cement.
- B. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8-inch buildup, sloped away from post.
- C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

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1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING HANDRAILS TO WALLS

- A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface, post or other obstruction.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads but not less than 48 inches o.c.
- C. Secure wall brackets to building construction as follows:
 1. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

3.6 ADJUSTING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- B. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.
- C. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 5200

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SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Wood grounds, nailers, and blocking.
 - 2. Plywood backing panels for mounting electrical and telephone equipment.
- B. Related Sections include the following:
 - 1. Division 06 Section "Sheathing": Wall and Roof sheathing and Nailable roof deck insulation panels.
 - 2. Division 07 Section "Fluid-Applied Membrane Air Barriers": Membrane system applied to exterior face of wall sheathing.
 - 3. Division 09 Section "Gypsum Board Assemblies": Steel framing and gypsum board partitions, for installation of wood blocking required for attachment of wall-mounted items.

1.2 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Preservative-treated wood.
 - 2. Power-driven fasteners.
 - 3. Powder-actuated fasteners.
 - 4. Expansion anchors.
 - 5. Metal framing anchors.

1.4 PRODUCT HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces.

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- B. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wood-Preservative-Treated Materials:
 - a. Baxter: J. H. Baxter Co.
 - b. Chemical Specialties, Inc.
 - c. Continental Wood Preservers, Inc.
 - d. Hickson Corp.
 - e. Hoover Treated Wood Products, Inc.
 - f. Osmose Wood Preserving, Inc.
 - 2. Metal Framing Anchors:
 - a. Alpine Engineered Products, Inc.
 - b. Cleveland Steel Specialty Co.
 - c. Harlen Metal Products, Inc.
 - d. Simpson Strong-Tie Company, Inc.

2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Wood / Plywood Structural Panels:
 - 1. Plywood: DOC PS 1.
 - 2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
 - 3. Comply with "Code Plus" provisions in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."
 - 4. Factory mark panels according to indicated standard.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP C2 (lumber) and AWP C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWP C31 with inorganic boron (SBX).
 - 1. Preservative Chemical, Exposed Locations Accessible to Children: Ammoniacal, or amine, copper quat (ACQ).
 - a. Do not use chemicals containing chromium or arsenic.

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2. Preservative Chemical, Concealed Locations: Chromated copper arsenate (CCA). If CCA-treated lumber is not commercially available, provide lumber treated according to AWWPA C31 with ammoniacal, or amine, copper quat (ACQ) or inorganic boron (SBX).
- B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft.
- C. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- E. Application: Treat items indicated on Drawings, and the following unless indicated for fire-retardant treatment:
 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.

2.4 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. For items of dimension lumber size, provide Hem-Fir, No. 2 grade lumber with 19 percent maximum moisture content.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber with 19 percent maximum moisture content and any of the following species:
 1. Mixed southern pine; SPIB.
 2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods; NELMA.
 5. Northern species; NLGA.
 6. Western woods; WCLIB or WWPA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 1. Mixed southern pine, No. 2 grade; SPIB.
 2. Hem-fir or Hem-fir (north), Standard or 3 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or Spruce-pine-fir, Standard or 3 Common grade; NELMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods, No. 3 Common grade; NELMA.
 5. Northern species, No. 3 Common grade; NLGA.
 6. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.

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2.6 PANEL PRODUCTS

- A. Plywood Backing Panels:
1. For sheet metal closures, provide Exposure 1 sheathing, span rating to suit framing in each location, and thickness as indicated but not less than 1/2 inch.
 2. For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch thick.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
 2. Where in contact with ACQ preservative-treated wood, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
1. Where in contact with ACQ preservative-treated wood, provide stainless steel bolts and washers complying with ASTM A 276 or ASTM A 666, Type 304; and stainless steel nuts complying with ASTM F 594, Alloy Group 1, CW.

2.8 METAL FRAMING ANCHORS

- A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

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- C. Mudsill Anchors: Straps for nailing to sill plates and securing to foundation walls with not less than 7 inch embedment.
 - 1. Product: MAS Mudsill Anchor; Simpson Strong-Tie.

2.9 MISCELLANEOUS MATERIALS

- A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. International Building Code; Table 2304.9.1, "Fastening Schedule."
- E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

3.2 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

3.3 PLYWOOD PANEL INSTALLATION

- A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
 - 1. Comply with "Code Plus" provisions in above-referenced guide.

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- B. Fastening Methods: Fasten panels as indicated below:
1. Plywood Backing Panels: Nail or screw to supports.

END OF SECTION 06 1000

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SECTION 06 1600 – SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wall sheathing.
 - 2. Composite nail base insulated wall sheathing.
 - 3. Flexible flashing at openings in sheathing.
- B. Related Sections include the following:
 - 1. Division 01 Section "Mockups": Information on constructing Mock-up wall.
 - 2. Division 06 Section "Rough Carpentry" for plywood backing panels and flooring panels.
 - 3. Division 07 Section "Liquid-Applied Membrane Air Barriers" for air barriers applied to wall sheathing.
 - 4. Division 07 Section "Thermal Insulation" for Continuous Insulation Wall Panels Applied over wall sheathing.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 QUALITY ASSURANCE

- A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria":
 - 1. Plywood.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

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- C. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
1. Product: Subject to compliance with requirements, provide one of the following:
 - a. "Dens-Glass Gold" by G-P Gypsum Corporation.
 - b. SECUROCK Brand Glass Mat Sheathing by United States Gypsum Company.
 - c. "Weather Defense Platinum" by LaFarge North America.
 - d. "GlasRoc" by Certainteed.
 - e. Gold Bond Brand "EXP"™ Sheathing, National Gypsum.
 2. Type and Thickness: As indicated, but not less than Type X, 5/8 inch thick.
- B. Cellulose Fiber-Reinforced Gypsum Sheathing: ASTM C 1278/C 1278M, gypsum sheathing.
1. Product: Subject to compliance with requirements, provide "Fiberock Sheathing with Aqua-Tough" by United States Gypsum Co.
 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
 3. Size: any of the following to best suit condition - 48 by 96 inches (1219 by 2438 mm), 48 by 108 inches (1219 by 2743 mm), 48 by 120 inches (1219 by 3048 mm).
- C. Plywood Wall Sheathing: Exterior, Structural I sheathing.
1. Span Rating: Not less than 16/0.
 2. Nominal Thickness: Not less than 1/2 inch (13 mm).

2.3 COMPOSITE NAIL BASE INSULATED WALL SHEATHING

- A. Plywood-Board-Surfaced, Polyisocyanurate-Foam Sheathing: Rigid, cellular, polyisocyanurate thermal insulation with Fire plywood board laminated to one face complying with ASTM C 1289, Type V.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Hunter Panels; Xci Ply (Class A) or products by one of the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Roofing Corporation.
 - b. Cornell Corporation.
 - c. Rmax, Inc.
 3. Polyisocyanurate-Foam Thickness: 2 inches.
 4. Fire Treated Plywood-Board Nominal Thickness: 5/8 inch.
 5. NFPA 285 Compliant.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.

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- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 - 1. For wall sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and complying with requirements for elastomeric sealants specified in Division 07 Section "Joint Sealants."

2.6 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.
 - c. Polyguard Products, Inc.; Polyguard 300.
- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
- C. Weather-Resistive Barrier over Composite Nail Base Sheathing: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), without perforations.
 - 2. Polymer-Based Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; and UV stabilized; with pressure-sensitive plastic tape recommended by building wrap manufacturer for sealing joints between and penetrations through building wrap.
 - a. Product: Tyvek StuccoWrap; DuPont Tyvek Weatherization Systems.

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Coordinate wall sheathing installation with underlayment, vapor barriers, flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly. Screw to studs.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast. For composite deck products that are not immediately shingled, provide an underlayment that will prevent moisture penetration into panels.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall Sheathing:
 - a. Screw to cold-formed metal framing.
 - b. Space panels 1/8 inch apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

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1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.4 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated and recommended by manufacturer or where indicated to comply with manufacturers written instructions.
 1. Prime substrates as recommended by flashing manufacturer.
 2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
 3. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.5 Weather-Resistive Barrier: Wrap into wall openings, such as for windows, doors, and mechanical equipment; lap with flashing to drain in the direction of flow. Extend continuously around corners and angles and behind control joints. Overlap upstanding vertical flashing/trim a minimum of 4 inches to shed water, unless otherwise indicated. Do not make holes, breaks, or tears in the barrier except by fasteners.

4. Asphalt-Saturated Organic Felt: Overlap to drain in the direction of flow. Apply horizontally with 4-inch overlap and 6-inch staggered end lap; fasten to sheathing with galvanized staples or roofing nails.

END OF SECTION 06 1600

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SECTION 06 4023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior wood standing and running trim and other woodwork for transparent/stained finish, including:
 - a. Interior window sills and aprons.
 - b. Wood bullnose for plastic laminate counters.
 - c. Built-in wood benches.
 - 2. Custom architectural casework not specified in other Sections, fabricated from wood components and plastic laminate, including but not limited to:
 - a. Countertops.
 - 3. Hardware and accessories.
 - 4. Shop finishing interior woodwork.
- B. Related Sections include the following:
 - 1. Division 05 Section "Metal Fabrications": Requirements for steel supports for architectural woodwork.
 - 2. Division 06 Section "Rough Carpentry": Furring, blocking, shims, and hanging strips for installing interior woodwork.
 - 3. Division 08 Section "Flush Wood Doors."
 - 4. Division 09 Section "Painting and Coating": Field finishing of architectural woodwork not indicated for shop finish.
 - 5. Division 12 Section "Institutional Laminate-Clad Casework": Plastic laminate casework from stock components.

1.2 DEFINITIONS

- A. Architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, including:
 - 1. Substrate and core materials.
 - 2. Laminates and adhesives.
 - 3. Counter materials.
 - 4. Hardware and accessories.
 - 5. Finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

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3. Show coordination with electrical work and video monitors.
- C. Samples for Verification: As follows:
1. Lumber for Transparent Finish: 50 sq. inches, finished on 1 side and 1 edge.
 2. Plastic-Laminate-Clad Panel Products: 8 by 10 inches, for each color and pattern.
 3. Counter Material: 6 inches square.
- D. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- 1.4 QUALITY ASSURANCE
- A. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Quality Standard: Unless otherwise indicated, comply with AWT's "Architectural Woodwork Quality Standards" for grades of architectural woodwork, construction, finishes, and other requirements.
1. The Contract Documents may contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.
- D. Mockups: Coordinate mockups with institutional casework. Before fabricating and installing architectural woodwork, build mockups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect seven days in advance of dates and times when mockups will be fabricated and installed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting architectural woodwork fabrication.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed.
 7. Construct full size mockups for the following elements:
 - a. Typical Plastic Laminate Countertop.
 - b. Kitchen Counter and base cabinets.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

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1.5 PRODUCT HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.
- B. Coordination with Related Items: Coordinate architectural woodwork with sizes, locations and access required for items incorporated into woodwork assemblies, including mechanical and electrical components.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood for Transparent Finish: Do not use 2 adjacent exposed faces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - 1. Wood Species and Cut, Typical Locations: Select white maple plain sawn or sliced.
- C. Wood Products: Comply with the following:
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade MD; Exterior Grade where indicated.
 - 2. Particleboard: ANSI A208.1, Grade M-2; M-2-Exterior Glue for laminate clad aprons and counters.
- D. Thermoset Decorative Overlay (Melamine): Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

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- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: As indicated in Finish Legend on the Drawings.
- F. Adhesive for Bonding Plastic Laminate: Urea-formaldehyde or Resorcinol.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- G. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish.
 - 1. As indicated in Finish Legend on the Drawings.

2.2 HARDWARE AND ACCESSORIES

- A. Countertop supports: Steel bracket counter supports with passthrough holes for cables and cords.
 - a. Product: FastCap Speed Brace – model # SB21X24BL
 - b. Size: 21”x 24”.
 - c. Color: Black.

2.3 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, Nailers, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
- D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

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- E. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.
- 2.5 WOOD BENCH (Shower)
 - A. Quality Standard: Comply with AWI Section 300.
 - B. Grade: Custom.
 - C. Assemble wood benches in the shop.
 - D. Wood Species: Ipe.
 - 1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches wide.
- 2.6 INTERIOR WOOD TRIM AND WOODWORK FOR TRANSPARENT FINISH
 - A. Quality Standard: Comply with AWI Section 300 for standing and running trim.
 - B. Interior Window Sills: Use solid hardwood of single length for each sill; do not glue for width unless sill is more than 4 inches wide.
 - 1. Assemble window sills in shop to maximum extent possible.
 - 2. Provide shop-applied finish for window sills.
 - C. Provide solid wood bullnose (1-1/2") for countertop edging – WD-1.
- 2.7 PLASTIC-LAMINATE COUNTERTOPS
 - A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.
 - B. High-Pressure Decorative Laminate Grade: HGS; 0.048 inch minimum thickness.
 - C. Colors, Patterns, and Finishes: As indicated in Finish Legend on the Drawings, or if not indicated, as selected by Architect from manufacturer's full range.
 - D. Edge Treatment: Same as laminate cladding on horizontal surfaces, unless otherwise indicated.
 - 1. Where indicated, provide solid lumber complying with requirements specified for transparent finished hardwood trim.
 - E. Core Material: Particleboard or medium-density fiberboard.
 - F. Core Material at Sinks: Exterior-grade plywood.
- 2.8 SHOP FINISHING ARCHITECTURAL WOODWORK
 - A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.
 - 1. Grade: Premium.

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- B. General: Shop finish exposed wood window sills at fabrication shop as specified in this Section.
 - 1. Refer to Division 09 Section "Painting and Coating" for finishing architectural woodwork not specified for shop finish, including standing and running wood trim.
- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Apply three coats to backs and concealed edges and ends of window sills.
- D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523:
 - 1. AWI Finish System TR-6: Catalyzed polyurethane.
 - 2. Staining: Match approved sample for color.
 - 3. Sheen: Satin, 30-50 gloss units.
 - 4. Number of Coats: As required by referenced standard unless otherwise indicated.
 - a. Window Stools: Provide not less than three coats of finish to exposed surfaces of interior wood window stools.

2.9 SOLID SURFACING MATERIAL

- A. Color: As indicated in the finish legend in the drawings.
- B. Thickness: 1/2 inch.
- C. Fabrication
 - 1. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and solid polymer manufacturer requirements. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.
 - 2. Fabricate backsplashes from solid surfacing material with optional radius cove where counter and backsplashes meet as indicated on Drawings. Backsplashes for most colors may be fabricated by traditional means discussed in K-25294 *Backsplashes*. Colors with metallic/mica particle or veined colors creating directional aesthetics (K-26833 *Directional Aesthetics*) may require the techniques in Technical Bulletin K-28235 *Thermoformed Backsplash*.
 - 3. Fabricate joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 50 mm (2") wide reinforcing strip of solid polymer material under each joint. Reinforcing strip of solid polymer material is not required when using DuPont™ Joint Adhesive 2.0.
 - 4. Provide holes and cutouts for plumbing and bath accessories as indicated on Drawings.
 - 5. Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work.
 - 6. Provide eased edge detail at countertop edge/face to provide thicker profile than products thickness. Reference drawing detail for dimensions.
 - 7. Finish: Ensure surfaces have uniform finish.
 - 8. Coordinate sink template and any holes required for plumbing with PC and approved shop drawings. Mount sink and seal as recommended by manufacturer.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Wood Trim and other Woodwork: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
 - 2. Install wood trim with no more variation from a straight line than 1/8 inch in 96 inches.
- F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Field Jointing: Where possible make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 2. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
 - 3. Secure tops to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each front, end, and back.
 - 4. Install counter support brackets as per manufacturers instructions. Provide blocking in wall as required.
 - 5. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.

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6. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and walls with adhesive.
 7. Seal junctures of top, splash, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
 8. Comply with requirements specified in Division 7 Section "Joint Sealants."
 9. Install wood bullnoses after counters are in place and secured. Miter all inside and outside corners. Fill finish nailing holes with filler matching stain. Sand as needed so filler blends in and is not readily visible.
- G. Window Stools: Install without joints, using full-size pieces for each window stool.
1. Install window stools with no more variation from a straight line than 1/8 inch in 96 inches.
 2. Paint reveal prior to stool install.
- H. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill fastener holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 4023

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SECTION 07 1326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes self-adhering rubberized-asphalt sheet waterproofing for the following:
 - 1. Below-grade walls where opposite side of wall faces building interior.
 - a. Along column line E where grade of existing building to remain may be higher than finish floor elevation.
- B. Related Sections include the following:
 - 1. Division 07 Section "Thermal Insulation": Board insulation installed with waterproofing systems.
 - 2. Division 07 Section "Joint Sealants": Joint sealant materials and installation.
 - 3. Division 33 Section "Subdrainage": Drainage panels and geotextile filter fabrics.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide waterproofing that prevents the passage of water.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Samples: 12-by-12-inch square of waterproofing and flashing sheet.
- D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- E. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.
- F. Sample Warranty: Copy of special waterproofing manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed by waterproofing manufacturer to install manufacturer's products.
- B. Source Limitations: Obtain waterproofing materials and protection course, through one source from a single manufacturer.

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- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.5 PRODUCT HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 WARRANTY

- A. Special Manufacturer's Warranty: Written warranty, signed by waterproofing manufacturer agreeing to replace waterproofing material that does not comply with requirements or that does not remain watertight during specified warranty period.
 - 1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch in width.
 - 2. Warranty Period: 5 years after date of Substantial Completion.
- B. Special Installer's Warranty: Written waterproofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, for warranty period of two years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; CCW MiraDRI 860.

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2. GCP Applied Technologies; Bituthene 3000.
3. Henry “Blueskin WP-200.
4. W.R. Meadows MEL-ROL.

2.2 RUBBERIZED-ASPHALT SHEET WATERPROOFING

- A. Rubberized-Asphalt Sheet: 60-mil-thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil-thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 1. Physical Properties: As follows, measured per standard test methods referenced:
 - a. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
 - f. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
 - g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
 - h. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Sheet Strips: Self-adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.
- E. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- F. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
 1. Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 4-1/2 inches wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side.
 2. Detail Strips: 62.5-mil-thick, felt-reinforced self-adhesive strip, 9 inches wide, with release film on adhesive side.

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- H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.
- I. Molded-sheet drainage panels:
 - 1. Molded-Sheet Drainage Panel: Such as MiraDRAIN 6200 or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch
- F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
 - b. At deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

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3.3 RUBBERIZED-ASPHALT SHEET APPLICATION

- A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
- E. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- F. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches beyond repaired areas in all directions.
- H. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 MOLDED SHEET DRAINAGE PANELS

- A. Install as protection course with butted joints over waterproofing membrane before starting subsequent construction operations.

3.5 PROTECTION AND CLEANING

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 1326

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SECTION 071801 – PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. The work under this Section shall consist of the application of waterborne pavement markings, as indicated in the Specifications and as directed by the Engineer, and in accordance with these specifications.

1.2 MATERIALS

- A. Provide materials from a source that is listed in PennDOT Bulletin 15. Certify materials as specified in Section 106.03(b)3.
- B. Certify the materials by filling out PennDOT Form CS-4171 “Certificate of Compliance”.
- C. Provide waterborne traffic paints listed in Bulletin 15.

1.3 CONSTRUCTION

- A. General
 - 1. At least 5 days before beginning work, provide the Engineer with a schedule of operations. In addition, provide the Engineer with the manufacturer’s instruction for the installation of the materials, application temperatures, proper mixing techniques, and any other data to ensure the material is being properly installed.
 - 2. Clean the roadway surface where pavement markings will be applied.
 - a. Remove surface treatment, laitance, curing compounds, or any materials that hinder adhesion.
 - b. Remove loose dirt and debris from area.
- B. Equipment
 - 1. Line Application – Use a machine that is:
 - a. Capable of simultaneously applying two parallel lines of the width indicated in solid or broken patterns or various combinations thereof;
 - b. Capable of automatically dispensing glass beads onto the paved surface, at the required application rate, by the pressurized gun method; and
 - c. Equipped with a measuring device, which automatically and continuously measures the length of each line placed, to the nearest foot.
 - 2. Legend Application
 - a. Include crosswalks, symbols, legends, stop lines, and other miscellaneous items.
 - b. Do not apply with hand brushes or rollers.
- C. Application Rates
 - 1. Paint – Dispense at a wet-film thickness of 15 mils \pm 1 mil for all markings, except edge line markings are 12 mils \pm 1 mil.

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2. Calibration – Use a machine calibrated as follows:
 - a. Line Measuring Device – Calibrate automatic line length gauges to maintain a tolerance of ± 25 feet per mile.
 - b. Cycle Length/Line Timer – Calibrate cycle length in a tolerance of 6 inches per 40 feet; calibrate line length to maintain a tolerance of 3 inches per 10 feet.

D. Surface Preparation

1. Clean the road surface where the waterborne pavement markings will be applied.
2. Remove all surface treatment, laitance, curing compound, or any contaminants that would hinder adhesion. Clear any loose dirt and other debris from the area to be painted with compressed air.
3. Surface preparation is incidental to the application of waterborne pavement markings, except for the removal of pavement markings.
4. Identify the location of final pavement markings by applying spots on the pavement at 40-foot intervals. The Engineer will approve the locations.

E. Temperature Restriction

1. Apply on a dry pavement with minimum ambient and pavement temperatures of 50°F and a maximum relative humidity of 80%.
2. Confirm proper atmospheric and pavement surface conditions with the Engineer.

F. Protection of Painted Surfaces

1. Provide protection to allow adequate time for the markings to dry and be track-free from vehicular traffic.
2. Follow manufacturer's recommendations or use a minimum of 30 minutes.
3. Use barrier cones to protect markings that do not dry in less than 2 minutes on a roadway where traffic is maintained.
4. Repaint marked or damaged areas, as directed.

G. Defective Markings

1. Remove and replace any markings placed incorrectly. Repair those markings, which after application and drying, the Engineer determines to be defective. Complete this work at no additional cost to the Owner.
2. Major types of defective work and method of repair include the following:
 - a. For inadequate retroreflectivity, glass bead coverage or retention, restripe over defective marking.
 - b. For insufficient thickness or line width, uneven cross-section, poor adhesion, or delaminating; remove defective markings as specified in PennDOT Pub. 408, Section 963.3 and clean pavement surface, including 1 foot beyond each end of the affected area. Remove loose particles and debris with compressed air. Restripe the marking on the cleaned surface as specified in this specification.

H. Guarantee

1. Guarantee pavement marking material against failure due to premature wear or poor adhesion resulting from defective materials or method of application in accordance with PennDOT Pub. 408, Section 107.16(b) for a period of 90 days from the date of acceptance.

1.4 MEASUREMENT AND PAYMENT

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- A. A line is measured by the linear foot.
- B. A legend is measured by each legend.

END OF SECTION 071801

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SECTION 07 2100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Insulation under slabs-on-grade.
 - 2. Foundation wall insulation.
 - 3. Concealed thermal insulation.
 - 4. Spray foam insulation for cavities in masonry veneer exterior walls.
 - 5. Expanding foam sealant for infiltration control.
 - 6. Vapor retarders.
- B. Related Sections include the following:
 - 1. Division 05 Section "Cold-Formed Metal Framing": Metal studs for exterior walls, to receive insulation.
 - 2. Division 06 Section "Sheathing": Nailable composite insulation panels.
 - 3. Division 07 Section "EPDM Roofing": Insulation specified as part of membrane roofing construction.
 - 4. Division 09 Section "Gypsum Board Assemblies": Sound attenuation insulation installed as part of metal-framed wall and partition assemblies.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certified Product Test Reports: For foamed-in-place masonry wall insulation showing compliance with specified performance values, including R-values.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of thermal insulation through one source.
- B. Foam Sealant Installer Qualifications: Engage an Installer for infiltration control sealing who has successfully completed 5 installations of scope similar to this Project.
- C. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

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1.4 PRODUCT HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Insulation must be protected from open flame and stored in accordance with the manufacturer's instructions. Protect against ignition at all times.
 - 3. Do not deliver plastic insulating materials to Project site before installation time.
 - 4. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.5 PROJECT CONDITIONS

- A. Sequencing and scheduling: Inspect for infiltration paths and install expanding foam sealant for infiltration control at the intervals indicated below. Do not enclose building envelope construction before inspecting and sealing infiltration paths.
 - 1. Before installing veneer.
 - 2. Before installing doors and windows.
 - 3. Before installing interior wall finishes.
 - 4. Before installing interior ceiling finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Extruded-Polystyrene Board Insulation:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Kingspan Insulation North America
 - d. Owens Corning.
 - 2. Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville Corporation.
 - c. Knauf Fiber Glass.
 - d. Owens Corning.
 - 3. Spray Polyurethane Foam Insulation:
 - a. BASF Corporation.
 - b. Dow Chemical Company (The).
 - c. Johns Manville
 - d. Huntsman
- Expanding Foam Sealant:
 - e. Dow Chemical Company.
 - f. Geocel Corporation.
 - g. Macklanburg-Duncan; GE Sealants & Adhesives.

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- h. Tytan Products.
- 4. Reinforced-Polyethylene Vapor Retarder:
 - a. Raven Industries, Inc.
 - b. Reef Industries, Inc.

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
 - 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
- B. Sustainability Requirements: Provide glass-fiber board insulation as follows:
 - 1. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.
- C. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
 - 1. Type IV, 25 psi.
 - a. Applications: Use for foundation walls, under-slab conditions.
 - b. Applications: Insulation Board applied in Masonry Cavity:
 - 1) Product: DOW "CavityMate Ultra", 2.125 inch thick, R12.
 - 2. Type X, 15 psi.
 - a. Applications: Insulation applied over sheathing in exterior walls.
 - b. Applications: Insulation Board applied in Masonry Cavity, 2 inches thick, R10.
 - 3. Type V, 100 psi.
 - a. Applications: Use for applications to receive concrete wearing surface (at concrete aprons to apparatus bays).
- D. Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from glass; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
 - 1. Applications: Use where blanket insulation is indicated and a vapor retarder facing is not required, including locations where a separate vapor retarder sheet is indicated or vapor retarder is provided by another material.
 - 2. Thermal Resistance: Provide blanket insulation with not less than the following R-values for thickness indicated:
 - a. Nominal 4 inch: R-11.
 - b. Nominal 6 inch: R-19.
 - c. Nominal 10 inch: R-30.
- E. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Applications: Use for fire safing where a vapor barrier is not required.
 - 2. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F (30.2 K x m/W at 24 deg C).
 - 3. Fiber Color: Darkened, where indicated.

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2.3 CONTINUOUS INSULATION WALL PANELS

- A. Board Insulation: Rigid, closed cell Class A, polyisocyanurate thermal insulation complying with ASTM C 1289, Type I, Class 2 and ASTM E84. The Polyisocyanurate foam core is bonded to Reinforced foil facers on both sides.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Hunter Panels; Xci Foil (Class A) or products by one of the following:
 - a. Atlas Roofing Corporation; Energy Shield Pro.
 - b. DuPont Chemical Company (The); Thermax (ci)
 - c. Johns Manville; Berkshire Hathaway Inc.; AP Foil Faced Foam Sheathing.
 - d. Rmax, Inc.; ECOMAXci FR
 2. Polyisocyanurate Insulation Thickness: 2 inches.
 3. Face Coating: 15-mil thick Reinforced Foil facers both sides.
 4. Seam Treatment: Provide Manufacturers Foil faced Sealant tape on all joints.
 5. NFPA 285 compliant.

2.4 SPRAY FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).
 2. Minimum R-value: R6.2 / inch per ASTM C518 (aged)
 3. Air Leakage: Less than 0.02L/s/M2 at 1-inch per ASTM E282-04
 4. Vapor Transmission: Maximum 0.98 perms at 1.5" per ASTM E96
 5. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 6. Products: Subject to compliance with requirements, provide one of the following:
 - a. Huntsman., Foam-Lok 2000-4G
 - b. Johns Manville, JM Corbond III
 - c. BASF Walltite
 - d. Carlisle SealTite Pro HFO
 7. Thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).

2.5 VAPOR RETARDER

- A. Reinforced-Polyethylene Vapor Retarder: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0507 perm.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Raven Industries, Inc.; DURA-SKRIM 6WW.
 - b. Reef Industries, Inc.; Griffolyn T-65.
- B. Vapor-Retarder Adhesive: Construction adhesive recommended by vapor retarder manufacturer for adhering to substrates indicated.
- C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

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2.6 AUXILIARY INSULATING MATERIALS

- A. Expanding Foam Sealant: Non shrinking, non drying, one-component expanding polyurethane foam sealant suitable for sealing infiltration pathways in building construction; VOC-compliant, with no CFC's or HCFC's; UL Listed, with Flame Spread of 25 or less and Smoke Density of 20 or less.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company; Great Stuff Pro.
 - b. Geocel Corporation; Expanding Foam Sealant
 - c. Macklanburg-Duncan; Polycel Expanding Foam Sealant.
 - d. Selena USA Inc., Tytan Products; One-Component Pro, Expanding Polyurethane Gun Foam Sealant.
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.7 INSULATION FASTENERS

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Adhesively Attached, Spindle-Type Anchors:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Gemco; Spindle Type.
 - 2. Insulation-Retaining Washers:
 - a. AGM Industries, Inc.; RC150.
 - b. AGM Industries, Inc.; SC150.
 - c. Gemco; Dome-Cap.
 - d. Gemco; R-150.
 - e. Gemco; S-150.
 - 3. Anchor Adhesives:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Gemco; Tuff Bond Hanger Adhesive.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
- C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
- D. Steel Sheet Closure and Attachment Components: Metal complying with ASTM C 645 requirements.
 - 1. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized.
 - 2. Thickness: Minimum base metal thickness as follows for gages indicated:
 - a. 20 gage: 0.0329 inches.
 - b. 16 gage: 0.0583 inches.
 - 3. Break-form to profiles shown.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

- A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
 - 1. If not indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to insulation manufacturer's written instructions.
- C. Protect top surface of horizontal insulation from damage during concrete work by applying protection board.

3.5 INSTALLATION OF THERMAL INSULATION, GENERAL

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

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- B. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
 - 1. Tape joints and ruptures in vapor retarder and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- C. Install blanket insulation in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
- D. Install Cavity-Wall Insulation as follows:
 - 1. Place small dabs of adhesive spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose.
 - 2. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
 - 3. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
- E. Installation of Continuous Insulation Wall Panels
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Slip board into "Z" retainer at bottom, ensuring that free clearance is maintained at bottom of board.
 - 3. Install without gaps or voids. Do not compress insulation.
 - 4. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
 - 5. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.
 - 6. Fasten or adhere insulation as recommended by the manufacturer's Installation Guide.
 - 7. Seal joints in board insulation or vapor barrier with tape.
 - 8. Install Weather Barrier over insulation panels as specified in Section 061600.
 - 9. Continuous wall insulation is not intended to be left exposed for extended periods of time without adequate protection. If extended exposure is anticipated all exposed foam surfaces exposed to daylight should be taped with a compatible waterproof tape. When properly installed, Panels can remain uncovered up to 180 days.
 - 10. Install exterior plywood sheathing fastened into Z-furring.
 - 11. Install exterior cladding as recommended by the cladding manufacturer and as specified in other sections of this specification.

3.6 INSTALLATION OF SPRAY FOAM INSULATION

- A. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written

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instructions.

3.7 INSTALLATION OF INFILTRATION CONTROL SEALANT

- A. General: Install expanding foam sealant at all infiltration pathways not blocked by other construction. Install at locations including, but not limited to, door frames, plumbing penetrations, tops and bottoms of frame walls, tops of masonry partitions, at flutes of steel decking, at steel beam cantilevers, wiring penetrations, and similar conditions.
 - 1. Prepare and install materials according to manufacturer's recommendations.
 - 2. Do not use expanding foam sealant for conditions where firestopping is indicated or required.

3.8 INSTALLATION OF VAPOR RETARDER

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as recommended by vapor retarder manufacturer. Extend vapor retarder to cover miscellaneous voids in insulated substrates.
- B. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- C. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.
- D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- E. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.9 PROTECTION AND CLEANING

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 2100

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SECTION 07 2423 - DIRECT-APPLIED FINISH SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes Direct-Applied Finish System (DEFS) for applications including the following:
 - 1. Applications over gypsum sheathing for exterior soffits.
- B. System components for DEFS applications include the following:
 - 1. Steel framing and furring for exterior soffits.
 - 2. Weather resistive barrier.
 - 3. Finish system substrate as noted above.
 - 4. Joint treatment tape for substrate joints.
 - 5. Polymer modified portland cement basecoat.
 - 6. Decorative, integrally colored, aggregated polymeric finish coat.
- C. Related Sections include the following:
 - 1. Division 05 Section "Cold-Formed Metal Framing": Metal framing behind exterior finish systems.
 - 2. Division 06 Section "Sheathing" for Gypsum sheathing for exterior soffits.
 - 3. Division 07 Section "Joint Sealants": Sealing joints in system with elastomeric joint sealants.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide systems that comply with the following performance requirements:
 - 1. Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 - 2. Weathertightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of system and assemblies behind system, including substrates, supporting wall construction, and interior finish.

1.3 SUBMITTALS

- A. Product Data: For each component of DEFS specified.
- B. Shop Drawings: Show fabrication and installation of system including plans, elevations, sections, details of components, joint locations and configurations within system and between system and construction penetrating it, termination details, and attachments to construction behind system.
- C. Samples for Verification: 12-inch-square panels for each finish, color, texture, and pattern specified. Prepare samples using same tools and techniques intended for actual work.
 - 1. Incorporate within each sample a typical control joint filled with sealant of color indicated or selected.

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- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed systems similar in material, design, and extent to those indicated for this Project and with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics:
1. Flame Spread, Finish Coats: 25 or less per ASTM E 84.
 2. Smoke Developed, Finish Coats: 450 or less per ASTM E 84.
- C. Store materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic, and other causes.

1.5 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install system when ambient outdoor air and substrate temperatures are 40 deg F and falling unless temporary protection and heat are provided.
- B. Coordinate installation of system with related Work specified in other Sections to ensure that wall assemblies, including substrate, flashing, trim, and joint sealers, are protected against damage from the effects of weather, age, corrosion, and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. W.R. Bonsal Co.
 2. Dryvit Systems, Inc.
 3. Senergy Inc.
 4. Sto Corp.

2.2 MATERIALS

- A. Steel Soffit Framing:
1. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch-wide flange, with ASTM A 653, G60, hot-dip galvanized zinc coating; depth as needed to support impose loads, but not less than 2 inches.
 2. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653, G60, hot-dip galvanized zinc coating.
 - a. Steel Studs: ASTM C 645; minimum base metal thickness 0.0312 inch.
 - b. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep; minimum base metal thickness 0.0312 inch.

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- B. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. "Dens-Glass Gold" by G-P Gypsum Corporation.
 - b. SECUROCK Brand Glass Mat Sheathing by United States Gypsum Company.
 - c. "Weather Defense Platinum" by LaFarge North America.
 - d. "GlasRoc" by Certainteed.
 - e. Gold Bond Brand "E²XP"TM Sheathing, National Gypsum.
 - 2. Type and Thickness: As indicated, but not less than Type X, 5/8 inch thick.
- C. Fasteners for Gypsum Sheathing: Stainless steel drill screws in length recommended by sheathing manufacturer for thickness of sheathing board to be attached.
- D. Membrane Flashing: Self-sealing, self-healing, fully adhered flexible rubberized asphalt and polyethylene composite flashing; 9 inches wide by 0.030 inch thick.
- E. Spacers: Woven or fused, self-furring PVC mesh lath furring strips; DEFS manufacturer's standard or product recommended in writing by DEFS manufacturer with manufacturer's standard corrosion-resistant mechanical fasteners suitable for intended substrate.
- F. Primer: System manufacturer's standard substrate conditioner to seal substrates from moisture penetration and to improve bond between substrate and coatings.
- G. Reinforcing Fabric: Balanced, alkali-resistant open-weave glass-fiber fabric treated for compatibility with other system materials.
- H. Joint/Corner Reinforcement: Polymer-coated open mesh tape, 4 inches wide.
- I. Base Coat Materials: System manufacturer's standard mixture.
 - 1. Fiber-Reinforced Basecoat: Portland cement based, ready-to-mix formulation containing dry latex polymers and polymeric fibers.
- J. Finish Coat Materials: System manufacturer's standard acrylic finish.
 - 1. Texture: Fine.
 - 2. Colors: As selected by Architect from manufacturer's full range.
- K. Water: Clean and potable.
- L. Aluminum Trim Accessories: Manufactured from extruded aluminum with clear anodized finish.
 - 1. Reveal Moldings: Extruded aluminum moldings of types indicated.
 - a. Basis-of-Design Products: Provide the following products of Fry Reglet, for applications indicated on Drawings:
 - 1) Vented Soffit Molding, Model No. WPM-75-V-300.
 - 2) Soffit Vent, Model No. DS-75-V-300.
 - 2. Color: Selected by Architect from manufacturer's full range.

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PART 3 - EXECUTION

3.1 INSTALLING STEEL SOFFIT FRAMING

- A. Installation Tolerances: Install steel framing components for soffits and ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.
- B. Install cross bracing and framing to resist wind uplift.
- C. Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.2 GYPSUM SHEATHING INSTALLATION

- A. General: Install gypsum sheathing to comply with GA-253 and manufacturer's written instructions.
- B. Cut boards at penetrations, edges, and other obstructions of the work; fit tightly against abutting construction, except provide a 3/8-inch setback where non-load-bearing construction abuts structural elements.
- C. Coordinate sheathing installation with flashing and joint treatment installation so these materials are installed in the sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
- D. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.
- E. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.

3.3 INSTALLING DEFS

- A. Comply with manufacturer's current published instructions for installation of system for each type of substrate indicated.
- B. Apply primer over substrates where required by system manufacturer for improving adhesion or for protecting substrates from premature degradation.
- C. Apply trim accessories at perimeter of system, at expansion joints, and elsewhere, as indicated. Use casing beads at perimeter locations.
 - 1. Cover flanges of trim accessories with basecoat reinforced with mesh. Feather basecoat minimum 4 inches from edges into field of board and allow to cure before application of full basecoat.
- D. Apply base coat to exposed surfaces of substrate in minimum thickness specified by system manufacturer.
- E. Embed reinforcing fabric in wet base coat to produce wrinkle-free installation with fabric continuous or lapped at corners and lapped or otherwise treated at joints to comply with system

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manufacturer's requirements. Completely embed fabric, applying additional base coat material if necessary, so that reinforcing fabric pattern is not visible.

- F. Install expansion joints at locations indicated and as follows:
 - 1. Where expansion or control joints occur in surface of construction.
 - 2. Where system abuts dissimilar materials.
- G. Install trim accessories at locations indicated. Mechanically fasten accessories to framing members, concrete, or masonry.
- H. Trowel-apply base coat over and into reinforcing fabric in thickness specified by system manufacturer to produce a flush, uniform surface with fabric fully embedded and prepared to receive finish coat.
- I. Apply finish coat over cured base coat in thickness specified by system manufacturer to produce a uniform finish of texture and color matching approved sample.

3.4 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements of Division 07 Section "Joint Sealants" and with EIMA "Joint Sealant Specifications for Exterior Insulation and Finish Systems (EIFS) Class PB and PM."
 - 1. Clean surfaces to receive sealants to comply with indicated requirements and system manufacturer's recommendations.
 - 2. Apply primer recommended by sealant manufacturer for surfaces to be sealed.
 - 3. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
 - 4. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints without disturbing joint seal.
 - 5. Where required by system manufacturer or sealant manufacturer, apply joint sealants after base coat has cured but before applying finish coat.

3.5 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive system coatings.
- B. Provide final protection and maintain conditions in a manner that ensures system is without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 2423

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SECTION 07 2726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fluid-applied membrane air barrier, vapor permeable applied to sheathing over metal studs.
 - 2. Fluid-applied membrane air barrier, vapor permeable applied to cmu block walls underneath continuous insulation wall panels.
- B. Related Sections include the following:
 - 1. Division 01 Section "Mockups": Information on constructing Mock-up wall.
 - 2. Division 07 Section "Thermal Insulation" for expanding foam sealant for infiltration control and for vapor retarders.
 - 3. Division 07 Section "Joint Sealants" for joint-sealant materials and installation.

1.3 DEFINITIONS

- A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor- permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.5 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
- B. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
- C. Qualification Data: For Applicator.

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- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly, 150 sq. ft., incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
 - 1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
 - 2. Include junction with roofing membrane.
 - 3. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
 - 2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Store rolls according to manufacturer's written instructions.
- D. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

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PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

- A. Provide products permitted within NFPA 285 tested wall assemblies matching Project wall assemblies.
- B. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Synthetic polymer membrane.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Synthetic Polymer Membrane:
 - 1) GCP Applied Technologies, Perm-A-Barrier VP, liquid
 - 2) Henry Company; Air-Bloc 17MR (low temperature), or All Weather STPE
 - 3) Prosoco R-Guard
 - 4) Sto Corp. StoGuard
 - 5) W.R. Meadows Air-Shield LMP (Black UV Stable or Gray 6 months UV stable)
 - 2. Physical and Performance Properties:
 - a. Membrane Air Permeance: Not to exceed 0.004 cfm/ sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Membrane Vapor Permeance: Not less than 4 perms; ASTM E 96.

2.2 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Primer: Primer recommended for substrate for use with self-adhered flashing by manufacturer of air barrier material.
- C. Butyl Strip: Vapor-retarding, 19-40 mil thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing for use with EPDM or TPO membranes.
- D. Modified Bituminous Strip: Vapor-retarding, 40-mil- thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing for use with compatible roofing membranes.
- E. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.
- F. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- G. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- H. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

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- I. Joint Sealant and Mastic: Provide sealant compatible with and recommended by membrane manufacturer for type of exposure. Mastics shall be compatible with membrane and be recommended by membrane manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
 - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
 - 5. Verify that masonry veneer anchor installation is complete and all blocking is in place.
 - 6. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

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1. Prime substrate and apply a single thickness of preparation coat strip extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air barrier membrane and embed a joint reinforcing strip in preparation coat.
- B. Gypsum Sheathing: Fill joints greater than 1/8 inch with sealant according to ASTM C 1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints.

3.4 TRANSITION STRIP INSTALLATION

- A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 2. Install butyl or modified bituminous strip as appropriate, on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over both substrates.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials as indicated.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bituminous transition strip or adhesive-coated transition strip so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
 1. Modified Bituminous and Adhesive-Coated Transition Strip: Roll firmly to enhance adhesion.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, modified bituminous strip.

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- J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 AIR BARRIER MEMBRANE INSTALLATION

- A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply primer to substrates at required rate and allow to dry when required by air barrier manufacturer. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours or not covered in the same day.
- D. Apply a continuous unbroken air barrier to substrates to achieve the manufacturer's recommended minimum dry film thickness. Apply membrane in full contact around protrusions such as masonry ties.
- E. Do not cover air barrier until it has been inspected by Owner's Representative or Architect.
- F. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.
- G. When required by manufacturer, immediately install insulation over membrane air barrier according to manufacturer's instructions.

3.6 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 30 days.
 - 2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 07 2726

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SECTION 07 4213 - METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Factory-formed and field-assembled, exposed-fastener, lap-seam structural metal panels for the following applications:
 - a. Wall panels over sheathing.
 - 2. Supplemental framing and furring supporting metal wall panels.
- B. Related Sections include the following:
 - 1. Division 01 Section "Mockups": Information on constructing Mock-up wall.
 - 2. Division 05 Section "Structural Steel": Primary framing supporting rooftop equipment screen assemblies.
 - 3. Division 05 Section "Cold-Formed Metal Framing": Framing behind metal wall panels.
 - 4. Division 06 Section "Sheathing": Wall sheathing.
 - 5. Division 07 Section "Building Insulation": Blanket insulation behind structural metal wall panels.
 - 6. Division 07 Section "Metal Flashing and Trim": Flashings and other sheet metal work not part of metal wall panel assemblies.
 - 7. Division 07 Section "Joint Sealants": Field-applied sealants not otherwise specified in this Section.

1.2 DEFINITION

- A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight system.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft.
- C. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.
- D. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592, ASTM E 330 and ASTM E 72:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure as indicated on Drawings.

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2. Deflection Limits: Engineer metal wall panel assemblies to withstand test pressures with deflection no greater than 1/180 of the span and no evidence of material failure, structural distress, or permanent deformation exceeding 0.2 percent of the clear span.
 - a. Test Pressures: 150 percent of inward and outward wind-load design pressures.
 3. Substrate: In instances where metal panels are attached to a substrate which is then attached to the structure, include the substrate attachment to structure as part of analysis.
- E. Thermal Transmission: Panel assembly shall provide a K-factor of 0.117 btu/sf/hr/deg F at 40 deg F mean temperature when tested according to ASTM C 177.
- F. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 1680 at a static-air-pressure difference of 12 lbf/sq. ft.
- G. Water Penetration: No water penetration when tested according to ASTM E 1646 at a minimum static pressure of 12 lbf/sq. ft.
- H. Thermal Movements: Provide metal wall panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
1. Accessories: Include details of flashing and trim items, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
- D. Qualification Data: For Installer.
- E. Maintenance Data: For metal wall panels to include in maintenance manuals.
- F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of metal wall panel through one source from a single manufacturer.

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- C. Surface-Burning Characteristics: Provide insulated metal wall panels having insulation-core materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Spread Index: 25 or less, unless otherwise indicated.
 - 2. Smoke-Developed Index: 450 or less, unless otherwise indicated.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels including installers of doors, windows, and louvers.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 - 6. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
 - 7. Review temporary protection requirements for metal wall panel assembly during and after installation.
 - 8. Review wall panel observation and repair procedures after metal wall panel installation.
 - 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 PRODUCT HANDLING

- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal wall panels from exposure to sunlight and high humidity, except to extent necessary for period of metal wall panel installation.
- E. Protect foam-plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

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2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

- A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including rupturing, cracking, or puncturing.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:
 1. ATAS International Inc.; Belvedere Panel, SHORT RIB PANEL (BWK360).
- B. Comparable Manufacturers: Subject to compliance with requirements, provide the basis-of-design product or comparable product by one of the following:
 1. AEP-Span.
 2. Berridge Manufacturing Co.
 3. CENTRIA Architectural Systems;
 4. Merchant & Evans, Inc.
 5. Petersen Aluminum Corporation.

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2.2 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 or AZ55 coating designation, Grade 40; structural quality.
 - 3. Surface: Smooth, flat finish.
 - 4. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.
 - a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605.
 - 5. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- B. Panel Sealants:
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.3 MISCELLANEOUS METAL FRAMING

- A. Steel Sheet Components, General: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
- B. Subgirts: C- or Z-shaped sections fabricated from 0.0598-inch bare steel thickness, shop-painted, cold-formed, metallic-coated steel sheet.
- C. Zee Clips: 0.079-inch bare steel thickness, cold-formed, galvanized steel sheet.
- D. Base or Sill Angles: 0.079-inch bare steel thickness, cold-formed, galvanized steel sheet.
- E. Cold-Rolled Furring Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange.
 - 1. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
- F. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

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2.4 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.
 - 1. Fasteners for Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 METAL WALL PANELS

- A. Exposed-Fastener, Structural Metal Wall Panels: Tapered-rib-profile, exposed-fastener metal wall panels; formed with raised, trapezoidal major ribs and flat pan between major ribs.
 - 1. Material: Zinc-coated (galvanized) steel sheet, 0.0269 inch thick (22 gage).
 - a. Exterior Finish: Fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
 - 2. Major-Rib Spacing: 6 inches o.c.
 - 3. Panel Coverage: 36 inches.
 - 4. Panel Height: 1.5 inches.

2.6 ACCESSORIES

- A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- B. Flashing and Trim: Formed from 0.0179-inch-thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

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2.7 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
 - 1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
 - 2. Fabricate wall panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads.
 - 3. Reference building elevations for lap seam locations and fabricate panels in corresponding lengths.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in

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the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
 - 1. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Field cutting of metal wall panels by torch is not permitted.
 - 2. Shim or otherwise plumb substrates receiving metal wall panels.
 - 3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
 - 4. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
 - 5. Install screw fasteners in predrilled holes.
 - 6. Install flashing and trim as metal wall panel work proceeds.
 - 7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 8. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

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- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.
1. Coat back side of wall panels with bituminous coating where wall panels will contact wood, ferrous metal, or cementitious construction.
- C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- D. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment as approved by architect. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
 6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weatherproof to driving rains.
 7. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

3.4 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form

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hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet, nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 4213

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SECTION 07 5323 - EPDM ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Adhered membrane roofing system.
 - 2. Roof insulation.
 - 3. Walkway pads.
 - 4. Manufactured roof specialties including:
 - a. Roof edge terminations.
 - b. Copings.
 - c. Roof expansion assemblies.
 - 5. Pipe flashings and other roof penetration flashings.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry": Wood nailers, curbs, and blocking; and plywood roof deck panels.
 - 2. Division 07 Section "Sheet Waterproofing": Similar membranes concealed by other construction.
 - 3. Division 07 Section "Metal Flashing and Trim": Metal roof penetration flashings and base flashings.
 - 4. Division 22 Sections: Roof drains.

1.2 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Insulation fastening patterns.

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- C. Samples for Verification: For the following products:
 - 1. Roofing Membrane: 12-by-12-inch square of sheet in color specified, including T-shaped side and end lap seam.
 - 2. Insulation: 12-by-12-inch square.
 - 3. Manufactured Roof Edge and Copings: Samples of actual products not less than 12 inches long showing factory-applied finishes.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of meeting performance requirements.
- F. Qualification Data: For Installer and manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.
- H. Research/Evaluation Reports: For components of membrane roofing system.
- I. Maintenance Data: For roofing system to include in maintenance manuals.
- J. Warranties: Special warranties specified in this Section.
- K. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has FMG approval for membrane roofing system identical to that used for this Project.
- C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
 - 1. For roof moisture testing, operator of roof moisture test apparatus shall have not less than 3 years experience performing the type of inspections indicated.
- D. Source Limitations: Obtain components for membrane roofing system approved by roofing membrane manufacturer.
 - 1. Manufactured Roof Specialties: Obtain roof edge terminations, copings, and roof expansion assemblies approved by roofing membrane manufacturer and that are part of roofing system warranty.
- E. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below

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by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

- F. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:
1. Meet with Owner; Architect; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 5. Review structural loading limitations of roof deck during and after roofing.
 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 7. Review governing regulations and requirements for insurance and certificates if applicable.
 8. Review temporary protection requirements for roofing system during and after installation.
 9. Review roof observation and repair procedures after roofing installation.
- G. Roof Installation Monitoring: Arrange for roofing system manufacturer's technical representative or qualified independent inspection agency acceptable to Owner to monitor roofing installation.
1. Manufacturer's representative shall monitor roofing installation no fewer than 2 days for every 5 days of roofing activity, for not less than 2 hours per day.
 2. Manufacturer's representative shall submit report to Architect noting any deviations from project requirements or manufacturer's installation standards.

1.6 PRODUCT HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

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1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Special warranty includes roofing system from roof edge to edge including roof terminations and coping; roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover boards, substrate board, expansion assemblies, roof penetrations, walkway products, and other components of membrane roofing system.
 2. Warranty Period: 20 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof terminations and coping, roof insulation, fasteners, cover boards, substrate boards, and walkway products, for the following warranty period:
1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EPDM ROOFING MEMBRANE

- A. EPDM Roofing Membrane: ASTM D 4637, Type II, scrim or fabric internally reinforced uniform, flexible sheet made from EPDM, and as follows:
1. Basis-of-Design Product: The design for EPDM membrane roofing is based on Sure-Seal Type "A"; Carlisle SynTec Incorporated. Subject to compliance with requirements, provide the named product or comparable product by one of the following:
 - a. Holcim Elevate [formerly Firestone Building Products Company].
(www.holcimelevate.com)
 - b. GenFlex Roofing Systems.
 - c. Johns Manville International, Inc.
 - d. Versico Inc.
 2. Thickness: 60 mils nominal.
 3. Exposed Face Color: Black.

2.2 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil-thick EPDM, partially cured or cured, according to application.
- C. Bonding Adhesive: Manufacturer's standard bonding adhesive.

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- D. Seaming Material: Manufacturer's standard primer and 6-inch-wide minimum, splice tape with release film.
- E. Lap Sealant: Manufacturer's standard single-component sealant, color to match roofing membrane.
- F. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- G. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- H. Pipe Penetration Seals: Preformed, self-flashing pipe seals for roof penetrations, consisting of membrane compatible with roofing and flashing materials, with stainless steel compression clamps.
- I. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.3 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch.
 - 1. Product: Subject to compliance with requirements, provide "Dens-Deck" manufactured by Georgia-Pacific Corporation.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening substrate panel to roof deck.

2.4 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, felt or glass-fiber mat facer on both major surfaces.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.5 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

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- C. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
- D. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.
 - 1. Product: Subject to compliance with requirements, provided "Dens-Deck" manufactured by Georgia-Pacific Corporation.

2.6 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

2.7 MANUFACTURED ROOF SPECIALTIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Manufactured Coping and Gravel Stop System:
 - a. Metal-Era, or re-branded comparable product by roofing manufacturer.
 - 2. Metal-Flanged, Bellows-Type Roof Expansion Assemblies:
 - a. Conspec Systems, Inc.
 - b. Expand-O-Flash; Johns Manville Corporation.
 - c. MM Systems Corporation.
- B. General: Provide products that are manufactured by or recommended by roofing system manufacturer for applications indicated, and are compatible with roofing membrane, flashings, and other components. Provide exposed covers with factory-formed corners and terminations, finished after fabrication, and with concealed splice plates.
- C. Materials:
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality; with a minimum thickness of 0.028 inch (24 gage).
 - 2. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for use intended and finish indicated, with not less than the strength and durability of Alloy 5005-H14; with a minimum thickness of 0.040 inch.
 - a. Finish: Clear anodic finish. / Fluoropolymer.
 - 3. Fasteners: Stainless steel, nonmagnetic, of manufacturer's standard type and size for product and application indicated. Match finish of exposed heads with material being fastened.
- D. Aluminum Finishes:
 - 1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.
 - 2. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating or resin manufacturer's written instructions.
 - 3. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat

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containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 1402, Test Method 7.

- a. Color and Gloss: As selected by Architect from manufacturer's full range of colors and glosses.
- E. Roof Edge Fascia and Gravel Stop: Provide gravel stops and fascia assemblies in shapes and sizes indicated, with shop-mitered and -welded corners. Include interlocking system consisting of extruded aluminum roof edge anchor designed for attachment on vertical face and to overlay, 0.050-inch aluminum anchor clips, stainless steel spring clips, concealed splice plates, snap-on cover; fasteners, trim and other accessories indicated or required for complete installation, with no exposed fasteners.
1. Provide exposed fascia components fabricated from formed-aluminum sheet, not less than 0.050 inch thick.
 2. Roof Edge Anchor: Extruded aluminum, minimum 0.080 inch thick.
 3. Basis-of-Design Product: Anchor-Tite Gravel Stop; Metal-Era, Inc.
- F. Copings: Provide copings in shapes and sizes indicated, with shop-fabricated corners. Include interlocking system consisting of extruded aluminum roof edge anchor designed for attachment on vertical face, 0.050-inch aluminum anchor clip system, stainless steel spring clips, concealed splice plates, snap-on coping cover; fasteners, trim and other accessories indicated or required for complete installation, with no exposed fasteners.
1. Provide exposed coping components fabricated from formed-aluminum sheet, not less than 0.050 inch thick.
 2. Provide custom formed cover, sloped 3/4 inch from outside edge to roof area, with mitered and welded corners ground smooth and finished after welding to match coping system.
 3. Roof Edge Anchor: Extruded aluminum, minimum 0.080 inch thick.
 4. Basis-of-Design Product: Anchor-Tite Coping; Metal-Era, Inc.
- G. Roof Expansion Assemblies: Manufacturer's standard assemblies of sizes and types indicated, including prefabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, coatings, and other components as recommended by joint unit manufacturer for complete installation. Fabricate assemblies specifically for conditions indicated.
1. Metal-Flanged, Bellows-Type Roof Expansion Assemblies: Provide assemblies consisting of exposed polymeric sheet over foam bellows, securely anchored at both edges to 3- to 4-inch-wide sheet metal nailing flanges, either flat or angle formed to fit cant or curbs as required. Insulate bellows with closed-cell, flexible rubber or plastic foam not less than 5/16 inch thick; adhere bellows to underside of polymeric sheet.
 2. Polymeric Sheet: Manufacturer's standard, not less than 60 mils thick.
 3. Metal Flanges: One of the following:
 - a. Sheet aluminum, minimum 0.032 inch thick.
 - b. Stainless steel, minimum 0.015 inch thick.
 4. Moisture Barrier: Manufacturer's standard, flexible, continuous, polymeric moisture barrier looped under roof expansion assembly covers at locations indicated. Fill space with blanket-type, glass-fiber insulation.
 5. Fire Barrier: Provide manufacturer's standard fire barrier.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Deck."
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - 1. Fasten substrate board to top flanges of steel deck according to recommendations in FMG's "Approval Guide" for specified Windstorm Resistance Classification.

3.4 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

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- E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- F. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
- G. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Loosely butt cover boards together and fasten to roof deck.
 - 1. Mechanically Attached Systems: Install per FMG or code body guidelines for specified wind uplift resistance.

3.5 ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
- B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
- H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.
- I. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

3.6 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

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- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.7 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.8 MANUFACTURED ROOF SPECIALTY INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Coordinate with installation of roof deck and other substrates to receive work of this Section and with roofing insulation, roofing membrane, flashing, and wall construction, as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor products securely to structural substrates to withstand lateral and thermal stresses and inward and outward loading pressures.
- B. Isolation: Where metal surfaces of units contact dissimilar metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces or provide other permanent separation as recommended by aluminum producer.
- C. Install exposed sheet metal components without excessive oil canning, buckling, and tool marks.
- D. Install assemblies true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
- E. Install systems to fit substrates and to result in watertight performance.
- F. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- G. Expansion Provisions: Install running lengths to allow controlled expansion for movement of metal components in relation to one another and to adjoining dissimilar materials, including flashing and roofing membrane materials, in a manner sufficient to prevent water leakage, deformation, or damage.
 - 1. Space movement joints at not more than 10 feet apart, with no joints located within 24 inches of corner or intersection. Provide expansion joints with concealed, self-draining splice plate.

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- H. Roof Expansion Assemblies: Extend roof expansion joint assemblies over curbs, parapets, fasciae and other elements in the construction profile, with factory-fabricated transitions to provide continuous, uninterrupted, waterproof roof expansion assemblies.
1. Install factory-fabricated transitions between roof expansion joint assemblies and building expansion joint cover assemblies to provide continuous, uninterrupted, watertight construction.
 2. Splice roof expansion joint assemblies with materials provided by roof expansion assembly manufacturer for this purpose, according to manufacturer's written instructions, to provide continuous, uninterrupted, waterproof roof expansion assemblies.
 3. Provide uniform profile of expansion joint assembly throughout length of each installation; do not stretch polymeric sheets.
 4. Install mineral-fiber blanket insulation to fill joint space within joint and moisture barrier.
 5. Bed anchorage flanges in cement or sealant recommended by manufacturer and securely nail to curbs and cant strips as recommended by manufacturer, but not less than 6 inches o.c.
 6. Anchor roof expansion joint assemblies in the manner indicated, complying with manufacturer's written instructions.
 7. Install roof expansion joint assemblies in the manner indicated, complying with manufacturer's instructions. Anchor to cants or curbs and seal to membrane with sealant compatible with roofing membrane and expansion joint assembly. Cover flanges with stripping or flashing and install according to requirements of roofing system manufacturer.
 8. Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.

3.9 FIELD QUALITY CONTROL

- A. Roof Moisture Testing: Owner may engage a qualified independent testing and inspecting agency to perform roof moisture tests and to mark areas of completed roofing where moisture is indicated by testing.
1. Moisture Survey: Testing and inspecting agency will perform an infrared video inspection of entire roof area to identify moist areas.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
1. Repair components of roofing system damaged by testing and inspection procedures. Comply with requirements of roofing system manufacturer for cutting and patching roofing, and the following:
 - a. Coordinate repair work with activities of testing and inspection agency so repairs are performed on same day that roof probes or test cuts are made.
 - b. Apply supplemental roofing membrane sheet to cover area of repairs and test probes, using sheet not less than 8 inches wider than area of repair, with rounded corner.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing systems after completion of installation and repairs, and submit report to Architect.
1. Notify Architect or Owner 3 days in advance of date and time of inspection.

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3.10 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: <Insert name of Owner.>
 - 2. Address: <Insert address.>
 - 3. Building Name/Type: <Insert information.>
 - 4. Address: <Insert address.>
 - 5. Area of Work: <Insert information.>
 - 6. Acceptance Date: <Insert date.>
 - 7. Warranty Period: <Insert time.>
 - 8. Expiration Date: <Insert date.>
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period.
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 55 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

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2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <Insert day> day of <Insert month>, <Insert year>.

1. Authorized Signature: <Insert signature.>
2. Name: <Insert name.>
3. Title: <Insert title.>

END OF SECTION 07 5323

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SECTION 07 6200 - METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes sheet metal flashing and trim in the following categories:
 - 1. Manufactured reglets and counterflashing.
 - 2. Formed roof drainage systems including downspouts.
 - 3. Formed metal base flashing, roof flashing, and counterflashing.
 - 4. Miscellaneous sheet metal trim and brake metal not specified as part of other assemblies.
- B. Related Sections include the following:
 - 1. Division 01 Section "Mockups": Information on constructing Mock-up wall.
 - 2. Division 04 Section "Unit Masonry": Through-wall flashing and other integral masonry flashings specified as part of masonry work.
 - 3. Division 05 Section "Metal Fabrications": Metal downspout boots.
 - 4. Division 06 Section "Rough Carpentry": Wood nailers, curbs, and blocking; and plywood backing for sheet metal cladding.
 - 5. Division 07 Section "Metal Wall Panels": Factory-formed metal wall panels and flashing and trim not part of sheet metal flashing and trim.
 - 6. Division 07 Section "EPDM Roofing": Manufactured sheet metal roof edge components including copings and fasciae; and installing sheet metal flashing and trim integral with roofing membrane.
 - 7. Division 07 Section "Roof Specialties": Manufactured sheet metal components including gutters, downspouts, reglets and counterflashings.
 - 8. Division 07 Section "Roof Accessories": Set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
 - 9. Division 07 Section "Joint Sealants": Elastomeric sealants.
 - 10. Division 07 Section "Expansion Control": Manufactured metal expansion-joint covers.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install roof edge flashing capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - 1. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft.: 60-lbf/sq. ft. perimeter uplift force, 90-lbf/sq. ft. corner uplift force, and 30-lbf/sq. ft. outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base

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engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

- D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 1. Identify material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- C. Samples: For sheet metal flashing, trim, and accessory items, in the specified finish. Include Sample sets composed of 2 or more units showing the full range of variations expected.
 1. Sheet Metal: 8-inch-square Samples of specified sheet materials to be exposed as finished surfaces.
 2. Trim and Accessories: 12-inch-long Samples of factory-fabricated products exposed as finished Work. Provide complete with specified factory finish.
- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
 1. Copper Standard: Comply with CDA's "Copper in Architecture Handbook."
- B. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 PRODUCT HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

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- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.6 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
 - 1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 - b. Colors: As selected by Architect from manufacturer's full range.
 - c. Applications: Sheet metal fabrications exposed to view in the completed work, in locations adjacent to metal products with a factory-painted finish.
 - 2. Anodized Finish: Apply the following coil-anodized finish:
 - a. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - b. Color: Light bronze. / Medium bronze. / Dark bronze. / Black.
 - c. Applications: As follows:
 - 1) Aluminum flashing and trim not exposed to view in the completed work.
 - 2) Aluminum flashing and trim in locations adjacent to metal products with a clear anodized finish.
 - 3) Aluminum flashing and trim in locations indicated on Drawings for a clear anodized finish.
- B. Stainless-Steel Sheet: ASTM A 240, Type 304; No. 2D (dull, cold rolled) finish.
- C. Copper Sheet: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet.
- D. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

2.2 UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.
- B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

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- C. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- C. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- E. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- F. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- G. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- I. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- K. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED REGLETS AND COUNTERFLASHING

- A. Manufacturers: Subject to compliance with requirements, provide one of the following:
1. Cheney Flashing Company.
 2. Fry Reglet Corporation.
 3. Hohmann & Barnard Inc.; STF Sawtooth Flashing.
 4. Krando Metal Products; Mechanically Keyed Flashing
- B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated.

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1. Material: Stainless steel, 0.0187 inch thick.
 2. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 4. Miscellaneous Type: Provide type as indicated in details or as needed for unique conditions.
 5. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
- C. Counterflashing: Provide counterflashing fabricated from the following metal in thickness indicated:
1. Stainless steel; 0.0187 inch thick.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

2.6 SHEET METAL FABRICATIONS

- A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

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- B. Downspouts: Fabricate downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Material: Aluminum; 0.050 inch thick.
 - C. Flashing and Trim Material: Aluminum; 0.050 inch thick.
 - 1. Applications: Step flashing, drip edges, base flashing and counterflashing; and cladding applied over plywood substrate for fascia and other applications indicated.
 - 2. Finish for Flashing and Trim Exposed to View: Factory-applied colored coating, high-performance organic finish.
 - 3. Finish for Concealed Flashing: Clear anodized.
 - D. Opening Flashing in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high end dams.
 - 1. Material: Aluminum; 0.050 inch thick.
 - E. Drip Edges: Aluminum; 0.050 inch thick.
 - F. Base Flashing: As follows:
 - 1. Stainless steel, 0.0250 inch thick; for flashing in contact with concrete or masonry.
 - 2. Aluminum, 0.050 inch thick; for flashing not in contact with concrete or masonry.
 - G. Flashing Receivers: As follows:
 - 1. Stainless steel, 0.0250 inch thick; for flashing receivers in contact with concrete or masonry.
 - 2. Aluminum, 0.050 inch thick; for flashing receivers not in contact with concrete or masonry.
 - H. Roof-Drain Flashing: Lead; 4.0 lb/sq. ft., hard tempered.
 - I. Equipment Support Flashing: Stainless Steel; 0.0250 inch thick.
 - J. Roof-Penetration Flashing: Stainless Steel; 0.0250 inch thick.
 - K. Roof Expansion-Joint Cover: Stainless Steel; 0.0250 inch thick. / Aluminum; 0.050 inch thick.
 - 1. Finish: Factory-applied colored coating, high-performance organic finish.
 - 2. Color: As selected by Architect
 - L. Custom Copings: Fabricate in minimum 96-inch-long, but not exceeding 10-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Joint Style: Butt, with 12-inch-wide concealed backup plate.
 - 2. Material: Aluminum; 0.050 inch thick.
- 2.7 FINISHES, GENERAL
- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
1. Coat side of uncoated aluminum, stainless-steel and lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be

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sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
 - 1. Aluminum: Use aluminum or stainless-steel fasteners.
 - 2. Copper: Use copper or stainless-steel fasteners.
 - 3. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with butyl sealant as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.
 - 1. Do not solder aluminum sheet.
 - 2. Pretinning is not required for lead sheet.
 - 3. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
 - 4. Copper Soldering: Tin uncoated copper surfaces at edges of sheets using solder recommended for copper work.
 - 5. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.
- J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.
- K. Roof Drainage System Installation: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
 - 1. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
 - a. Provide elbows at base of downspout to direct water to collection boot.
 - b. Connect downspouts to underground drainage system indicated.
- L. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.
- M. Roof Flashing Installation: Install sheet metal roof flashing and trim to comply with performance requirements, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

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1. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - a. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 24-inch centers.
 2. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - a. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 24-inch centers.
 3. Anchor interior leg of coping with screw fasteners and washers at 24-inch centers.
 4. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant.
 - a. Secure in a waterproof manner by means of anchor and washer at 36-inch centers.
 5. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 - a. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - b. Seal with butyl sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.
- N. Wall Flashing Installation: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
1. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Unit Masonry." / "Stone Masonry."
 2. Reglets: Installation of reglets is specified in Division 03 Section "Cast-in-Place Concrete." / 04 Section "Unit Masonry."
 3. Openings Flashing in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.
- 3.3 CLEANING AND PROTECTION
- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
 - B. Clean and neutralize flux materials. Clean off excess solder and sealants.
 - C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
 - D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 6200

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SECTION 07 7200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Roof Hatches.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry": Wood nailers.
 - 2. Division 07 Section "Metal Flashing and Trim": Metal flashing and counterflashing not part of roof accessories.
 - 3. Division 07 Sections: Roofing accessories included as part of roofing Work.
 - 4. Division 09 Section "Paints and Coatings": Requirements for field painting.
 - 5. Division 23 Sections: Roof-mounted mechanical equipment and curbs.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for roof accessories with factory-applied color finishes.

1.3 QUALITY ASSURANCE

- A. Standards: Comply with the following:
 - 1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
 - 2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, ratline, leaking, or fastener disengagements due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Fabricate roof hatch units to withstand 40-lbf/sq. ft. external and 20 lbf/ sq.ft. internal loading pressure.

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PRODUCTS

1.5 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Roof Hatches:
 - a. Babcock Davis.
 - b. Bilco Company.
 - c. Nystrom Building Products.

1.6 MATERIALS, GENERAL

- A. Galvanized Steel Sheet: ASTM A 653/A 653M with G90 coating designation; commercial quality, unless otherwise indicated.
- B. Wood Nailers: Softwood lumber, not less than 1-1/2 inches thick, complying with the requirements of Division 06 Section, Rough Carpentry.
- C. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
 - 1. Where removing exterior exposed fasteners affords access to building, provide nonremovable fastener heads.
- D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- E. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.
- F. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- G. Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint surfaces; ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, G, A, and, as applicable to joint substrates indicated, O.
- H. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

1.7 ROOF HATCHES

- A. General: Fabricate units to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loading pressure. Frame with minimum 9-inch-high, integral-curb, formed cants and cap flashing (roofing counterflashing), with welded or sealed mechanical corner joints. Provide double-wall cover (lid) construction. Provide gasketing and equip with corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, interior padlock hasps, and both interior and exterior latch handles.
- B. Type: Single leaf personnel access.
 - 1. For ladder access; 36" x 36".

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- C. Material: Aluminum, sheets and extrusions.
- D. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.
 - 1. Basis of Design; Bil-Guard Hatch Railing System, model RL-E.
- E. Safety Ladder Post: Manufacturer's standard complete system including post, clamps, fasteners, and all accessories required for a complete installation.
 - 1. Basis of Design; Bilco LadderUP Safety Post, model LU-1.

1.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.9 GALVANIZED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 2 - EXECUTION

2.1 INSTALLATION

- A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of framing, roof deck, blocking, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.

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- B. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated,
- C. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.
- D. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.
- E. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.
- F. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.
- G. Heat-and-Smoke Vents: Locate, install, and test according to NFPA 204M.

2.2 CLEANING AND PROTECTION

- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 07 7200

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SECTION 07 8413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes through-penetration firestopping systems for all interruptions and penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - 1. Floors.
 - 2. Roofs.
 - 3. Walls and partitions.
- B. This Section includes fire blocking for all interruptions and penetrations through non-fire-resistance-rated floor assemblies.
- C. Related Sections include the following:
 - 1. Division 07 Section "Fire-Resistive Joint Systems."
 - 2. Division 22 and 23 Sections: Duct and piping penetrations.
 - 3. Division 25-28 Sections: Cable and conduit penetrations.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
- B. F-Rated Systems: Provide firestopping with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide firestopping with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1. Penetrations located outside wall cavities.
 - 2. Penetrations located outside fire-resistive shaft enclosures.
 - 3. Penetrations located in construction containing fire-protection-rated openings.
 - 4. Penetrating items larger than 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- D. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with ASTM E 814 or UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- E. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of zero as determined by ASTM G21.

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- F. Fire Blocking: Fill penetrations in non-fire-resistance-rated floor construction with non-combustible material tested for resistance to passage of fire, smoke and heat, as acceptable to authorities having jurisdiction and complying with **current version** IBC, Section 717.1 et.al.
 - 1. Provide fire blocking using systems rated for not less than 1 hour fire-resistance rating.
- G. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant firestopping.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide firestopping not requiring removal of insulation.
- H. For firestopping exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.3 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Engineering Judgement: Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed firestopping similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

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- B. Source Limitations: Obtain firestopping, for each kind of penetration and construction condition indicated, from a single manufacturer, and from the same manufacturer as for fire-resistive joint systems specified in Division 07 Section "Fire-Resistive Joint Systems."
 - 1. Manufacturer selection is the responsibility of the General Construction Contractor. Other Contractors shall comply with specified requirements using products of manufacturer selected by the General Construction Contractor.
- C. Fire-Test-Response Characteristics: Provide firestopping that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Firestopping systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Firestopping products correspond to those indicated by reference to through-penetration firestop system designations listed by UL in "Fire Resistance Directory."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 PRODUCT HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for firestopping to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate firestopping per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestopping.

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- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. 3M Fire Protection Products.
 - 2. Hilti, Inc.
 - 3. Nelson Firestop Products.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping that is compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.3 FILL MATERIALS FOR FIRESTOPPING SYSTEMS

- A. General: Provide firestopping containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

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- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing firestopping to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install firestopping to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated

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firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 07 8413

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SECTION 07 8446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fire-resistive joint systems for the following:
 - 1. Floor-to-floor joints.
 - 2. Floor-to-wall joints.
 - 3. Head-of-wall joints.
 - 4. Wall-to-wall joints.
- B. Related Sections include the following:
 - 1. Division 07 Section "Penetration Firestopping": Systems installed in openings in walls and floors with and without penetrating items.
 - 2. Division 07 Section "Joint Sealants": Non-fire-resistive joint sealants.
 - 3. Division 07 Section "Expansion Control": Fire-resistive joint systems consisting of metal frames and seals.

1.2 PERFORMANCE REQUIREMENTS

- A. General: For joints in the following constructions, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed:
 - 1. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
- B. Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equaling or exceeding fire-resistance rating of constructions in which joints are located, as determined by UL 2079.
- C. Fire Resistance of Perimeter Fire-Containment Systems: Integrity and insulation ratings indicated as determined by UL 2079.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed and relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.
- C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.

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- D. Qualification Data: For Installer.
- E. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire-resistive joint systems for each kind of joint and construction condition indicated through one source from a single manufacturer, and from same manufacturer as through-penetration firestop systems specified in Division 07 Section "Penetration Firestopping."
- B. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
 - a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
 - b. Fire-resistive joint systems correspond to those indicated by referencing system designations listed by UL in its "Fire Resistance Directory."

1.5 PRODUCT HANDLING

- A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

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- C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Fire-Resistive Joint Systems:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Nelson Firestop Products.
 - d. GCP Applied Technologies.
 - 2. Perimeter Fire-Containment Systems:
 - a. United States Gypsum Company.
 - b. GCP Applied Technologies.

2.2 FIRE-RESISTIVE JOINT SYSTEMS, GENERAL

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.

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2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
- B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

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3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner may engage a qualified independent inspecting agency to inspect fire-resistive joint systems and to prepare inspection reports.
 - 1. Inspecting agency will state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.
- B. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and inspecting agency has approved installed fire-resistive joint systems.
- C. If deficiencies are found, repair or replace fire-resistive joint systems so they comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 8446

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SECTION 07 9200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:
1. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between metal panels.
 - d. Joints between different materials listed above.
 - e. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - f. Control and expansion joints in ceilings and other overhead surfaces.
 - g. Other joints as indicated.
 2. Exterior joints in the following horizontal traffic surfaces:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between different materials listed above.
 - c. Other joints as indicated.
 3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile expansion, contraction and isolation joints.
 - d. Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
 - f. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - g. Joints between counters, backsplashes, and adjoining walls.
 - h. Joints between different materials, unless directed otherwise.
 - i. Other joints as indicated.
 4. Interior joints in the following horizontal traffic surfaces:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Expansion, contraction and isolation joints in tile flooring.
 - c. Joints between different materials, unless directed otherwise.
 - d. Other joints as indicated.
- B. Related Sections include the following:
1. Division 04 Section "Unit Masonry": Masonry control and expansion joint fillers and gaskets.
 2. Division 07 Section "Metal Wall Panels": Sealing joints in metal siding.
 3. Division 07 Section "Metal Flashing and Trim": Sealing joints related to flashing and sheet metal; including sealant products for concealed joints in sheet metal assemblies.
 4. Division 07 Section "Fire-Resistive Joint Systems": Sealing joints in fire-resistance-rated construction.
 5. Division 07 "Roofing" sections: Sealing joints related to roofing system installation.
 6. Division 08 Section "Glazing": Glazing sealants.

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7. Division 09 Section "Gypsum Board Assemblies": Sealing perimeter joints of gypsum board partitions to reduce sound transmission.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- G. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- H. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

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- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 2. Submit not fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 4. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 5. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:
1. Locate test joints where indicated or, if not indicated, as directed by Architect.
 2. Conduct field tests for each type of sealant and joint substrate indicated.
 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 5. Test Method: Test joint sealants by hand-pull method described below:
 - a. Install joint sealants in 60-inch-long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
 - b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
 - c. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
 6. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.5 PRODUCT HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

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- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Mechanical damage caused by individuals, tools, or other outside agents.
- D. Provide material warranties for each type of sealant as follows:
 - 1. Latex Sealants: 5 year material warranty.
 - 2. Urethane Sealants: 10 year material warranty.
 - 3. Silicone Sealants: 20 year material warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of this Section.

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2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range, unless otherwise indicated.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of this Section, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
- B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

2.4 LATEX JOINT SEALANTS

- A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of this Section.

2.5 PREFORMED JOINT SEALANTS

- A. Preformed Foam Sealant for Concealed Joints: Provide manufacturer's standard preformed, precompressed, impregnated, open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; factory produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following:
 - 1. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
 - 2. Impregnating Agent: Neoprene rubber suspended in water-based emulsion.
 - 3. Density: Manufacturer's standard.
 - 4. Backing: Pressure-sensitive adhesive, factory applied to one side with protective wrapping.
- B. Preformed Foam Sealant for Compressible Draftstopping: Provide manufacturer's standard preformed, precompressed, impregnated, open-cell foam sealant manufactured from urethane foam impregnated with a nondrying, water-based, stabilized, polymer-modified acrylic adhesive; factory produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer.
- C. Colored Preformed Foam Sealant: Provide manufacturer's standard preformed, precompressed, binary seal combining factory-applied cured silicone facing with expanding foam sealant backing; factory produced in precompressed sizes and in roll form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following:

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1. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
2. Impregnating Agent: Chemically stabilized acrylic.
3. Density: 8.4 to 9.1 lb/cu. ft.
4. Backing: Pressure-sensitive adhesive, factory applied to one side with protective wrapping.
5. Movement Capability: Plus 25 percent and minus 25 percent, 50 percent total movement.
6. Colors: As selected by Architect from manufacturer's full range.

2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 1. Type C: Closed-cell material with a surface skin.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Preparing Existing Joints: Completely remove existing sealant, backing materials and other joint fillers from joints in existing building in areas indicated. / all exterior and interior joints within Contract limits.
- B. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- D. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.

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3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
- E. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses provided for each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 1. Remove excess sealants from surfaces adjacent to joint.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, to produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant to comply with sealant manufacturer's written instructions.

3.4 CLEANING AND PROTECTION

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- B. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.5 JOINT SEALANT SCHEDULE

- A. Single-Component, Neutral-Curing Silicone Sealant:
 1. Products: Provide one of the following:
 - a. Pecora Corporation; 890NST or 890FTS.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 100/50
 4. Use Related to Exposure: NT (nontraffic).
 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated

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6. Applications: Exterior non-traffic building joints in metal trim, metal panels, metal drainage systems, and metal in glazing assemblies. Joints in DEFS assemblies.
- B. Single-Component, Neutral-Curing Silicone Sealant:
1. Products: Provide one of the following:
 - a. GE Silicones; SilPruf SCS2000 or LM SCS2700.
 - b. Pecora Corporation; 864NST.
 - c. Polymeric Systems Inc.; PSI-641.
 - d. Tremco; Spectrem 1.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 50
 4. Use Related to Exposure: NT (nontraffic).
 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 6. Applications: Exterior non-traffic building joints in metal trim, metal panels, metal roofing and drainage systems, and metal in glazing assemblies.
- C. Single-Component, Neutral-Curing Tintable Silicone Sealant:
1. Product: Provide one of the following:
 - a. Pecora 890FTS
 - b. Tremco; Spectrem 4.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 50 or better.
 4. Use Related to Exposure: NT (nontraffic).
 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 6. Applications: Joints in DEFS assemblies.
- D. Mildew-Resistant Silicone Sealant:
1. Products: Provide one of the following:
 - a. Dow Corning; 786 Mildew Resistant.
 - b. GE Silicones; Sanitary SCS1700.
 - c. NUCO Industries, Inc.; NuFlex 302.
 - d. Pecora Corporation; 898.
 - e. Tremco; Tremsil 600 White.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 50
 4. Formulation: Formulated with fungicide.
 5. Use Related to Exposure: NT (nontraffic).
 6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 7. Applications: Perimeter joints of plumbing fixtures, counters and backsplashes; and perimeter joints in ceramic tile.
- E. Multicomponent Nonsag Urethane Sealant:
1. Products: Provide one of the following:
 - a. BASF; MasterSeal NP 2.
 - b. Pecora Corporation; Dynatrol II.
 - c. {Tremco; Dymeric 240/240FC}.
 - d. {Tremco; Vulkem 922.}
 - e. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
 2. Type and Grade: M (multicomponent) and NS (nonsag).
 3. Class: Not less than 25.
 4. Use Related to Exposure: NT (nontraffic).

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5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated.
 6. Applications: Exterior joints in non-traffic surfaces not indicated for another type of joint sealant.
- F. Single Component Nonsag Silane Modified Polymer (STPU or STPE) Sealant. Provide sealants that can be painted once cured.
1. Products: Provide one of the following:
 - a. BASF;
 - b. Pecora Corporation; Dynatrol I-XL Hybrid.
 - c. Tremco;
 - d. Sika Corporation, Inc.;
 2. Type and Grade: S (single-component) and NS (nonsag).
 3. Class: 50.
 4. Use Related to Exposure: NT (nontraffic).
 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 6. Applications:
 - a. Exterior joints in non-traffic surfaces not indicated for another type of joint sealant.
 - b. Interior expansion joints in exterior wall construction where exposed to view in completed construction.
- G. Multicomponent Pourable Urethane Sealant:
1. Products: Provide one of the following:
 - a. Bostik Findley; Chem-Calk 550.
 - b. Meadows, W. R., Inc.; POURTHANE.
 - c. Pecora Corporation; Dynatrol II-SL
 2. Type and Grade: M (multicomponent) and P (pourable).
 3. Class: 25.
 4. Uses Related to Exposure: T (traffic).
 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 6. Applications: Joints in paving.
- H. Single-Component Pourable Urethane Sealant:
1. Products: Provide one of the following:
 - a. BASF; MasterSeal SL 1.
 - b. Pecora Corporation; Urexpan NR-201.
 - c. Sika Corporation, Inc.; Sikaflex - 1CSL.
 - d. Tremco; Vulkem Nova 300 SSL.
 2. Type and Grade: S (single component) and P (pourable).
 3. Class: 25.
 4. Uses Related to Exposure: T (traffic).
 5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
 6. Applications: Interior joints in walking surfaces.
- I. Clear Latex Sealant:
1. Product: Pecora Corporation; AVW-920.
 2. Color: Clear, translucent.
 3. Type and Grade: S (single component) and NS (nonsag).
 4. Class: 25.
 5. Use Related to Exposure: NT (nontraffic).

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6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 7. Applications: Interior joints between ceramic tile wall base or prefaced masonry wall base and smooth-surfaced flooring materials.
- J. Acoustic Sealant: Comply with ASTM C 834, Type P, Grade NF.
1. Products: Provide one of the following:
 - a. Pecora Corporation; AC-20 FTR.
Tremco; TREMstop - Smoke and Sound.
 2. Applications: Interior joints in acoustically rated partitions and ceilings.
- K. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.
1. Products: Provide one of the following:
 - a. Bostik Findley; Chem-Calk 600.
 - b. Pecora Corporation; AC-20+.
 - c. Tremco; Tremflex 834.
 2. Applications: Interior joints not indicated for another type of sealant.
- L. Preformed Foam Sealant:
1. Manufacturers: Provide products by one of the following:
 - a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
 - b. illbruck Sealant Systems, Inc.; Wilseal 600.
 - c. Schul International Co.; Sealtite Standard.
 - d. Erie Metal Specialties Inc., CSN Series.
 2. Applications: Exterior wall expansion joints, where concealed from view in completed construction.
- M. Preformed Foam Sealant for Compressible Draftstopping:
1. Products:
 - a. Emseal Joint Systems, Ltd.; Emseal Backerseal (Greyflex).
 - b. Schul International Co.; Sealtite B.
 - c. Erie Metal Specialties Inc., CSN Series.
 2. Applications: Secondary seal at top of masonry walls at roof edge fascia condition where indicated.
- N. Colored Preformed Foam Sealant:
1. Products: Provide one of the following:
 - a. Emseal Joint Systems, Ltd.; Emseal Colorseal.
 - b. Schul International Co.; Seismic Sealtite (vertical) Color Econoseal (horizontal)
 - c. Erie Metal Specialties Inc., CS Series non-seismic, CSS Series seismic.
 2. Applications: Exterior wall expansion joints where exposed to view in completed construction.

END OF SECTION 07 9200

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SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Steel doors.
 - 2. Steel door frames.
 - 3. Frames for interior glazed openings.
 - 4. Fire-rated door and frame assemblies.
 - 5. Fire-rated window frames.
- B. Related Sections include the following:
 - 1. Division 08 Section "Flush Wood Doors": Wood doors installed in steel frames.
 - 2. Division 08 Section "Door Hardware": Door hardware and weather stripping.
 - 3. Division 08 Section "Glazing": Glass in glazed openings, and integral steel frames for fire-rated glazing assemblies.
 - 4. Division 09 Section "Gypsum Board Assemblies": Spot-grouting frames installed in steel-framed gypsum board partitions.
 - 5. Division 09 Section "Painting and Coating": Field painting factory-primed doors and frames.

1.2 DEFINITIONS

- A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.3 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Shop Drawings: Show the following:
 - 1. Elevations of each door design.
 - 2. Details of doors including vertical and horizontal edge details.
 - 3. Frame details for each frame type including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, accessories, joints, and connections.
 - 7. Coordination of glazing frames and stops with glass and glazing requirements.
- C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

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1.4 QUALITY ASSURANCE

- A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 or UL 10C.
 - 1. Test Pressure: Test at positive pressure.
 - a. Except for 20 minutes door assemblies, after 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
 - b. For 20 minutes corridor door assemblies, comply with NFPA 252 or UL 10C without the hose stream test.
 - c. For sidelights and transoms, comply with NFPA 252 including the hose stream test.
 - 2. Smoke Doors: Where smoke doors are indicated, comply with the following in addition to requirements for fire-rated door assemblies:
 - a. UL 1784, with test conducted according to International Building Code, Section 715.3.3.
 - 3. Testing Agency Certification Labels: Provide labels for fire doors, and "S" labels for smoke doors.
 - 4. Temperature-Rise Rating: At exit enclosures in buildings without approved fire suppression systems, provide door assemblies that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.
- C. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

1.5 PRODUCT HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products; an Assa Abloy Company.
 - 2. Curries Company; an Assa Abloy Company.

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3. The Kewanee Corporation.
4. Pioneer Industries; an Assa Abloy Company.
5. Republic Doors and Frames; an Allegion Company.
6. Steelcraft; an Allegion Company.

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.
- C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.3 DOORS

- A. General: Provide doors of sizes, thicknesses, and designs indicated.
- B. Typical Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
 2. Door Face Thickness: 0.042 inch (18 gage).
- C. Interior Doors at Exit Stairs: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
 1. Level 3 and Physical Performance Level B (Extra Heavy Duty), Model 2 (Seamless).
 2. Door Face Thickness: 0.053 inch (16 gage).
- D. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
 2. Level 3 and Physical Performance Level A (Extra Heavy Duty).
 - a. Model 2 (Seamless) unless otherwise indicated.
 3. Door Face Thickness: 0.053 inch (16 gage).
- E. Vision Lite Systems: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.

2.4 FRAMES

- A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. Frames of 0.053-inch-thick (16 gage) steel sheet for:
 1. Wood doors.
 2. Interior steel doors.
- C. Frames of 0.067-inch-thick (14 gage) steel sheet for:

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1. Door openings wider than 48 inches.
 2. Exterior doors.
- D. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- E. Plaster Guards: Provide 0.016-inch-thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- F. Supports and Anchors: Fabricated from not less than 0.042-inch-thick, electrolytic zinc-coated or metallic-coated steel sheet.
- G. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.5 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch-thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- C. Interior Door Faces: Fabricate exposed faces of doors from cold-rolled steel sheet, unless otherwise indicated.
- D. Core Construction: One of the following manufacturer's standard core materials that produce a door complying with SDI standards:
1. Resin-impregnated kraft/paper honeycomb.
 2. Vertical steel stiffeners.
 3. Rigid mineral-fiber board.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.
- F. Clearances for Fire-Rated Doors: As required by NFPA 80.
- G. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- H. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- I. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

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- J. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.
 - 1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F or better.
 - K. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
 - L. Frame Construction: Fabricate frames to shape shown.
 - 1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints unless otherwise indicated.
 - 2. Fabricate knock-down, drywall slip-on frames for in-place gypsum board partitions.
 - 3. Provide welded frames with temporary spreader bars.
 - M. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
 - N. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
 - O. Glazing Stops: Manufacturer's standard, formed from 0.032-inch-thick steel sheet.
 - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass.
 - 2. Provide screw-applied, removable, glazing stops on inside of glass.
 - P. Astragals: As required by NFPA 80 to provide fire ratings indicated.
- 2.6 FINISHES
- A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 1. Place frames before construction of enclosing walls and ceilings.
 - 2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

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3. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
 4. Install fire-rated frames according to NFPA 80.
 5. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.
- C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.
1. Fire-Rated Doors: Install within clearances specified in NFPA 80.
- 3.2 ADJUSTING AND CLEANING
- A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

END OF SECTION 08 1113

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SECTION 08 1416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Solid-core doors with wood-veneer faces with transparent finish.
 - 2. Factory finishing flush wood doors for transparent finish.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. This Section includes requirements that wood products are obtained from forests certified by an FSC-accredited certification body.
- C. Related Sections include the following:
 - 1. Division 08 Section "Hollow Metal Doors and Frames": Hollow metal frames for wood doors.
 - 2. Division 08 Section "Aluminum-Framed Entrances and Storefronts": Interior storefront framing for wood doors.
 - 3. Division 08 Section "Door Hardware": Hardware for wood doors.
 - 4. Division 08 Section "Glazing": Glass view panels in flush wood doors.

1.2 SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.
- C. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
 - 1. Faces of Factory-Finished Doors: Show the full range of colors available for stained finishes.
- D. Samples for Verification:
 - 1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.
 - 2. Frames for light openings, 6 inches long, for each material, type, and finish required.
- E. Certificates of Chain-of-Custody: Signed by door manufacturers certifying that wood products were obtained from forests certified by an FSC-accredited certification body to comply with

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FSC 1.2, "Principles and Criteria." Include evidence that door manufacturer is certified for chain-of-custody by an FSC-accredited certification body.

- F. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
- C. Forest Certification: Provide doors made from wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."

1.4 PRODUCT HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
1. Warranty shall be in effect during the following period of time from date of Substantial Completion:
- a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Door Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Buell Door Company.
 2. Eggers Industries; Architectural Door Division.
 3. Graham; an Assa Abloy Group company.
 4. MarshField-Algoma.
 5. Mohawk Flush Doors, Inc.

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6. Oshkosh Architectural Door Co.
7. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Doors for Transparent Finish:
1. Grade: AWI Premium, with Grade AA faces.
 2. Species and Cut: Select white maple, plain sliced.
 3. Match between Veneer Leaves: Book match.
 4. Assembly of Veneer Leaves on Door Faces: Balance match.
 5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 6. Stiles: Applied wood-veneer edges of same species as faces and covering edges of faces.

2.3 SOLID-CORE DOORS

- A. Structural Composite Lumber Cores: Comply with the following requirements:
1. Structural Composite Lumber: WDMA I.S. 10
 - a. Screw withdrawal Face: 700 lbf.
 - b. Screw withdrawal Edge: 400 lbf.
- B. Interior Veneer-Faced Doors:
1. Core: Structural Composite Lumber.
 2. Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering. Veneer shall be hot-pressed to core assembly.
- C. Particleboard Cores: Comply with the following requirements:
1. Particleboard: ANSI A208.1, Grade LD-2.
 2. Provide doors with structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.
- D. Interior Veneer-Faced Doors:
1. Core: Particleboard.

2.4 FABRICATION

- A. Factory Fitted Doors: Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing.
- B. Finish doors at factory.

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- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: Manufacturer's standard finish with performance comparable to AWI System TR-4 conversion varnish.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Sheen: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 1416

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SECTION 08 3113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SUMMARY

- A. The terms "access door" and "access panel" are synonymous, and apply to doors ranging in size from 6 inches x 6 inches to 48 inches x 48 inches, to be installed in walls, floors, and ceilings to permit operation and maintenance of devices concealed by such construction and otherwise inaccessible.
- B. Furnish access doors in sizes and locations:
 - 1. Indicated.
 - 2. Required for access to mechanical and electrical equipment requiring access and not otherwise accessible.
 - 3. Subject to qualifications set forth in this section.
- C. Mechanical equipment items requiring access include the following:
 - 1. Valves, dampers and other control devices.
 - 2. Fans and other motor-operated equipment.
- D. Electrical equipment items requiring access include the following:
 - 1. Motors control devices
 - 2. Junction boxes.
- E. Furnish inserts and anchoring devices which must be built into other work for installation of access doors.
- F. Division of Responsibilities:
 - 1. General Construction Contractor:
 - a. Provide all access doors as shown on reflected ceiling plans.
 - b. Install all access doors furnished by Plumbing, Fire Protection, HVAC, and Electrical Contractors.
 - 2. Plumbing, Fire Protection, HVAC, and Electrical Contractors: Furnish all access doors not shown on drawings to the General Construction Contractor for installation for access to items as described in Paragraph 1.02.C & D of this Section, and in the applicable Divisions of the Contractors scope of work.
- G. Related Sections:
 - 1. Division 23 - Access Doors in ductwork.
- H. Product Furnished but not Installed under this Section.
 - 1. Installation of access doors in masonry and drywall surfaces, respectively, is specified in Divisions 04 and 09, to comply with the requirements of this section.

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1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of access door assembly and anchorage devices, including setting drawings and templates.
- B. Compliance: If not included in product data, submit evidence that assemblies comply with required fire ratings.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Wherever a fire-resistance classification is required, furnish access door assemblies including doors, frames, and hardware from manufacturer listed in Underwriters Laboratories, Inc.; "Classified Building Materials Index" for rating required, with UL Label on each unit.
- B. Coordinate with mechanical and electrical work for final sizes and locations of access doors. Verify such coordination by shop drawings as specified in Article: Submittals.

1.5 REGULATORY REQUIREMENTS

- A. Comply with the applicable provisions of codes and standards as acceptable by local, state, and federal jurisdictions.

1.6 REFERENCED STANDARDS

- A. Underwriters Laboratories, Inc.:
 - 1. Classified Building Materials Index.

1.7 PRODUCT HANDLING:

- A. Deliver products to project site in accordance with installation schedule, wrapped and packaged to protect against damage.
- B. Store and handle to protect products against any corrosion or physical damage.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer subject to compliance with requirements specified:
 - 1. Bar-Co., Inc.
 - 2. Bilco
 - 3. Cesco Products
 - 4. J.L. Industries
 - 5. Karp Associates, Inc.
 - 6. Larsen's Manufacturing Co.
 - 7. Milcor, Inc.
 - 8. Nystrom, Inc.
 - 9. Substitution: No Substitution Allowed.

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2.2 MATERIALS AND FABRICATION

A. General:

1. Furnish each access door assembly manufactured as an integral unit, complete with parts and ready for installation.
2. Fabricate assemblies of continuous welded construction. Grind welds smooth and flush with adjacent surfaces.
3. Furnish attachment devices and fasteners of type required to secure access panels to each type of support.

B. Materials:

1. Fabricate doors and frames from steel, except fabricate from stainless steel in toilet rooms, shower rooms, washer/dryer rooms and other high humidity areas.
2. Gages as specified.
3. Finish steel components with factory-applied prime paint.
 - a. Stainless steel components: No. 4 Satin Finish.

C. Frames: 16-gage except as otherwise specified.

1. Fabricate frame with exposed flange nominally 1 inch wide around perimeter of frame for units to be installed in exposed masonry.
2. For gypsum drywall and for plaster on gypsum lath, furnish perforated frames with drywall bead.
3. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.

D. Doors:

1. Flush Panel Doors for CMU walls: Not less than 16-gage, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees.
2. Recessed Access Doors and Trimless Frames for gypsum wallboard partitions and ceilings: Fabricated from steel sheet.
3. Ceiling Access Doors: In plaster or drywall ceilings opening into conditioned air plenums or return air plenums, furnish with gaskets to control passage of air and sound.

E. Locking Devices:

1. For access doors in Mechanical and Electrical spaces, furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.
2. For other access doors, provide one cylinder lock per access door. Furnish 2 keys per lock and key locks alike, unless otherwise scheduled.
3. For doors which automatically close and latch, provide inside latch release.

PART 3 - EXECUTION

2.3 INSTALLATION

- A. Installation is specified in Substrate Sections to comply with the requirements of this section.
- B. Comply with manufacturer's installation instructions.
- C. Confirm final locations as correct for access to concealed work.

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- D. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- E. Install with no distortion of frames.
- F. Verify that access doors operate properly before installation of adjacent work.

2.4 INSPECTION AND ADJUSTMENT

- A. Inspect, as part of the work of this section, initial installation of each type of access door, to confirm correct procedures.
- B. Adjust hardware and panels after installation for proper operation.
- C. If assemblies cannot be adjusted to operate properly, repair or replace components with manufacturing defects, submit written report of deficiencies apparently due to installation.

END OF SECTION 08 3113

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SECTION 08 3613 - SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Doors - glazed aluminum sectional overhead doors and foam insulation core.
 - 2. Tracks configured for lift clearance type.
 - 3. Motor operators and control devices.
- B. Related Sections include the following:
 - 1. Division 16 Sections: Electrical service and connections for powered operators, and for disconnect switches, circuit breakers and accessories.

1.2 DEFINITIONS

- A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - 1. Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
- B. Operation-Cycle Requirements: Design sectional overhead door components and operator to operate for not less than 10,000 cycles. Verify weight of doors and capability of motor operator and size accordingly.
- C. Air Infiltration: Provide sectional overhead doors rated for 0.08 cfm at 15 mph, and 0.13 cfm at 25 mph.
- D. Thermal Performance: Provide sectional overhead doors that are rated as follows:
 - 1. R-Value: 3.43
 - 2. U-Value: 0.28

1.4 SUBMITTALS

- A. Product Data: For each type and size of sectional overhead door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - 1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - 2. Summary of forces and loads on walls and jambs.

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3. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
 - B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 1. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.
 - C. Samples for Initial Selection: For units with factory-applied color finishes.
 - D. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 1. Frame: 6-inch length.
 2. Panel: 6 inches square.
 - E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- 1.5 QUALITY ASSURANCE
- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the sectional overhead door manufacturer for both installation and maintenance of units required for this Project.
 - B. Manufacturer Qualifications: Engage a firm experienced in manufacturing sectional overhead doors similar to those indicated for this Project and with a record of successful in-service performance.
 - C. Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer.
 1. Obtain operators and controls from the sectional overhead door manufacturer.
 - D. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: 521 Series Thermacore Glazed Aluminum Overhead Sectional Doors; Overhead Door Corporation, Dallas TX, (800) 887-3667.
- B. Comparable Manufacturers: Subject to compliance with requirements, products by one of the following will be considered upon submission to Architect:

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1. Clopay Building Products Co.
2. Fimble Door Corporation.
3. Raynor Garage Doors.
4. Roll-Lite Door Corp.; Div. of Clopay Building Products Co.
5. Wayne-Dalton Corp.
6. Windsor Door; A United Dominion Company.

2.2 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

- A. Door Assembly: Stile and rail assembly secured with 1/4 inch (6 mm) diameter through rods.
1. Panel Thickness: 1-3/4 inches (44 mm).
 2. Center Stile Width: 2-11/16 inches (68 mm)
 3. End Stile Width: 3-5/16 inches (84 mm)
 4. Intermediate Rail Pair Width: 3-11/16 inches (94 mm).
 5. Top Rail Width:
 - a. 3-3/4 inches (95 mm).
 6. Bottom Rail Width:
 - a. 4-1/2 inches (114 mm).
 7. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.
 8. Stiles and Rails: 6063 - T6 aluminum.
 9. Springs:
 - a. 10,000 cycles.
 10. Glazing:
 - a. 1/2 inch (12.5 mm) Tempered Insulating Low-E glass.
- B. Finish and Color:
1. Finish/Color - custom powder coat color for (3) doors as selected by Architect.
 2. Finish/Color - as selected by Architect from manufacturer's standard offering for (2) doors.
- C. Wind Load design: Design as calculated in accordance with applicable code as follows:
1. Design pressure of 20 lb/sq ft.
- D. Insulation: Manufacturer's standard CFC-free polyurethane-foam-type thermal insulation, foamed in place to completely fill inner core of section, pressure bonded to face sheets to prevent delamination under wind load and with maximum flame-spread and smoke-developed indices of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely, with no exposed insulation material evident.
- E. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints, and free of warp, twist, and deformation.

2.3 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Provide manufacturer's standard, lift clearance track (to specified height), galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653, for minimum G60 zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track at 2 inches o.c. for door-drop safety device. Slope tracks at proper angle from vertical or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

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- B. Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members, complying with ASTM A 36 and ASTM A 123. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
- C. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.
- D. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and at top of overhead door.
 - 1. Provide motor-operated doors with combination bottom weatherseal and sensor edge.
 - 2. In addition, provide continuous flexible seals at door jambs for a weathertight installation.

2.4 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Provide heavy-duty galvanized steel hinges, of not less than 0.0747-inch-thick uncoated steel, at each end stile and at each intermediate stile, per manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges, where required, for doors exceeding 16 feet in width, unless otherwise recommended by door manufacturer.
- C. Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide case-hardened steel roller tires of 3-inch-diameter for 3-inch track, 2-inch-diameter for 2-inch track.
- D. Push-up Operation: Lift handles and pull rope for raising and lowering doors, operating with a maximum 25-lbf lift or pull.
 - 1. Push/Pull Handles: Provide galvanized steel lifting handles on each side of door.
- E. Provide safety interlock switch to disengage power supply when door is locked.

2.5 COUNTERBALANCING MECHANISM

- A. Torsion Spring: Operation by torsion-spring counterbalance mechanism consisting of adjustable-tension torsion springs, fabricated from oil-tempered-steel wire complying with ASTM A 229, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for 10,000 cycles minimum.
- B. Cable Drums: Provide cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide 1 additional midpoint bracket for shafts up to 16 feet long and 2 additional brackets at one-third points to support shafts more than 16 feet long, unless closer spacing is recommended by door manufacturer.

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- C. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side, designed to automatically stop door if either cable breaks.
- D. Bracket: Provide anchor support bracket, as required to connect stationary end of spring to the wall, to level shaft and prevent sag.
- E. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.6 ELECTRIC DOOR OPERATORS

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operational life specified, complete with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Industrial Duty Operator – LiftMaster MAXUM JDC Operator, with slow start, slow stop DC motor with overload protection and battery backup for emergency operation.
- B. Comply with NFPA 70, and UL325/2010 requirements for continuous monitoring of safety devices.
- C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.
- F. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or considering service factor.
 - 1. Type: Polyphase, medium-induction type.
 - 2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 3. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
 - 4. Provide totally enclosed, nonventilated or fan-cooled motors, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.
- G. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- H. Remote Controls: Provide (8) commercial operator transmitters from same manufacturer that is compatible with door operator.

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- I. Antenna Extender Kit: Provide (4) 041A3504 Antenna Extender Replacement Kit.
 - 1. Locate where directed by Owner.
- J. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Sensor Edge: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Provide pneumatically actuated automatic bottom bar.
 - 2. Monitored Photo Eye System.
- K. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall and overhead areas, including opening framing and blocking, with Installer present, for compliance with requirements for installation tolerances, clearances, and other conditions affecting performance of Work of this Section.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
- B. Fasten vertical track assembly to framing at not less than 24 inches o.c. Hang horizontal track from structural overhead framing with angle or channel hangers welded and bolt fastened in place. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.3 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.4 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
 - 3. Review data in the maintenance manuals. Refer to applicable Division 1 Sections.

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4. Schedule training with Owner with at least 7 days advance notice.

END OF SECTION 08360

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SECTION 08 4113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Exterior aluminum stile and rail glazed entrance doors.
 - 2. Frames for entrances.
 - 3. Storefront-type framing system for exterior glazed openings, including the following:
 - a. Fixed glass.
- B. Related sections include the following:
 - 1. Division 07 Section "Joint Sealants": Joint sealants installed as part of storefront systems.
 - 2. Division 08 Section "Aluminum Windows": Operable ventilators installed in storefront framing systems.
 - 3. Division 08 Section "Door Hardware": Lock cylinders for entrances and other hardware not specified in this Section.
 - 4. Division 08 Section "Glazing": Glass and glazing for storefront systems.

1.2 SYSTEM DESCRIPTION

- A. General: Provide aluminum-framed storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
 - 1. Air infiltration and water penetration exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. Glazing: Physically and thermally isolate glazing from framing members.
- C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.
- D. Wind Loads: Provide aluminum-framed storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent. Determine wind loads by calculations based on load criteria indicated on Drawings.
 - 1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
 - 2. Static-Pressure Test Performance: Provide aluminum-framed storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
 - a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
 - b. Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.

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- E. Dead Loads: Provide aluminum-framed storefront system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
 - 1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
 - 2. Provide a minimum 1/16-inch clearance between members and operable windows and doors.
 - F. Live Loads: Provide aluminum-framed storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
 - G. Air Infiltration: Provide aluminum-framed storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.
 - H. Water Penetration: Provide aluminum-framed storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:
 - 1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
 - I. Thermal Movements: Provide aluminum-framed storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 - J. Structural-Support Movement: Provide aluminum-framed storefront systems that accommodate structural movements including, but not limited to, sway and deflection.
 - K. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.
 - L. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.1.
 - M. Dimensional Tolerances: Provide aluminum-framed storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.
- 1.3 SUBMITTALS
- A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

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- B. Shop Drawings: For aluminum-framed storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
 - 1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.
- C. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- E. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of aluminum-framed storefront systems with requirements based on comprehensive testing of current systems.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing aluminum-framed storefront systems similar to those required for this Project and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Prepare data for aluminum-framed storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Source Limitations: Obtain each type of aluminum-framed storefront system through one source from a single manufacturer.
- C. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

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- B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of aluminum-framed storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures including, but not limited to, excessive deflection.
 - 2. Failure of system to meet performance requirements.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Failure of operating components to function normally.
 - 5. Water leakage through fixed glazing and frame areas.
 - 6. Warranty Period: 2 years from date of Substantial Completion.
- C. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Provide the products specified below, by Kawneer Company, Inc.
 - 1. Exterior Storefront System: Trifab Versaglaze 451T Framing System.
 - 2. Stile and Rail Aluminum Doors: Kawneer 500 Swing Doors.
- B. Comparable Manufacturers: Subject to compliance with requirements, provide the specified products or comparable products by the following:
 - 1. Storefront Framing System: EFCO 960
 - 2. Stile and Rail Aluminum Doors: EFCO D500

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Bars, Rods, and Wire: ASTM B 211.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10.
- B. Steel Reinforcement: Complying with ASTM A 36 for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 for hot-rolled sheet and strip.
- C. Glazing as specified in Division 08 Section "Glazing."
- D. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

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- E. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.
- F. Secondary Sealant: For use as weatherseal, compatible with structural silicone sealant and other system components with which it comes in contact, and that accommodates a 50 percent increase or decrease in joint width at the time of application when measured according to ASTM C 719.
 - 1. Color: Black.
 - 2. Use neutral-cure silicone sealant with insulating-glass units.
- G. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- H. Sealants and joint fillers for joints at perimeter of aluminum-framed storefront systems as specified in Division 07 Section "Joint Sealants."
- I. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 COMPONENTS

- A. Framing Systems: Provide primary storefront framing member sizes as follows, with types corresponding to designations on Drawings:
 - 1. Exterior Storefront System (SF-1): Kawneer Encore Framing 1 3/4 x 4 1/2 inches.
- B. Stile and Rail Doors: Provide manufacturer's standard 1-3/4-inch-thick glazed doors with minimum 0.125-inch-thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
 - 1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
 - 2. Door Design: As indicated on Drawings.
 - 3. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
- C. Subframes and Sills: Provide subframes and sills with anchors for frame units as shown, of profile and dimensions indicated but not less than 0.062-inch-thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match frames.
- D. Trim and Closures: Provide trim, cover plates and other closures, for both exterior and interior conditions as shown, matching storefront framing, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of frame units due to thermal expansion and building deflections.
 - 1. Include cladding for structural members supporting sunscreen assemblies adjacent to storefront systems.
- E. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

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- F. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Reinforce members as required to retain fastener threads.
 - 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
- G. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
- H. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
- I. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
 - 1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.

2.4 HARDWARE

- A. Hardware: As specified in Division 08 Section "Door Hardware."
 - 1. Coordinate with specified products.

2.5 FABRICATION

- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
 - 1. Fabricate components for screw-spline frame construction.
- B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
- C. Prepare components to receive concealed fasteners and anchor and connection devices.
- D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."
 - 1. Provide glazing stops to accommodate stained glass panels furnished by Owner in locations indicated.
- G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

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- H. Framing System: Fabricate framing in profiles indicated for flush glazing (without projecting stops).
 - 1. Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system, to withstand imposed loads, and to maintain indicated width and depth of primary frame members.
 - 2. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- I. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
 - 1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.

2.6 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. Class I, Clear Anodic Finish: AA-M10C21A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611 Class1.
- E. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - 1. Color: [Medium bronze] [Dark bronze].

2.7 STEEL PRIMING

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
- B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.
- C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of aluminum-framed storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing aluminum-framed storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 07 Section "Joint Sealants."
- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
 - 1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
- G. Install glazing to comply with requirements of Division 08 Section "Glazing," unless otherwise indicated.
- H. Install secondary-sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.
- I. Install perimeter sealant to comply with requirements of Division 07 Section "Joint Sealants," unless otherwise indicated.
 - 1. Provide neat, uniform sealant joints with bead formed by edges of framing members. Remove excess sealant which overlaps onto adjacent face of framing members during application of sealants.
- J. Erection Tolerances: Install aluminum-framed storefront systems to comply with the following maximum tolerances:

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1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing indicated.
- B. Hose Stream Test: After completing the installation of test areas indicated, test storefront system for water penetration according to AAMA 501.2 requirements.
 1. Perform tests on two locations for each different storefront condition.
 2. Continue testing until obtaining two consecutive passing results for each different storefront condition.
- C. Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

3.4 ADJUSTING AND PROTECTION

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure aluminum-framed storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 4113

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SECTION 08 5113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of aluminum-framed windows:
 - 1. Projected ventilators in storefront framing.
- B. Related Sections include the following:
 - 1. Division 07 Section "Joint Sealants": Sealing window perimeter joints.
 - 2. Division 08 Section "Aluminum-Framed Entrances and Storefronts": Aluminum-framed entrance and storefront systems.
 - 3. Division 08 Section "Glazing": Glass and glazing for aluminum windows.

1.2 DEFINITIONS

- A. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.
- B. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.
- C. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:
 - 1. Minimum size required by AAMA/NWWDA 101/I.S.2.
- B. AAMA/NWWDA Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.
- C. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/NWWDA 101/I.S.2, Air Infiltration Test.
 - 1. Maximum Rate: 0.6 cfm/sq. ft. of area at an inward test pressure of 6.24 lbf/sq. ft.
- D. Water Resistance: No water leakage as defined in AAMA/NWWDA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/NWWDA 101/I.S.2, Water Resistance Test.
 - 1. Test Pressure: 15 percent of positive design pressure, but not less than 2.86 lbf/sq. ft. or more than 12 lbf/sq. ft.

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- E. Condensation-Resistance Factor: Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.
- F. Thermal Movements: Provide aluminum windows, including anchorage, that accommodate thermal movements of units resulting from the following maximum change (range) in ambient and surface temperatures without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Flashing and drainage details.
 - 4. Weather-stripping details.
 - 5. Thermal-break details.
 - 6. Glazing details.
- C. Samples for Verification for products other than the Basis-of-Design: For aluminum window components required, prepared on Samples of size indicated below.
 - 1. Main Framing Member: 12-inch-long, full-size sections of extrusions with specified finish.
 - 2. Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.
- D. Qualification Data: For Installer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each type, grade, and size of aluminum window. Test results based on use of down-sized test units will not be accepted.
- F. Maintenance Data: For operating hardware, weatherstripping, and finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

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- D. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.
- E. Mockups: Coordinate mockup to incorporate into exterior wall mockup.
 - 1. Build mockups as part of the exterior wall mockup specified in Division 01 Section.
 - 2. Mockup to show all window system components and interface with wall system.
 - a. Project out window not required as part of mockup.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Failure to meet performance requirements.
 - 2. Structural failures including excessive deflection.
 - 3. Water leakage, air infiltration, or condensation.
 - 4. Faulty operation of movable sash and hardware.
 - 5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 6. Insulating glass failure.
- B. Warranty Period: 2 years from date of Substantial Completion.
- C. Warranty Period for Metal Finishes: 5 years from date of Substantial Completion.
- D. Warranty Period for Glass: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for aluminum windows is based on Glassvent, project-out windows for storefront framing; Kawneer Company, Inc. Subject to compliance with requirements, provide the specified product or one of the following comparable products:
 - 1. Oldcastle; Signature Series 2750.
 - 2. EFCO Corp.; No. 510 I, Flush Face.

2.2 MATERIALS, GENERAL

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than 0.062-inch thickness at any location for the main frame and sash members.

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- B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
 - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when aluminum window is closed.
- F. Replaceable Weather Seals: Comply with AAMA 701/702.
- G. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 GLAZING

- A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

2.4 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide extruded, cast, or wrought aluminum or nonmagnetic stainless steel.
- B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- C. Four-Bar Friction Hinges: Comply with AAMA 904.
 - 1. Locking mechanism and handles for manual operation.
 - 2. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

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- D. Limit Devices: Provide limit devices designed to restrict ventilator opening. Limit clear opening to dimension selected by Architect; with custodial key release.
- E. Projected Windows: Provide the following operating hardware:
 - 1. Hinge: Concealed fourbar friction hinge with adjustable-slide friction shoe; two per ventilator.
 - 2. Lock: Cam-action, sweep lock handle with strike.
 - a. Provide two locks per ventilator where recommended by manufacturer for window size.
 - 3. Limit Device: Concealed limit device; located on jamb of each ventilator.

2.5 INSECT SCREENS

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on inside of window and provide for each operable exterior sash or ventilator.
 - 1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Architectural C-24 class.
 - 2. Hinged Screens: Provide fully-operable, top-hinged screens or full-width wicket at each operable window unit, with full-width finger pull. Wickets located within screens are not acceptable.
- B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
 - 1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
 - 2. Finish: Match aluminum window members.
- C. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch-diameter, coated aluminum wire.
 - 1. Wire-Fabric Finish: Charcoal gray.

2.6 FABRICATION

- A. General: Fabricate aluminum windows, in sizes indicated, that comply with requirements and that meet or exceed AAMA/NWWDA 101/IS.2 performance requirements for the following window type and performance class. Include a complete system for assembling components and anchoring windows.
 - 1. Projected Windows: P-HC70.
- B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- C. Fabricate window frames with unequal legs to permit installation in glazing channel of storefront, and to minimize frame and sash sight lines.
- D. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
 - 1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.

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2. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
 3. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash.
- E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.
- F. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- G. Subframes and Sills: Provide subframes and sills with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch-thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.
- H. Trim and Closures: Provide trim, cover plates and other closures, for both exterior and interior conditions as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated.
- I. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/NWWDA 101/1S.2.
- J. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
1. Provide glazing stops to accommodate stained glass panels furnished by Owner in locations indicated.
- 2.7 FINISHES
- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other conditions affecting performance of work.
1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

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2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- E. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/1.S.2.

3.3 FIELD QUALITY CONTROL

- A. Conduct hose stream test as specified in Division 08 Section "Aluminum-Framed Entrances and Storefronts."

3.4 ADJUSTING AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.
- C. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- D. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
- E. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08 5113

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SECTION 08 7100 – DOOR HARDWARE

PART 1 - GENERAL

- 1.1 The work of this Section consists of the furnishing of all materials, accessories, incidentals and the like necessary and/or required for the complete execution of finished hardware and related work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
- A. All hardware items in connection with hollow metal doors and frames, aluminum door and frames.
 - B. All hardware items in connection with wood doors set in hollow metal or custom fabricated wood frames as scheduled.
 - C. Check after installation and certify as to proper installation and operating condition.
 - D. Furnish all necessary screws, special screws, bolts, special bolts, expansion shields and all other items not specifically mentioned but necessary and required to make a complete job in all respects.
 - E. Design of all fastenings shall harmonize with the hardware as to material and finish.
 - F. NOTES: All hardware will conform to governing codes and ADA guidelines.
 - 1. Finishing Hardware shall include but not be limited to:
 - 2. Hinges and pivots.
 - 3. Bored and/or mortise lock and latch sets
 - 4. Mortise Deadbolts
 - 5. Exit Devices
 - 6. Trim and Plates
 - 7. Closers
 - 8. Overhead Stops, Holders and Limit Arms
 - 9. Door Stops and Bumpers
 - 10. Manual and Automatic Flush Bolts and Strikes Surface
 - 11. Bolts
 - 12. Door Coordinators
 - 13. Silencers
 - 14. Thresholds
 - 15. Weatherstripping
 - 16. Door Interviewers
 - 17. Key Cabinets
 - 18. Alarm Devices
 - 19. Control Monitors
 - 20. Electrified Hardware Items, Controls and Power Supplies
 - G. Provide all finish hardware as necessary for complete operation or all doors and other items, with proper type screws and accessories for attachment of each item.
 - H. Hardware finishes shall conform to Building Hardware Manufacturers Association (BHMA) finish standards or to U.S. standards listed.

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1.2 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification with specific reference to:

NOTE - This section does not cover items generally known as rough hardware nor items of finish hardware when noted elsewhere in the specifications as being furnished or included with unit items by other suppliers or contractors as well as the following.

Hardware required to be furnished under other sections of the Specifications shall not be included in the hardware required under this Section. The Contractor shall thoroughly familiarize himself with the hardware requirements of the other Sections, so that no duplication will occur.

- A. Conduit and wiring for electrical connections and security systems.
- B. Demolition
- C. Rough Carpentry
- D. Finish Carpentry
- E. Hollow Metal Work
- F. Wood Doors
- G. Access Doors
- H. Toilet Accessories

1.3 QUALITY ASSURANCE

- A. Conform to all applicable codes. Provide all throws, projections, coatings, knurling, opening, and closing forces, and other special functions required by State and Local Building Codes, and all applicable Handicap Codes and conformance to ADA requirements.
- B. For fire rated openings, provide hardware complying with NFPA 80 and NFPA 101 without exception. Provide only hardware tested and listed by UL for the type and size of door installed and fire resistance rating required.
- C. Further, furnish all products to comply with the State Building Code and handicapped codes and regulations. This specification notwithstanding the Drawings, local, state, or jurisdictional authority shall take precedence. Any change required to meet such codes or authority shall be made by this Contractor and shall be a part of this work.
- D. All hardware shall be of the best quality in construction, design, and finish, and free from defects and shall be of the proper kind for its required use and shall fit its intended location perfectly. Should any hardware, as specified, fail to meet the intended requirements, or require any modification to suit the intended location, this matter or any other advance information shall be brought to the attention of the Architect in ample time to avoid delay in manufacture and delivery of the hardware. Any defective pieces shall be replaced by the Contractor at his own expense.

Hardware in all spaces shall be a type which will always permit the door to be opened from the inside without direct manipulation of any locking device.

Qualification of Supplier:

- 1. A recognized supplier of architectural finish hardware with warehousing facilities, who has been furnishing hardware in the vicinity of the project for not less than five years, and who is, or who employs, an architectural hardware consultant.

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2. Qualifications of Architectural Hardware Consultant (AHC): Certified by the Door and Hardware Institute.

1.4 SUBMITTALS

- A. Schedules: Submit to the Architect six (6) copies of the complete hardware schedule within fourteen (14) days after the receipt of contract award. Submit therewith complete catalog cuts and descriptive data of all products specifically scheduled therein. No materials shall be ordered or templates issued until the hardware schedule has been approved by the Architect. The form and detail of hardware schedules shall be in vertical format in conformance to the Door and hardware Industry standards.
- B. All hardware sets shall be clearly cross-referenced to the hardware group numbers listed in this specification.
- C. Samples: If required, submit to the Architect for approval, a complete line of samples as directed. Samples shall be plainly marked, giving hardware number used in this Specification, project site to be stored. Samples will remain with the Architect until delivery of all hardware to the project is complete, after which time they will be turned over to the General Contractor for incorporation into the work.
- D. Keying System Submission: Before cylinders are ordered, submit a complete proposed keying system for approval.
- E. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.
- F. Electric /Electronic Hardware submittals shall consist of:
1. Wiring Diagrams: Provide complete wiring diagrams for each opening requiring electrified hardware, except openings where only magnetic hold-opens are specified.
 2. Provide a copy with each hardware schedule submitted after approval. Supply a copy with delivery of hardware to jobsite and another copy to owner at time of job completion.
- G. List all electrical components by opening in the hardware submittals.
- H. Operational Descriptions: Provide complete operational descriptions of electronic components listed by opening in the hardware submittals.
- I. Operations descriptions to detail how each electrical component functions within the opening incorporating all conditions of ingress and egress. Provide a copy with each hardware schedule submitted for approval. Supply another copy with delivery of hardware to jobsite. Provide required copies of "closeout" as specified in Section 01700.
- J. Elevation Drawings: Provide elevation drawings of electronic hardware and systems identifying locations of the system components with respect to their placement in the door opening. Provide a copy with each hardware schedule submitted for approval. Supply another copy with delivery of hardware to jobsite. Provide required copies for "closeout" as specified in Section 01700.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. NOTE: Coordinate with Article 3.03 herein

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1. Delivery of hardware shall be made to the project by the Hardware Supplier in accordance with the instructions of the General Contractor. Package all hardware shipped to the jobsite in biodegradable packs such as paper or cardboard boxes and wrapping. Should non-biodegradable packing such as plastic, plastic bags or large amounts of Styrofoam be utilized, then the General Contractor will be responsible for the disposal of the non-biodegradable packing to a licensed or authorized collector for recycling of the non-biodegradable packing.
2. The General Contractor shall provide adequate locked storage space with shelving for the hardware, shall be responsible for all items of hardware after receipt from the Supplier, and shall replace all hardware lost or damaged after delivery and receipt.
3. The General Contractor shall furnish the Hardware Supplier with receipts for all hardware and accessory items received and shall send copies of these receipts to the Architect, if requested.

1.6 EXTENDED GUARANTEE/WARRANTY: Door closers, 25 years.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The "Schedule of Hardware", as shown on the drawings or hereinafter included, is assumed to be complete. However, the omission or any item or items shall not relieve the Contractor from furnishing of same. Locks and other devices shall be furnished for all openings as called for in the "Schedule".
- B. The "Schedule" is not intended to mention every particular item of hardware required but is intended to establish type and quality for the locations and types of openings where hardware will be applied. Items not specifically mentioned shall be supplied in quality and type equal to similar work included in the "Schedule". Doors without set numbers shall be supplied with hardware of comparable type.
- C. Hardware sets are used to indicate the desired function and operation of doors. All modifications in hardware required by reason of the construction characteristics shall be such as to provide the specified operation of functional features, subject to approval of the Architect.
- D. Specified numbers of certain manufacturers have been cited herein to simplify description and to establish a standard of quality.

2.2 TEMPLATES

- A. The hardware supplier shall immediately, but not later than three (3) days after approval of the Schedule by the Architect, furnish the General Contractor with complete template information necessary for fabrication of doors, frames, etc. No templates shall be furnished prior to the approval of the Hardware Schedule.

2.3 HARDWARE FOR LABELED FIRE DOORS, EXIT DOORS AND SMOKE DOORS

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- A. Hardware shall conform to requirements of NFPA 80 for labeled fire doors and NFPA 101 for exit doors, as well as to other requirements specified. Labeling and listing of UL Building Materials Directory, for class of door being used will be accepted as evidence of conformance to these requirements. Install minimum latch throw as specified on label of individual doors.
- B. Provide hardware listed by UL except where heavier materials, large sizes, or better grades are specified herein. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements. Specific hardware requirements of door and frame manufacturers which exceed sizes and weights of hardware listed herein shall be provided with no additional charge.

2.4 KEYS AND KEYING

- A. All Locks/Cylinders shall be Grandmaster keyed and Master keyed in groups as directed by Owner/Architect at the Factory furnishing said hardware.
- B. Cylinders: 6 or 7 pin design, fixed or removable core as specified, complying with performance requirements of ANSI A 156.5. All keys are made of nickel silver only.
- C. Contractor is responsible for installing permanent cores for removable core systems unless owner instructs otherwise.
- D. After receipt of an approved Hardware Schedule and prior to ordering any locking devices, hardware supplier shall arrange through the General Contractor for a meeting with the Architect and/or Owner to discuss keying arrangements for this project. A Keying Layout Schedule shall be submitted for review within ten (10) days after such meeting.
- E. Keys - Material, nickel silver only; Size bow, Standard. All keys shall be identified by BOW STAMPING BOTH KEYS AND CYLINDER.

Key quantity as follows:

- 6 – Grand Master
- 6 – Master Keys, each selection
- 2 – Control keys (Removable core systems)
- 10 – Construction Master Keys
- 2 – Change Keys per Cylinder
- 5% of total key requirements in blanks

- 1. Supply a bitting list for all change keys and master keys to the Owner.
- 2. All Grand Master, Master and change keys shall be delivered to the owner and/or Owner's representative via registered mail.

2.5 FASTENERS

- A. Manufacture hardware to conform to published templates, generally prepared for machine screw installation.
 - 1. Furnish screws, expansion shields, toggle bolts and other anchorage devices required

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for proper and code compliant installation, with each hardware item. Provide Phillips flat head screws except as otherwise indicated. Finish exposed screws to match the hardware finish, or if exposed in surfaces of other work, to match the finish of such other work as closely as possible, except as otherwise indicated.

2. Provide concealed fasteners for hardware units which are exposed when the door is closed, except to the extent no standard manufactured units of the type specified are available with concealed fasteners. It is this supplier's responsibility to provide proper fasteners at mineral core doors, where special blocking is provided in mineral core doors, confirm with Architect if through bolts are required.
3. All closers and exit devices on labeled wood doors shall be thru bolted if required by the door manufacturer.
4. All thresholds shall be fastened with machine screws and anchors.
5. All hardware shall be installed only with fasteners supplied by manufacturers of specific products.
6. NOTE: If required by intended use, fasteners shall be "security" type.

2.6 PACKING AND MARKING

- A. All hardware shall have the required screws, bolts, and fastenings necessary for proper installation and shall be wrapped in the same package as the hardware item with which to be used.
- B. Each package shall be clearly labeled indicating the portion of the work for which it is intended.

2.7 FINISH HARDWARE DESCRIPTION

- A. Hardware items shall conform to respective specifications and standards and to requirements specified herein.
- B. Materials and Finish: Materials and finishes shall be as herein listed, unless specifically listed otherwise in hardware groups:
 1. Exterior Butts: Linear hinges, cap to be in power coat finish in color as selected by the Architect.
 2. Interior butts:
 - a. 626 & 630 for interior doors
 - b. 626 & 630 for exterior doors.
 - c. Door Closers: Sprayed to match hardware finish or plated.
 - d. Exit Devices: 630 base metal standards with manufacturer of exit device.
 - e. Kick, Push and Armor Plates: Metal 630
 - f. Door Pulls/Push- Pull Bar Sets: 630

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- g. All other hardware shall be: 626 service / 626 for public spaces.
- 3. Stops: Furnish at all doors. Wherever an opened door, or any item of hardware thereon, strikes a wall at 90 degrees, or within the maximum range of opening, provide wall bumpers, unless otherwise dictated by conditions.
- 4. NOTE: Overhead stop shall be used on doors where floor stops, or wall stops cannot be used or could cause a hazardous condition as well as at doors that swing into the center of the room and/or because of furniture or equipment layouts that permit the door to lay at the wall at 180 degrees.
- 5. Key Cabinet
 - a. Furnish one Aristocrat wall key cabinet as manufactured by Telkee Inc. or approved equal. The cabinet shall be complete with all hooks, tags, index cards, and other accessories for a complete Dual System.
 - b. Cabinet size sufficient to accommodate all lock keys related to this Contract, based on two keys per lock, with allowance for expansion of not less than 50%.

PART 3 – EXECUTION

3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation.
- B. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION OF HARDWARE

- A. Install hardware following manufacturer's instructions. Except as indicated or specified otherwise. Use fasteners furnished with hardware to fasten hardware in place. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Use machine screws set in expansions shields for fastening hardware to solid concrete and masonry surfaces. Use toggle bolts where required for fastening to hollow core construction. Use through bolts where indicated or specified and where necessary for satisfactory installation.

3.3 RESPONSIBILITY

- A. The Contractor will be responsible for all hardware after the delivery to him until final completion and acceptance of the building.
- B. Hardware supplier shall be responsible for:
 - 1. Coordinating hardware with material to which it is applied.
 - 2. Coordinating his material with other trades.
 - 3. Obtaining shop drawings for materials to which hardware is applied.
 - 4. Checking shop drawings and furnishing templates to other suppliers or Subcontractors requiring same.
- C. The strikes for all latch and dead lock units shall be furnished with wrought boxes to match the finish specified.

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- D. Painted parts of closers exposed to weather shall be finished with a rust inhibitive paint.
- E. All wrapping furnished by the manufacturer on knobs, handles and pulls shall be replaced upon the hardware as soon as it is installed and shall remain thereon until the completion of construction.

3.4 SHIPPING AND IDENTIFICATION

- A. Ship all hardware with proper fastenings for secure application to intended substrate.
- B. Each package of hardware shall be legibly marked indicating the part of the work for which it is intended. Markings shall correspond with the item numbers shown on the approved Hardware Schedule.
- C. Keys shall be tagged within each package set and plainly marked on the face of the envelope with the Key Control number, door designation and all identification as necessary.

3.5 HARDWARE SCHEDULE FOLLOWS

**LIST OF
MANUFACTURERS**

<u>ITEM</u>	<u>SPECIFIED MANUFACTURER</u>	<u>APPROVED SUBSTITUTION</u>
Hinges	McKinney	Stanley, Ives
Continuous Hinges	ABH	Stanley, Pemko, Ives
Locksets, Cylinders,	Sargent	Best, Schlage
Removable Cores	Sargent	Best, Schlage
Exit Devices	Sargent	Precision, Von Duprin
Closers	Norton	Sargent, LCN, Stanley
Overhead Stops	ABH	Rixson, Glynn Johnson
Push, Pulls, Kick Plates, Stops	Rockwood	Ives, Trimco
Gaskets, Seals, Thresholds, Weatherstrip	Pemko	Zero, Reese

NOTE: Use only manufacturers specified or listed acceptable. No others will be accepted unless prior approved by the architect. Any manufacturer submitted without prior approval will be rejected.

END OF SECTION 08 7100

Hardware Set 1

Doors: 100A, 202

Door pull thru bolts with device chassis, bolts are concealed under chassis cover.

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Weatherstrip by aluminum frame supplier.

Each to receive:

1	EA	Continuous Hinge	A110HD C x Dr. Hgt.	AH
1	EA	Rim Exit Device	60 8804 Less Pull US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Electric Strike	9400 630	HS
1	EA	Door Pull	BF159 x 7 5/16" CTC US32D	RO
1	EA	Surface Closer	CPS7500 689	NO
1	EA	Bracket	6890 689	NO
1	EA	Blade Stop	6891 689	NO
1	EA	Threshold	2005AT x Opening width MSES25SS	PE

Hardware Set 2

Doors: 106B, S2

Door pull thru bolts with device chassis, bolts are concealed under chassis cover.

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Each to receive:

1	EA	Continuous Hinge	A110HD C x Dr. Hgt.	AH
1	EA	Rim Exit Device	60 8804 Less Pull US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Electric Strike	9600 630	HS
1	EA	Door Pull	BF159 x 7 5/16" CTC US32D	RO
1	EA	Surface Closer	CPS7500 689	NO
1	EA	Kick Plate	K1050 10" x 2" LDW US32D BEV CSK	RO
1	EA	Threshold	2005AT x Opening width MSES25SS	PE
1	EA	Gasketing Head & Jambs	S773BL	PE

Hardware Set 3

Doors: 100E

Door pull thru bolts with device chassis, bolts are concealed under chassis cover.

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Weatherstrip by aluminum frame supplier.

Each to receive:

1	EA	Continuous Hinge	A110HD C x Dr. Hgt.	AH
1	EA	Rim Exit Device	60 8804 Less Pull US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Electric Strike	9400 630	HS
1	EA	Door Pull	BF159 x 7 5/16" CTC US32D	RO
1	EA	Surface Closer	CPS7500 689	NO
1	EA	Bracket	6890 689	NO
1	EA	Blade Stop	6891 689	NO
1	EA	Threshold	2005AT x Opening width MSES25SS	PE

Hardware Set 4

Doors: S1, S3

Each to receive:

3	EA	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2" US26D	MK
1	EA	Rim Exit Device	12 8815 ETP US32D	SA
1	EA	Surface Closer	7500 (PR as req'd) 689	NO
1	EA	Kick Plate	K1050 10" x 2" LDW US32D BEV CSK	RO
1	EA	Door Stop	409/442 as req'd US26D	RO
1	EA	Gasketing Head & Jambs	S88BL	PE

Hardware Set 5

Doors: 101, 102, 103, 209

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Each to receive:

3	EA	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2" US26D	MK
1	EA	Storeroom/Closet Lock	60 8204 LNP US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Electric Strike	4500C 630	HS
1	EA	Surface Closer	CLP7500 689	NO
3	EA	Silencer	608-RKW	RO

Hardware Set 6

Doors: 108, 200, 208

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Each to receive:

3	EA	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2" US26D	MK
1	EA	Storeroom/Closet Lock	60 8204 LNP US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Electric Strike	4500C 630	HS
1	EA	Surface Closer	7500 (PR as req'd) 689	NO
1	EA	Door Stop	409/442 as req'd US26D	RO
3	EA	Silencer	608-RKW	RO

Hardware Set 7

Doors: 104, 105, 204, 205, 206, 207

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Each to receive:

3	EA	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2" US26D	MK
1	EA	Storeroom/Closet Lock	60 8204 LNP US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Electric Strike	4500C 630	HS
1	EA	Surface Closer	7500 (PR as req'd) 689	NO
1	EA	Kick Plate	K1050 10" x 2" LDW US32D BEV CSK	RO
1	EA	Door Stop	409/442 as req'd US26D	RO
1	EA	Gasketing Head & Jambs	S88BL	PE

Hardware Set 8

Doors: 109

Closer at active door, overhead stop at inactive.

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Each to receive:

6	EA	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4-1/2" US32D	MK
2	EA	Flush Bolt	555 US26D	RO
1	EA	Storeroom/Closet Lock	60 8204 LNP US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Surface Overhead Holder/Stop	9000 Series US32D	AH
1	EA	Surface Closer	CPS7500T 689	NO
1	EA	Threshold	2005AT x Opening width MSES25SS	PE
1	EA	Gasketing Head & Jambs	S773BL	PE
1	EA	Astragal	355CS x Dr. Hgt.	PE

Hardware Set 9

Doors: 110

Electric Strike released by card reader.

Card reader, door position switch, request to exit switch and 24v power by security systems supplier.

Each to receive:

3	EA	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4-1/2" US32D	MK
1	EA	Storeroom/Closet Lock	60 8204 LNP US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Surface Closer	CPS7500T 689	NO
1	EA	Threshold	2005AT x Opening width MSES25SS	PE
1	EA	Gasketing Head & Jambs	S773BL	PE

Hardware Set 10

Doors: 106A, 107, 201

Each to receive:

3	EA	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2" US26D	MK
1	EA	Classroom Lock	60 8237 LNP US32D	SA
1	EA	Core	6300 US15 MK	SA
1	EA	Surface Closer	7500 (PR as req'd) 689	NO
1	EA	Kick Plate	K1050 10" x 2" LDW US32D BEV CSK	RO
1	EA	Door Stop	409/442 as req'd US26D	RO
3	EA	Silencer	608-RKW	RO

Hardware Set 11

Doors: T1, T2, T4, T5

Each to receive:

3	EA	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2" US26D	MK
1	EA	Privacy Lock	V20 8265 LNP US32D	SA
1	EA	Surface Closer	7500 (PR as req'd) 689	NO
1	EA	Kick Plate	K1050 10" x 2" LDW US32D BEV CSK	RO
1	EA	Mop Plate	K1050 4" x 1" LDW US32D BEV CSK	RO
1	EA	Door Stop	409/442 as req'd US26D	RO
3	EA	Silencer	608-RKW	RO

Hardware Set 12

Doors: T3

Each to receive:

3	EA	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2" US26D	MK
1	EA	Privacy Lock	V20 8265 LNP US32D	SA
1	EA	Surface Closer	2800ST 689	NO
1	EA	Kick Plate	K1050 10" x 2" LDW US32D BEV CSK	RO
1	EA	Mop Plate	K1050 4" x 1" LDW US32D BEV CSK	RO
1	EA	Door Stop	409/442 as req'd US26D	RO
3	EA	Silencer	608-RKW	RO

Hardware Set 13

Doors: 203

Each to receive:

6	EA	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2" US26D	MK
2	EA	Flush Bolt	555 US26D	RO
1	EA	Storeroom/Closet Lock	60 8204 LNP US32D	SA
2	EA	Surface Overhead Holder/Stop	9000 Series US32D	AH
2	EA	Silencer	608-RKW	RO

Hardware Set 14

Doors:

Construction cores for contractors use.

Each to receive:

12	EA	Construction Core	6300 x KA US15	SA
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SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Doors.
 - 3. Glazed entrances.
 - 4. Interior borrowed lites.
 - 5. Storefront framing.
- B. Related Sections include the following:
 - 1. Division 08 Section "Mirrors."

1.3 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
- F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

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1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - b. Specified Design Snow Loads: As indicated, but not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads."
 - c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less .
 - d. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.
 - 2) For insulating glass.
 - 3) For laminated-glass lites.
 - e. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 - f. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 - 2. For laminated-glass lites, properties are based on products of construction indicated.
 - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).

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- b. Solar Heat Gain Coefficient: NFRC 200.
- c. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
 - 1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
- D. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- F. Product Test Reports: For each of the following types of glazing products:
 - 1. Coated float glass.
 - 2. Insulating glass.
 - 3. Glazing gaskets.
- G. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type:
 - 1. Clear float glass: Obtain clear float glass from one primary glass manufacturer.
 - 2. Tinted float Glass: Obtain tinted, heat-absorbing, and light-reducing float glass from one primary glass manufacturer for each tint color indicated.
 - 3. Laminated glass: Obtain laminated glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.
- C. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.

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- D. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
 - E. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Glass Testing Agency Qualifications: An independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
 - F. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
 - G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 for Category II materials.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
 - H. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: [GANA Laminated Division's "Laminated Glass Design Guide" and JGANA's "Glazing Manual."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 - 3. IGM Publication for Sloped Glazing: IGM TB-3001, "Sloped Glazing Guidelines."
 - 4. IGM Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
 - I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
 - 1. Insulating Glass Certification Council.
 - 2. Associated Laboratories, Inc.
 - J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

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1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.9 WARRANTY

- A. General Warranty: Special warranties specified in the Article shall not deprive Owner of other rights Owner may have under other provision of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Manufacture.
- C. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: Five years from date of Manufacture.
- D. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Manufacture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Product: Subject to compliance with requirements, provide product specified.
2. Basis-of-Design Product: The design for each glazing product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

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2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 3. For uncoated glass, comply with requirements for Condition A.
 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- C. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified.
- D. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.
- E. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:
1. Interlayer: Polyvinyl butyral or cured resin of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - a. For polyvinyl butyral interlayers, laminate lites in autoclave with heat plus pressure.
 - b. For cured-resin interlayers, laminate lites with laminated-glass manufacturer's standard cast-in-place and cured-transparent-resin interlayer.
 2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.
- F. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 4. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Polyisobutylene and silicone.
 5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Aluminum with black, color anodic finish.
 - b. Desiccant: Molecular sieve or silica gel, or blend of both.
 - c. Corner Construction: Fabricate spacer from a single piece, bent and mitered at corners.
- G. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified.

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- a. Basis of Design: Vitro Architectural Glass; Sungate 500 or approved equivalent product by manufacturers identified in this Specifications.

2.3 FIRE-RATED GLAZING PRODUCTS

- A. Laminated Glass with Intumescent Interlayers: Proprietary Category II safety glazing product in the form of multiple lites of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Kind FT (fully tempered) float glass laminated with intumescent interlayers; and as follows:
 - 1. Fire-Protection Rating: 60 minutes and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Basis of Design Product: Subject to compliance with requirements, "PyroStop" by Pilkington Building Products North America and distributed by Technical Glass Products or a comparable product by one of the following:
 - a. "SuperLite II XL." by SAFTIFIRST.
 - b. AGC InterEdge Technologies., ; Pyrobel.

2.4 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - 1. EPDM, ASTM C 864.
 - 2. Thermoplastic polyolefin rubber, ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
 - 1. EPDM.
 - 2. Thermoplastic polyolefin rubber.

2.5 GLAZING SEALANTS

- A. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

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1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.9 MONOLITHIC FLOAT-GLASS UNITS

- A. Uncoated Clear Float-Glass Units **MG-1**: Class 1 (clear) Kind FT (fully tempered) float glass.
 1. Thickness: 6.0 mm.

2.10 LAMINATED-GLASS UNITS

- A. Fire-Rated Heat-Treated Laminated-Glass Units; **LG-1**:
 1. Basis-of-Design Product: PyroStop by Pilkington Building Products North America and distributed by Technical Glass Products or a comparable product by one of the following:
 - a. SuperLite II XL by SafliFirst.
 2. Kind LT, consisting of two lites of fully tempered float glass.
 3. Outer Lite: Class 1 (clear float glass).
 - a. Kind FT (fully tempered).
 - b. Thickness: 3.0 mm.
 4. Inner Lite: Class 1 (clear) float glass.
 - a. Kind FT (fully tempered).
 - b. Thickness: 3.0 mm.
 5. Intumescent Interlayer:

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- a. Thickness: not less than that required to comply as a Type II safety glass material and fire rating.
- b. Interlayer Color: Clear.
6. Fire-Protection Rating: 60 minutes, with permanent labeling.

2.11 INSULATING-GLASS UNITS

A. Solar-Control Low-E Insulating-Glass Units **IG-1:**

1. Basis-of-Design Product: Vitro Architectural Glass; Solarban 60 Solar Control Low-E. or a comparable product by one of the following:
 - a. AGC Glass North America; Energy Select 40.
 - b. Guardian Industries, Inc.; Sun-Guard SuperNeutral-68.
2. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm .
3. Interspace Content: Air.
4. Outdoor Lite: Class 1 (clear) float glass.
 - a. Annealed .
5. Indoor Lite: Class 1 (clear) float glass.
 - a. Annealed.
6. Low-E Coating: Sputtered on second surface.
7. Visible Light Transmittance: 68-70 percent.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.28 maximum.
10. Solar Heat Gain Coefficient: 0.38 maximum.
11. Outdoor Visible Reflectance: 0.11 percent maximum.
12. Shading Coefficient: 0.44

B. Solar-Control Low-E Insulating-Glass Units **IG-2:**

1. Basis-of-Design Product: Vitro Architectural Glass; Solarban 60 Solar Control Low-E. or a comparable product by one of the following:
 - a. AGC Glass North America; Energy Select 40.
 - b. Guardian Industries, Inc.; Sun-Guard SuperNeutral-68.
2. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm .
3. Interspace Content: Air.
4. Outdoor Lite: Class 1 (clear) float glass.
 - a. Kind FT (fully tempered).
5. Indoor Lite: Class 1 (clear) float glass.
 - a. Kind FT (fully tempered).
6. Low-E Coating: Sputtered on second surface.
7. Visible Light Transmittance: 68-70 percent.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.28 maximum.
10. Solar Heat Gain Coefficient: 0.38 maximum.
11. Outdoor Visible Reflectance: 0.11 percent maximum.
12. Shading Coefficient: 0.44

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:

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1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

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3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

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- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

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SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum wallboard, including abuse-resistant gypsum board.
 - 2. Tile backing panels.
 - 3. Non-load-bearing steel framing for gypsum board assemblies up to 12 feet in height.
 - 4. Special corner finishing units for gypsum board assemblies, designed to bond structurally with gypsum panels to prevent cracks.
 - 5. Sound attenuation blankets and acoustical sealant for gypsum board assemblies.
 - 6. Installation of access panels in gypsum board assemblies.
- B. Related Sections include the following:
 - 1. Division 05 Section "Cold-Formed Metal Framing": Steel framing for exterior walls, roofs and other conditions, and for raised interior platforms; furring along bottom of roof trusses; and gypsum sheathing.
 - 2. Division 05 Section "Cold-Formed Metal Framing" for interior partitions exceeding 12 feet in height.
 - 3. Division 06 Section "Rough Carpentry": Wood blocking for support of wall-mounted items; and gypsum wallboard used as underlayment for interior raised platform construction.
 - 4. Division 06 Section "Gypsum Sheathing": Installations over steel framing.
 - 5. Division 07 Section "Direct-Applied Exterior Finish Systems": Framing and furring for exterior soffits and ceilings; and cement board and gypsum sheathing installed with DEFS.
 - 6. Division 07 Section "Firestopping": Firestopping.
 - 7. Division 07 Section "Fire-Resistive Joint Systems": Fire-resistance-rated joint sealants.
 - 8. Division 09 Section "Shaft Wall Assemblies": Framing, gypsum panels, and other components forming shaft wall assemblies.

1.2 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide non-load-bearing gypsum board wall and partition assemblies capable of withstanding uniform load of 5 lbf/sq. ft. over entire wall for heights of partitions indicated without failing.
 - 1. Deflection Limit: L/360, unless otherwise indicated; L/600 for gypsum board assemblies with ceramic tile facing.
 - 2. Provide framing member size, thickness and spacing, and supplemental bracing as necessary to comply with manufacturer's published recommendations for conditions of installation and performance requirements.

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1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.
- C. Samples: For the following products:
 - 1. Trim Accessories: Full-size sample in 12-inch-long length for each trim accessory indicated.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."
- B. Gypsum Board Finish Mockups: Before finishing gypsum board assemblies, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Simulate finished lighting conditions for review of mockups.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.
- C. Protect cold-formed framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice".

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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1. Steel Framing and Furring:
 - a. California Expanded Metal Products Company (CEMCO).
 - b. ClarkDietrich Building Systems.
 - c. Marino\WARE.
2. Gypsum Board and Related Products:
 - a. G-P Gypsum Corp.
 - b. National Gypsum Company.
 - c. United States Gypsum Co.
 - d. CertainTeed Gypsum; Saint-Gobain
3. Special Corner Finishing Units:
 - a. No-Coat; Manufactured by CertainTeed.

2.2 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Contractor's Option: Use framing or grid suspension system as specified in this Article.
- B. Components, General: Comply with AISI S220 and ASTM C 645 for conditions indicated.
- C. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
- D. Hangers: Wire hangers; ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base steel thickness of 0.0538 inch, a minimum 1/2-inch-wide flange, with ASTM A 653, G40, hot-dip galvanized zinc coating; depth as needed to support imposed loads, but not less than the following:
 1. Overhead Structural Support Spacing up to 4 Feet: 1-1/2 inches.
 2. Overhead Structural Support Spacing Between 4 Feet and 6 Feet: 2-1/2 inches.
 3. Overhead Structural Support Spacing Between 6 Feet and up to 10 Feet: 4 inches.
- F. Furring Channels (Furring Members): Commercial-steel sheet having a coating with equivalent corrosion resistance complying with ASTM A 653, G40, hot-dip galvanized zinc coating.
 1. Steel Studs: AISI S220 and ASTM C 645; minimum base metal thickness 0.0179 inch.
 2. Depth: 3-5/8 inches unless otherwise indicated.
- G. Grid Suspension System for Interior Ceilings: AISI S220 and ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; Drywall Grid System.
 - c. USG Drywall Grid.
 2. Supplemental Supports: In locations where building structural elements supporting ceiling suspension systems are spaced more than 48 inches o.c. and where obstructions or other conditions prevent support of ceiling suspension systems at 48 inches o.c. or less, provide cold-formed metal framing to support ceiling systems to comply with specified standards, with depth of supplemental framing members not less than the following:
 - a. Overhead Structural Support Spacing up to 4 Feet: 1-1/2 inches.
 - b. Overhead Structural Support Spacing Between 4 Feet and 6 Feet: 2-1/2 inches.
 - c. Overhead Structural Support Spacing Between 6 Feet and 10 Feet: 4 inches.

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2.3 STEEL PARTITION AND SOFFIT FRAMING

- A. Components, General: As follows:
1. Comply with AISI S220 and ASTM C 645 for conditions indicated.
 2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and having a coating with equivalent corrosion resistance complying with ASTM A 653, G40, hot-dip galvanized zinc coating. [EQ coatings conforming to AISI S220, Section 10 that have ICC-ES Evaluation Reports are acceptable.] A40 galvanized products are not acceptable.
 - a. Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authority having jurisdiction.
- B. Steel Studs and Runners: AISI S220 and ASTM C 645; depth 3-5/8 inches unless otherwise indicated; thickness as follows:
1. 0.0296 inch unless otherwise indicated or required by referenced standards to support indicated loads within maximum deflections specified.
 2. 0.0296 inch for the following applications:
 - a. For studs supporting wall-mounted items.
 - b. For studs in partitions that are not braced or secured at top.
 - c. At fire door frames.
 - d. Wherever abuse-resistant or impact-resistant wallboard is indicated.
 - e. Where indicated.
 3. Equivalent Gauge “EQ” steel studs and runners:
 - a. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems, ProSTUD/ProTRAK products, or a comparable product from one of the members of the SFIA.
 - b. Minimum base-steel thickness: 0.0190 inch (20 EQ) 70ksi.
 - c. “EQ” (Equivalent Gauge Thickness) steel studs and runners: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement.
- C. Proprietary Deflection Track: Steel sheet top runner manufactured to prevent cracking of gypsum board applied to interior partitions resulting from deflection of structure above; in thickness indicated for studs and in width to accommodate depth of studs.
1. Product: Subject to compliance with requirements, provide one of the following:
 - a. ClarkDietrich Building Systems; MaxTrak slotted deflection track.
 - b. The Steel Network; VertiClip SLD.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated or needed for supported items; minimum base metal thickness 0.0312 inch.
- E. Hat-Shaped, Rigid Furring Channels: AISI S220 and ASTM C 645.
1. Minimum Base Metal Thickness: 0.0179 inch.
 2. Depth: 7/8 inch unless otherwise indicated.
- F. Resilient Furring Channels: ½ inch deep, steel sheet members designed to reduce sound transmission.
1. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Resilient Channel RC Deluxe (RCSL), or approved equal.

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- G. Headers and Jambs: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, or web depths indicated, unpunched, with stiffened flanges and as follows:
 - 1. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems: Heavy Duty Studs or approved equal.
- H. Backing Plate: Proprietary fire-resistance-treated blocking and bracing in width indicated.
 - 1. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Danback Fire-Treated Wood Backing Plate D16F, or approved equal.
- I. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.4 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Gypsum Wallboard (GWB): ASTM C 1396.
 - 1. Type: Type X.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered.
 - 4. Mold and mildew resistance: ASTM D3273
 - 5. Location: Where abuse-resistant is not specified, unless otherwise indicated.
- C. Abuse-Resistant Gypsum Wallboard (ARW): ASTM C 1629/C 1629M.
 - 1. Core: 5/8 inch, Type X.
 - 2. Mold and mildew resistance: ASTM D3273
 - 3. Surface Abrasion: Meets or exceeds Level 3 requirements.
 - 4. Surface Indentation: Meets or exceeds Level 1 requirements.
 - 5. Single-Drop Soft-Body Impact: Meets or exceeds Level 2 requirements.
 - 6. Long Edges: Tapered.
 - 7. Locations: Typical for gypsum board walls, from floor to 96 inches above floor.

2.5 TILE BACKING PANELS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178.
 - 1. Product: Dens-Shield Tile Backer; G-P Gypsum Corp.
 - 2. Core: 5/8 inch, Type X.
- C. Cementitious Backer Units: ANSI A118.9.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Wonderboard.
 - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - c. United States Gypsum Co.; DUROCK Cement Board.
 - 2. Thickness: 5/8 inch.

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2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc, except as otherwise indicated.
 - 2. Shapes:
 - a. Cornerbead: Use at outside corners, unless otherwise indicated.
 - b. Expansion (Control) Joint: Use where needed – coordinate locations with Architect.
- B. Self-Masking Trim: PVC edge moldings with removable protective strip.
 - 1. Use at exposed panel edges where gypsum board abuts other materials.
 - 2. Manufacturers: Subject to compliance with requirements, provide products one of the following:
 - a. Fast Mask S-100; Flannery Inc.
 - b. Peel Away Angle; A-Z Bogart Inc.
 - c. Ceiling Trim No. 22 Vinyl Tech; Plastic Components Inc.
- C. Special Corner Finishing Units: Paper-surfaced, pre-formed units with tapered, high-strength plastic membrane forming rigid corner unit with inner surface and paper flap that bond permanently with gypsum board with joint compound.
 - 1. Product: ULTRACORNER; No-Coat.
 - 2. Locations: At Contractor's option, special corner finishing units may be used at exterior corners in gypsum board walls instead of metal corner beads.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape: Paper, unless otherwise indicated.
 - 1. Joint Tape for Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels: As recommended by manufacturer.
- E. Joint Treatment for GRG Fabrications: Provide materials complying with ASTM C 475 and with the recommendations of the manufacturers of both glass-fiber reinforced gypsum fabrications and joint treatment materials for each application indicated.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

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- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Isolation Strip at Exterior Walls: Asphalt-saturated organic felt; ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
- E. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- F. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
 - b. Pecora Corp.; AIS-919.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
- G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

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3.3 INSTALLING STEEL FRAMING, GENERAL

- A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
 - 1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
 - 2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
 - a. Use proprietary deflection track except as otherwise indicated.
- D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

3.4 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Suspend ceiling hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
 - 3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
 - 4. Secure hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 6. Do not attach hangers to steel deck tabs.
 - 7. Do not attach hangers to steel roof deck or to bridging for roof joists or floor joists. Attach hangers to structural members.
 - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.

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- C. Sway-brace suspended steel framing with hangers used for support.
- D. Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.
- E. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards.
 - 1. Hangers: 48 inches o.c.
 - 2. Carrying Channels (Main Runners): 48 inches o.c.
 - 3. Furring Channels (Furring Members): 16 inches o.c.
- F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

- A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.
 - 1. Where studs are installed directly against exterior walls, install asphalt-felt isolation strip between studs and wall.
- B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
 - 1. Cut studs 1/2 inch short of full height to provide perimeter relief.
 - 2. For fire-resistance-rated and STC-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.
- D. Install steel studs and furring at 16 inches o.c., unless otherwise indicated.
- E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- F. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - 1. Install two studs at each jamb, unless otherwise indicated.
 - 2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
 - 3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

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- G. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

3.6 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect open concrete coffers or structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations, and trim edges with L-bead edge trim where edges of gypsum panels are exposed.
- K. Sound-Insulated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
 - 1. Penetrations in assemblies include, but are not limited to, ducts, pipes, conduits, electrical boxes, outlets and switches.

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- L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

3.7 PANEL APPLICATION METHODS

- A. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - c. In locations where gypsum board surfaces will be illuminated by continuous cove lighting, install panels vertically.
- B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile and behind shower enclosures. Install with 1/4-inch gap where panels abut other construction or penetrations.
 - 2. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.8 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840, in specific locations approved by Architect for visual effect.
- C. Special Corner Finishing Units: Apply according to manufacturer's instructions at outside wall corners.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 - 1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated.

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2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile and where indicated.
3. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.
4. Level 5: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface where indicated.
 - a. Provide Level 5 finish in locations where gypsum board surfaces will be illuminated by continuous cove lighting.

3.10 IDENTIFICATION

- A. Identify fire rated walls and partitions and other walls required to have protected openings or penetrations effectively and permanently with signs or stenciling above accessible ceilings, repeated at intervals not exceeding 30 feet measured horizontally along walls and partitions.
- B. Include the following information in lettering not less than 3 inches high with 3/8 inch stroke:
 1. "FIRE BARRIER - PROTECT ALL OPENINGS."

END OF SECTION 09 2116

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SECTION 09 2118 - SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Stair enclosures.
 - 2. Horizontal enclosures.
- B. Related Sections include the following:
 - 1. Division 09 Section "Gypsum Board Assemblies": Requirements for facing panels, and applying and finishing panels in gypsum board shaft-wall assemblies.

1.2 SUBMITTALS

- A. Product Data: For each gypsum board shaft-wall assembly indicated.
- B. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.
- C. Research/Evaluation Reports: Evidence of compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction that substantiate required fire-resistance rating for each gypsum board shaft-wall assembly.

1.3 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory" or another publication acceptable to authorities having jurisdiction.

1.4 PRODUCT HANDLING

- A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat on leveled supports off the ground to prevent sagging.

1.5 PROJECT CONDITIONS

- A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Division 09 Section "Gypsum Board Assemblies."

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. G-P Gypsum Corp.
 2. National Gypsum Company.
 3. United States Gypsum Co.

2.2 ASSEMBLY MATERIALS

- A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.
- B. Steel Framing: AISI S220 and ASTM C 645.
1. Protective Coating: Manufacturer's standard corrosion-resistant zinc coating.
- C. Gypsum Liner Panels: Manufacturer's proprietary liner panels in 1-inch thickness and with moisture-resistant paper faces.
- D. Gypsum Wallboard: ASTM C 1396, core type as required by fire-resistance-rated assembly indicated.
1. Edges: Tapered and featured for prefilling.
- E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section "Gypsum Board Assemblies" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- F. Gypsum Wallboard Joint-Treatment Materials: ASTM C 475 and as specified in Division 09 Section "Gypsum Board Assemblies."
- G. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- H. Track (Runner) Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
1. Postinstalled Expansion Anchors: Where indicated, provide expansion anchors with capability to sustain, without failure, a load equal to 5 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 488.

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2.3 GYPSUM BOARD SHAFT WALL

- A. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing and inspecting agency or by manufacturer product designation.
- B. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.
 - 1. Depth: As indicated or as required to suit applications.
 - 2. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.
- C. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches, in depth matching studs.
 - 1. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 - 1. ASTM C 754 for installing steel framing.
 - 2. Division 09 Section "Gypsum Board Assemblies" for applying and finishing panels.
- B. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with
- C. furring and other support.
- D. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
- E. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- F. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.

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- G. Install control joints to maintain fire-resistance rating of assemblies.
- H. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C 919, whichever is more stringent.

END OF SECTION 09 2118

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SECTION 09 3000 - TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Floor tile.
 - 2. Wall tile.
 - 3. Tile accessories and trim.
 - 4. Self-leveling cementitious underlayment for transitions of floors adjacent to shower areas, to prepare for application of thinset tile.
 - 5. Crack-suppression membrane.
 - 6. Provisions for installing crack-suppression membrane at all minor cracks in floor slabs receiving floor tile. Allow for 15% of total floor tile area for crack suppression membrane.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-In-Place Concrete": Monolithic slab finishes specified for tile substrates.
 - 2. Division 07 Section "Joint Sealants": Sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 3. Division 09 Section "Gypsum Board Assemblies": Tile backer board.

1.2 DEFINITIONS

- A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- B. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with minimum value of 0.6 as determined by testing identical products per ASTM C 1028.
- B. Load-Bearing Performance: For ceramic tile installed on walkway surfaces, provide installations rated for the following load-bearing performance level based on testing assemblies according to ASTM C 627 that are representative of those indicated for this Project:
 - 1. Extra Heavy: Passes cycles 1 through 14.

1.4 SUBMITTALS

- A. Product Data: For each type of tile, mortar, grout, patching material, and other products specified.
- B. Shop Drawings: For the following:
 - 1. Tile patterns and locations.
 - 2. Widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces including details of typical expansion, control joint and crack suppression membrane installation.

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3. Flooring transition details between tile and other floor materials.
 4. Build-up of sloped substrate for shower areas and adjacent areas to receive thinset tile, including indication of methods to achieve slopes to drain (if needed).
- C. Grout Samples for Initial Selection: Manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.
- D. Samples for Verification: Include Sample sets showing the full range of variations expected.
1. Tile: Full size tiles of each size and color specified.
 2. Grout: Actual grout samples from manufacturers sample kit.
 3. Accessories: Full-size units of each type of trim and accessory for each color required.
 4. Metal Edge Strips: 6 inch lengths.
 5. Metal Cove Units: 6 inch lengths.
- E. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- F. Product Certificates: Signed by manufacturers certifying that the products furnished comply with requirements.
- G. Material Test Reports: For each tile-setting and -grouting product and special purpose tile.
- H. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance. Installer to have a minimum 5 years experienced and or member of the NTCA (National Tile Contractors Association).
- B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from one source and by a single manufacturer for each product:
1. Metal Thresholds.
 2. Metal Cove units.
 3. Waterproofing/Crack Suppression Membranes.
 4. Joint sealants.
- E. Mockups: Before installing tile, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects

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and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.

1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Include mockup of sloped tile floors in shower areas and of typical expansion, and control joints and crack suppression joints.
3. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before proceeding with final unit of Work.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Review methods and procedures related tiling including, but not limited to, the following:

1. Inspect and discuss condition of substrate and other preparatory work performed by other trades and including testing requirements specified in Part 3.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review special designs and patterns.
4. Review protection procedures.

1.6 PRODUCT HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.
 1. Comply with underlayment and patching material manufacturer's written recommendations for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting product performance.
- B. Close areas to traffic during patching and underlayment application and for time period after application recommended in writing by manufacturer.

1.8 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

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- B. Tile and Trim Units: 1 unopened box for each color, pattern and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tile Products: Subject to compliance with requirements, provide products indicated in Finish Legend on the Drawings.
1. For comparable products proposed by Contractor, submit detailed product data for scheduled products and proposed products for comparison and Architects approval.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Tile Setting and Grouting Materials:
 - a. Custom Building Products.
 - b. MAPEI Corporation.
 - c. LATICRETE International, Inc.
 2. Cementitious Patching and Underlayment Compounds:
 - a. Custom Building Products.
 - b. MAPEI Corporation.
 - c. LATICRETE International, Inc.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with latest 2014/2015 ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
1. Match colors, textures, and patterns indicated by referencing manufacturer's standard designations for these characteristics.
 2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
 3. Tile for Sloped Surfaces: For tile located on ramps and other sloped surfaces, provide textured surface pattern for slip resistance, selected by Architect from full range of available patterns.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.

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2.3 TILE PRODUCTS

- A. Wall Tile: Flat tile as follows:
 - 1. Module Size: as indicated in the finish schedule.
 - 2. Thickness: 5/16 inch.
 - 3. Finish: Matte, opaque glaze, unless otherwise indicated.
 - 4. Product: As indicated in the finish schedule.
- B. Floor Tile: Flat tile as follows:
 - 1. Module Size: as indicated in the finish schedule.
 - 2. Thickness: 1/4 inch.
 - 3. Finish: Matte, opaque glaze, unless otherwise indicated.
 - 4. Product: As indicated in the finish schedule.

2.4 ALUMINUM THRESHOLDS

- A. Aluminum Thresholds: Provide aluminum thresholds as indicated on Drawings.

2.5 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANES

- A. General: Manufacturer's standard product that complies with ANSI A118.10. Provide under all floor tile and on walls in showers. Select from the following.
- B. Chlorinated-Polyethylene-Sheet Product: Nonplasticized, chlorinated polyethylene faced on both sides with high-strength, nonwoven polyester fabric, for adhering to latex-portland cement mortar; 60 inches wide by 0.030-inch nominal thickness.
 - 1. Product: The Noble Company; Nobleseal TS.
 - 2. MAPEI Corporation; Mapeguard WP 200.
- C. Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber and fabric reinforcement.
 - 1. Products: One of the following:
 - a. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane.
 - b. MAPEI Corporation; Mapelastic AquaDefense with fabric.
 - c. Custom Building Products: "Custom 9240" Waterproofing and Anti-fracture Membrane.

2.6 SETTING AND GROUTING MATERIALS

- A. Latex-Portland Cement Mortar (Thinset - Small Format Tile 15 inches or less in any direction): ANSI A118.4, composed as follows:
 - 1. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
 - a. For wall applications, provide nonsagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.
- B. Latex-Portland Cement Mortar (Medium Bed/LHT Thin Set-Large Format Tile Mortar 15 inches or greater in any direction): ANSI A118.4 and ANSI A118.15.

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1. Prepackaged Dry-Mortar Mix: Factory-prepared modified dry set mortar mixture of portland cement; inorganic aggregates, copolymers and chemicals; and other ingredients to which only water needs to be added at Project site.
 2. Products: Basis Of Design: Custom Building Products; Pro-Lite.
 - a. LATICRETE International, Inc.; Tri-Lite.
 - b. MAPEI Corporation; Ultralite.
- C. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.
- D. High Performance Cement Grout: ANSI A118.7.
1. Polymer Type: Ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients. Basis of Design: Custom Building Products; Prism Sure Color Grout
 - a. Unsanded grout mixture for joints 1/8 inch and narrower.
 - 1) LATICRETE International, Inc.; Permacolor.
 - 2) MAPEI Corporation; Ultracolor.
 - b. Sanded grout mixture for joints 1/8 inch and wider.
 - 1) LATICRETE International, Inc.; Permacolor.
 - 2) MAPEI Corporation; Ultracolor.
- E. Water-Cleanable Epoxy Grout: ANSI A118.3.
1. MAPEI Corporation; Kerapoxy CQ.
 2. Custom Building Products; CEG-Lite

2.7 MISCELLANEOUS MATERIALS

- A. Cementitious Patching and Underlayment: Cement-based, polymer-modified product that can be applied in uniform thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations. For patching, use trowel-grade product suitable for build-up of slopes as indicated. For underlayment, use self-leveling product.
1. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 2. Compressive Strength: Not less than 4700 psi at 28 days when tested according to ASTM C 109/C 109M.
 3. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer formulated for use with underlayment when applied to substrate and conditions indicated.
 4. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch, or coarse sand as recommended by underlayment manufacturer.
 - a. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
 5. Water: Potable and at a temperature of not more than 70 deg F.
 6. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- C. Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; is compatible with tile, mortar, and grout products; and is easily removable after grouting is completed without damaging grout or tile.

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1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
 1. MAPEI Corporation; UltraCare Concentrated Tile & Grout Cleaner.
 2. Custom Building Products; Grout and Tile Cleaner
 3. Aqua Mix; Heavy Duty Tile & Grout Cleaner
- E. Grout Sealer: Manufacturer's standard product for sealing grout joints that does not change color or appearance of grout.
 1. Applications: Apply grout sealer to grout joints in tile floors, except in locations with epoxy grout; and to grout joints in tile walls located in toilet rooms.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aqua Mix; Grout and Tile Sealer
 - b. Custom Building Products; Tilelab grout and Tile Sealer
 - c. Bostik; CeramaSeal Grout Sealer.
 - d. C-Cure; Penetrating Sealer 978.
 - e. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - f. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
 - g. MAPEI Corporation; UltraCare Penetrating Stone, Tile & Grout Sealer.
- F. Metal Edge & Cove Strips:
 1. Cove conditions: Schluter DILEX-AHK.
 2. Outside Corners: Schluter QUADDEC.
 3. Top of Wainscot: Schluter JOLLY.
- G. Flexible Sealant
 1. Professional-grade, 100% silicone sealant specifically formulated for heavy traffic expansion and movement joints, horizontal and vertical complying with ASTM standards; shore 'A' hardness (AST C661), joint movement (ASTM C920), elongation at break (ASTM D412), Flexibility (ASTM C734), and passes weatherability (Accelerated Weathering Tester QUV).
 2. Subject to compliance with requirements, provide the following:
 - a. MAPEI Corporation; Mapesil T.
 - b. Custom Building Products; 100% Silicone Caulk

2.8 MIXING

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
 1. Add materials, water, and additives in accurate proportions.
 2. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.
- B. Mixing Cementitious Patching and Underlayment Materials: Provide batch type mechanical mixer for mixing topping material at Project site. Equip batch mixer with a suitable charging hopper, water storage tank, and a water measuring device. Use only mixers that are capable of mixing aggregates, cement, and water into a uniform mix within specified time, and of discharging mix without segregation.

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1. Proportion materials following manufacturer's recommendations.
2. Provide aggregate as recommended by manufacturer for thickness of pour required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 3. Verify that cracks and each type of joint in tile substrates are coordinated with tile joint locations; if not coordinated, adjust in consultation with Architect.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.
 1. Prepare metal surfaces of stair risers as recommended by manufacturer of tile adhesive, including removal of coatings and roughening surface to provide bond.
- B. Cleaning and Regrouting Existing Tile: Remove soap scum, wax, coatings, oil, and other substances from existing tile surfaces. Remove cracked, loose, deteriorated and discolored grout without damaging tiles. Thoroughly rinse and dry before applying new grout. Apply new grout to comply with requirements indicated for grouting new tile.
- C. Provide concrete substrates for tile floors installed with thinset mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.
 1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
 - a. Basis of Design Product, subject to requirements
 - b. Custom Building Products, Custom Tech 100 Self Leveling.
 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- D. Prepare and clean substrate for application of cementitious patching and underlayment according to manufacturer's written instructions for substrate indicated. Provide clean, dry, neutral-pH substrate for product application.
 1. Treat nonmoving substrate cracks to prevent cracks from telegraphing (reflecting) through underlayment according to manufacturer's written recommendations.
 2. Fill substrate voids to prevent underlayment from leaking.

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3. Concrete Substrates: Mechanically remove laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond according to manufacturer's written instructions.
 4. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.
 5. Joints: Mark locations of joints in base slab so that joints in top course will be placed directly over them.
- E. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- F. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
1. Grout release.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCNA Installation Guidelines: TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation." Refer to latest edition. Comply with TCNA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Lay out tile wainscots as indicated on sheet A2.03. In rooms with showers, set height of first course of tile based on lowest point needed at shower drain. Cut tile to slope of floor keeping top of tile level. Set first course of tile in adjacent spaces aligned with tile from shower.
- G. Movement Joints: Locate expansion, control, contraction, isolation, and other joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

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1. Locate joints in tile surfaces as referenced in EJ171 from latest edition of TCNA and at other locations where fillers are placed between adjoining construction elements.
2. Reference architectural details for specific movement joint locations.
3. Prepare joints and apply sealants to comply with requirements of Division 07 Section "Joint Sealants."

H. Grout tile to comply with ANSI A108.10.

3.4 CEMENTITIOUS PATCHING AND UNDERLAYMENT APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
1. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
 2. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface. Provide slope to drain at shower areas as indicated.
1. Apply a final layer without aggregate if required to produce smooth surface.
 2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install finish flooring over underlayment until after time period recommended by underlayment manufacturer.
1. Test for dryness 5-7 days after application in accordance with ASTM F 1869 anhydrous calcium chloride test. If no condensation occurs after 48-72 hours, underlayment is dry.
- F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.5 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANE INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.
- B. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.
- C. Do not install tile over membrane until membrane has cured and been tested to determine that it is watertight.
- D. Install on all toilet room and shower floors and on shower walls.

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3.6 FLOOR TILE INSTALLATION

- A. General: Install tile to comply with requirements in the Ceramic Tile Installation Schedule, including those referencing TCNA installation methods and ANSI A108 series of tile installation standards.
- B. Joint Widths: Install tile on floors with the following joint widths:
 - 1. Floor and Wall Tile: 1/4 inch, unless otherwise indicated or directed.
- C. Joint Alignment: Coordinate joints with wall tile, such that they all align.
- D. Metal Edge Strips: Install at all outside corner and top of wainscot conditions.
- E. Metal Cove Strips: Install at all base conditions – miter corner conditions.

3.7 WALL TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Installation Schedule, including those referencing TCNA installation methods and ANSI setting-bed standards.
- B. Joint Widths: Install tile on walls with the following joint widths:
 - 1. Wall Tile: 1/4 inch.
- C. In showers, install tile such that required ADA clearances are kept.

3.8 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove high performance cement grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. Grout Sealer: Apply grout sealer to tile joints in locations indicated, according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.
- C. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

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2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

E. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.9 PREPARATION FOR COMMERCIAL TRAFFIC

A. Clean quarry tile flooring not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean tile flooring using method recommended by manufacturer.

1. Apply first coat of maintenance finish on floor tile after cleaning.
2. Coordinate selection of floor finish product with Owner's maintenance service.

3.10 CERAMIC TILE INSTALLATION SCHEDULE

A. Tile Thinset Floor Installation:

1. Installation Method: Thin-set mortar bonded to concrete subfloor; TCNA F113.
2. Setting Bed and Grout: ANSI A108.5 with the following mortar and grout:
 - a. Medium-bed/LHT, latex portland cement mortar.
 - b. High performance cement sanded grout.

B. Tile over Waterproof Membrane on all showers and elevated slabs:

1. Installation Method: Waterproof membrane over concrete; thin-set mortar; TCNA F122 or F122A and ANSI A108.5.
2. Thin-Set Mortar: Medium-bed/LHT, latex portland cement mortar.
3. Grout: High performance cement unsanded grout.

C. Tile over Partial or Full Crack Suppression Membrane:

1. Installation Method: Waterproof membrane over concrete; thin-set mortar; TCNA F125 F125A and ANSI A108.5.
2. Thin-Set Mortar: Medium-bed/LHT, latex portland cement mortar.
3. Grout: High performance unsanded grout.

D. Interior Wall Tile Thinset on Tile Backer Board:

1. Setting Method: Glass-mat, water-resistant backer board; thin-set mortar; TCNA W245 and ANSI A108.5.
2. Thin-Set Mortar: Latex-portland cement mortar.
3. Grout: High performance cement unsanded grout.

E. Interior Wall Tile on Thinset over Waterproof Membrane on all shower walls on Tile Backer Board:

1. Setting Method: Glass-mat, water-resistant backer board; thin-set mortar; TCNA W245 and ANSI A108.5.
2. Thin-Set Mortar: Latex-portland cement mortar.
3. Grout: High performance cement unsanded grout.

END OF SECTION 09 3000

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SECTION 09 5100 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Acoustical panels and exposed suspension systems for ceilings, with panels of the following types:
 - a. Standard mineral fiber acoustical panels.
 - 2. Acoustical panel replacement for repairing ceilings damaged by other contractors.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordinate Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 1. Ceiling suspension members.
 - 2. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 4. Minimum Drawing Scale: 1/4 inch = 1 foot.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panels: Set of full-size Samples of each type, color, pattern, and texture.
 - 2. Wood Panels: Set of 12-inch square Samples with specified wood species, pattern and finish.
 - 3. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch-long Samples of each type, finish, and color.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- B. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. CISCAs Recommendations for Acoustical Ceilings: Comply with CISCAs "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
- C. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Locate mockups in the location and of size directed by Architect.

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2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PRODUCT HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Coordination: Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Ceiling Panels: Full-size panels not less than 1 box of each type.
- B. Provide quantity of acoustical panels indicated below, for Owner's use and replacement of panels damaged by work of other prime contracts. Include cutting panels to fit suspension system members. Replacement of panels is only for panels damaged by other prime contractors after installation of ceilings indicated on Drawings. Replace panels only as directed by Architect. Furnish balance of extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Ceiling Panels: Full-size panels not less than 1 full boxes of each type.
 2. Suspension System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide product indicated on Drawings or comparable product.

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2.2 ACOUSTICAL PANELS

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- B. Standard Mineral Fiber Acoustical Panels: Match appearance characteristics indicated for each product type listed in finish legend.
 - 1. Color: White.
 - 2. Edge Detail: Tegular reveal sized to fit flange of exposed suspension system members, unless otherwise indicated.
 - 3. Thickness: 3/4 inch, unless otherwise indicated.
 - 4. Size: As indicated on Drawings.
 - 5. Sag Resistance: Equivalent to Armstrong "HumiGuard Plus No Sag Warranty"; 90 percent humidity.

2.3 METAL SUSPENSION SYSTEMS

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
 - 1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition; unless otherwise indicated.
 - 2. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594; for ceilings located in wet areas as follows:
 - a. Shower Areas: Alloy 304 or 316.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper; unless otherwise indicated.
 - 2. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400; for ceilings located in wet areas including shower areas, dishwashing areas and swimming pools.
 - 3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.
- E. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

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1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
 3. At conditions where layout of full tiles do not quite meet walls, provide custom edge angle to extend necessary length to avoid thin slivers of tile.
- F. Special Accessories for Acoustical Ceilings: Provide factory-prepared units as described below to accommodate installation conditions indicated, finished to match appearance of exposed suspension system members.
1. Drywall Transition Clip: For transition from 5/8 inch gypsum board to acoustical ceiling; eliminates need for drywall bead.
 - a. Product: DW58; Armstrong.
- G. Supplemental Supports: In locations where building structural elements supporting ceiling suspension systems are spaced more than 48 inches o.c. and where obstructions or other conditions prevent support of ceiling suspension systems at 48 inches o.c. or less, provide cold-formed metal framing to support ceiling systems to comply with specified standards, with depth of supplemental framing members not less than the following:
1. Overhead Structural Support Spacing up to 4 Feet: 1-1/2 inches.
 2. Overhead Structural Support Spacing Between 4 Feet and 6 Feet: 2-1/2 inches.
 3. Overhead Structural Support Spacing Between 6 Feet and 10 Feet: 4 inches.
- 2.4 AUXILIARY MATERIALS
- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans, unless indicated otherwise.

3.3 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

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1. Provide secondary restraint as required for acoustical panel ceilings.
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck or to bridging for roof joists or floor joists. Attach hangers to structural members.
 8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

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4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5100

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SECTION 09 6500 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Resilient wall base.
 - 2. Resilient stair treads and landing tiles.
 - 3. Resilient flooring accessories.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls": Self-adhesive surface protection products to protect flooring installations during construction.
 - 2. Division 03 Section "Hydraulic Cement Underlayment": Requirements for preparing existing concrete substrates.
 - 3. Division 03 Section "Maintenance of Concrete": Requirements for epoxy filler for structural cracks in existing concrete substrates.
 - 4. Division 09 Section "Carpeting": Installation of resilient carpet accessories, and for carpeted areas to receive resilient wall base.

1.2 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Shop Drawings: Show installation details including the following:
 - 1. Tile patterns and locations.
 - 2. Profiles, locations and colors of resilient accessories and flooring transition strips; and floor leveling for transitions between flooring materials.
- C. Samples for Initial Selection: Manufacturer's color charts showing colors and patterns available for flooring.
 - 1. Include selection samples showing colors and glosses available for game-line and marker paint.
- D. Samples for Verification: For each different color and pattern of resilient flooring and accessory specified, showing full range of variations expected in these characteristics:
 - 1. Tiles: Full size units.
 - 2. Resilient Wall Base and Accessories: 12 inches long.
- E. Product Test Reports: Based on tests performed by a qualified independent testing agency evidencing compliance of static-control resilient floor coverings with requirements based on comprehensive testing of current products.
- F. Maintenance Data: To include in Operating and Maintenance Manual specified in Division 01.

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1.3 QUALITY ASSURANCE

- A. Accessibility: Comply with applicable requirements of the Americans with Disabilities Act "Accessibility Guidelines" (ADAAG), together with ANSI A117.1 "Accessible and Usable Buildings and Facilities."
- B. Single-Source Responsibility for Flooring: Obtain each type, color, and pattern of flooring from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- C. Fire Performance Characteristics: Provide resilient flooring with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 watts per sq cm or more per ASTM E 648.
 - 2. Smoke Density: Less than 450 per ASTM E 662.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Review methods and procedures related to resilient floorings including, but not limited to, the following:
 - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades and including testing requirements specified in Part 3.
 - 2. Review condition of concrete substrates in detail for cleanliness of concrete substrate and methods of contamination and dirt removal.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review special designs and patterns.
 - 5. Review protection procedures.

1.4 PRODUCT HANDLING

- A. Deliver resilient flooring materials and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F and 90 deg F.
- C. Store tiles on flat surfaces.
- D. Move resilient flooring and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.5 PROJECT CONDITIONS

- A. Maintain a minimum temperature of 70 deg F in spaces to receive flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F.
- B. Do not install flooring materials until they are at the same temperature as the space where they are to be installed.

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- C. Close spaces to traffic during flooring installation.

1.6 SEQUENCING AND SCHEDULING

- A. Install flooring and accessories after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Tile: Furnish not less than one box, of each class, wearing surface, color, pattern and size of resilient floor tile installed.
 - 2. Wall Base and Accessories: Furnish not less than 20 linear feet of each different type and color of resilient wall base and accessory strips installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Resilient Flooring Products: Subject to compliance with requirements, provide products indicated in Finish Legend on the Drawings.
 - 1. For substitutions proposed by Contractor, submit detailed product data for scheduled products and proposed substitutions for comparison.

2.2 COLORS AND PATTERNS

- A. Resilient Flooring Product Colors and Patterns: As indicated on Drawings, or if not indicated, as selected by Architect from manufacturer's full range.

2.3 RESILIENT WALL BASE

- A. Rubber Wall Base: ASTM F 1861.
 - 1. Type (Material Requirement): TS (rubber, vulcanized thermoset).
 - 2. Group (Manufacturing Method): I (solid).
 - 3. Style: Cove with top-set toe.
 - 4. Minimum Nominal Thickness: 1/8 inch.
 - 5. Height: 4 inches.
 - 6. Lengths: Cut to size from coils; use of 4 foot or other single lengths is not permitted.
 - 7. Exterior Corners: Job-formed.
 - 8. Interior Corners: Job-formed.

2.4 RESILIENT STAIR ACCESSORIES

- A. Rubber Stair Treads: Products of style suitable for use indicated and complying with FS RR-T-650, Composition A, Type 2 design (designed) products complying with the following requirements.
 - 1. Type: Combination tread and riser.
 - 2. Type 2 Design: Raised-disc pattern with minimum 2 inch wide contrasting nosing strip in color selected by Architect.

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3. Thickness: 1/4 inch tapering to 3/16 inch at back edge.
4. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, obtain Architect's approval for joint locations.

- B. Rubber Tiles for Stair Landings: Homogeneous rubber tile, solid color.
1. Wearing Surface: Molded pattern matching stair treads.
 2. Thickness: 0.125 inch.
 3. Size: Not less than 18 by 18 inches.

2.5 RESILIENT FLOORING ACCESSORIES

- A. Resilient Molding Accessory:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Flexco, Inc.
 - c. Tarkett
 - d. R.C.A. Rubber Company (The).
 - e. Roppe Corporation, USA.
 - f. VPI, LLC; Floor Products Division.
 2. Description: Carpet edge for glue-down applications, Reducer strip for resilient floor covering, Joiner for tile and carpet, Transition strips.
 3. Material: Rubber.
 4. Profile and Dimensions: As indicated or as selected by Architect from all types available.
 5. Colors and Patterns: As selected by Architect from full range of industry colors.

2.6 SUBFLOOR LEVELING PRODUCTS

- A. Provide Subfloor Leveling products where flooring material are of different thickness to provide a flush surface in the finish products.
- B. Leveling Compound:
1. Use Trowelable Leveling Compound to make up the difference in thickness of adjacent floor finish products.
 2. Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- C. Resilient Subfloor Leveler: In Lieu of Leveling Compound the following may be used.
1. Manufactures: Subject to compliance with requirements, provide products by one of the following:
 - a. Roppe Subfloor Leveler - #301
 - b. Tarkett Subfloor Leveler – LS 40
 2. Description: Thermoplastic rubber (TP) or polyvinyl chloride (PVC) reducer strip for transitioning subfloors.
 3. Profile and Dimensions: As indicated or as selected by Architect.
 4. Colors and Patterns: Manufactures standard color.

2.7 INSTALLATION ACCESSORIES

- A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

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- B. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- C. Adhesives (Cements): Water-resistant type recommended by flooring manufacturer to suit resilient flooring products and substrate conditions indicated.
- D. Seam Sealer: Formulation provided or approved by floor covering manufacturer for products indicated.
- E. Transition Strips: Rubber accessory moldings for edges of flooring and transitions between different flooring materials, as specified in Division 09 Section "Resilient Base and Accessories."
- F. Stair Tread Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates not conforming to tread contours.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine areas where installation of resilient flooring will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with flooring manufacturer's requirements and those specified in this Section.
- B. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and alkalinity characteristics by performing tests recommended by resilient material manufacturer.
 - 2. Finishes of subfloors comply with tolerances and other requirements specified in Division 03 Section "Cast-In-Place Concrete" for slabs receiving resilient flooring.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cracks in Existing Floor Substrates: Refer to Division 03 Section "Maintenance of Concrete" for epoxy filler for structural cracks in existing flooring substrates scheduled to receive resilient flooring.
- B. Comply with manufacturer's installation specifications to prepare substrates indicated to receive flooring.
- C. Clean, prepare, and apply moisture vapor emission control system. See Division 09 Section "Moisture Vapor Emission Control."
- D. Slope substrate with Leveling and Patching material to produce flush transitions between flooring materials. Taper transitions not less than 24 inches in any direction, unless otherwise approved by Architect.

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1. In locations where flooring materials change at a doorway, extend elevated portion of patched area so taper is located beyond door opening, and so finish flooring is level at adjacent doors.
- E. Use stair tread nose filler per tread manufacturer's directions to fill nosing substrates not conforming to tread contours.
- F. Apply primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.3 RESILIENT FLOORING INSTALLATION, GENERAL

- A. General: Comply with flooring manufacturer's installation directions and other requirements indicated that are applicable to each type of flooring included in Project.
- B. Scribe, cut, and fit flooring to butt tightly to vertical surfaces, permanent fixtures, built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- D. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.
- E. Install flooring on covers for telephone and electrical ducts, and similar items occurring within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- F. Adhere flooring to substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.
- G. Use full spread of adhesive applied to substrate in compliance with flooring manufacturer's directions including those for trowel notching, adhesive mixing, and adhesive open and working times.
- H. Hand roll flooring where required by tile manufacturer.

3.4 INSTALLATION OF RESILIENT ACCESSORIES

- A. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 2. Install inside and exterior corners before installing straight pieces.
 3. Form inside corners on job from straight pieces of maximum lengths possible by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce snug fit to substrate.
 4. Form outside corners on job from straight pieces of maximum lengths possible by shaving back of base at point where bending will occur. Remove a strip perpendicular to length of

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base and only deep enough to produce a snug fit without bends whitening or removal of more than half the thickness of wall base.

- B. Apply resilient accessories to stairs as indicated and according to manufacturer's installation instructions.
- C. Place resilient flooring accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

3.5 FIELD QUALITY CONTROL

- A. Testing: Arrange for testing electrical resistance of static-control resilient floor covering systems for compliance with requirements in accordance with Owner's electrostatic-discharge control program.
 - 1. Arrange for testing of floors prior to performing any floor polish procedures.

3.6 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing flooring installation:
 - 1. Remove visible adhesive and other surface blemishes using cleaner recommended by flooring manufacturers.
 - 2. Sweep or vacuum floor thoroughly.
 - 3. Do not wash floor until after time period recommended by resilient flooring manufacturer.
 - 4. Damp-mop flooring to remove black marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by flooring manufacturer.
 - 1. If recommended by flooring manufacturer, apply protective floor polish to flooring surfaces that are free from soil, visible adhesive, and surface blemishes.
 - a. Use commercially available product acceptable to flooring manufacturer.
 - b. Coordinate selection of floor polish with Owner's maintenance service.
 - 2. Cover flooring with undyed, untreated building paper or self-adhesive surface protection until inspection for Substantial Completion.
 - 3. Do not move heavy and sharp objects directly over resilient flooring. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09 6500

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SECTION 09 6723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes decorative resurfacing system, epoxy and silica aggregate mortar, high build grout and seal coat with integral coloring and cove base.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls": Self-adhesive surface protection products to protect flooring installations during construction.
 - 2. Division 07 Section "Joint Sealants": Joint-sealant materials and installation of sealant materials at joints in resinous flooring systems.

1.2 SUBMITTALS

- A. Product Data: Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available.
- C. Samples for Verification: 6 inches square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated.
- D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- E. Material Test Reports: From a qualified independent testing agency indicating and interpreting test results of the resinous flooring's reaction to chemicals and other reagents and substantiating compliance with requirements.
- F. Maintenance Data: For resinous flooring to include in the maintenance manuals specified in Division 01.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to install resinous flooring systems specified with not less than twenty years of successful experience with this type of system.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- C. Field Samples: On floor area selected by Architect (various alcoves), provide full-thickness resinous flooring system samples that are approximately 48 inches square to demonstrate texture,

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color, thickness, chemical resistance, cleanability, and other features of each resinous flooring system required. Simulate finished lighting conditions for review of in-place field samples.

1. If field samples are unacceptable, make adjustments to comply with requirements and apply additional samples until field samples are approved.
2. After field samples are approved, these surfaces will be used to evaluate resinous flooring.
3. Obtain Architect's approval of field samples before applying resinous flooring.
4. Final approval of colors will be from field samples, not samples submitted for verification.

1.4 PRODUCT HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
 1. Concrete substrate shall be properly cured for 30 days.
 2. Maintain a minimum slab temperature of 60 degrees before, during, and for 72 hours after installation and at a minimum 5 degrees above dew point during installation. Air temperatures to be between 60 and 85 degrees.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.
- D. Protection of the finished floor from damage by subsequent trades shall be the responsibility of the general contractor.

1.6 WARRANTY

- A. Warranty: Warranty shall be from the polymer system applicator. The polymer system shall be warranted against defects in materials and workmanship for a period of ten years. Repair or replace any or all portions of the work that fail under normal conditions or use during the warranty period, promptly and at no cost to the customer and by using methods and materials specified for the initial construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for resinous flooring is based on Engine Bay Floors - Firehouse Epoxy Flooring; Floor Resurfacing 4000 floor coating system.

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2.2 MATERIALS

- A. Resinous Flooring: Resinous floor surfacing system consisting of pre-primer, primer; mortar, body coat(s) including resin, hardener, aggregates, and colorants; and sealing or finish coat(s).
1. Color: Incorporation of 3 colors as indicated on Drawings.
 2. System Thickness: 250 mils (1/4")
 3. Flooring:
 - a. Primer: a two component, greater than 95% solids, lower than 50 g/l VOC, epoxy primer cured with modified cycloaliphatic amine hardener with additive offering enhanced adhesion to concrete substrates.
 - b. Mortar: a three component (epoxy resin, modified cycloaliphatic amine, silica sand mortar) with greater than 95% solids, lower than 50 g/l VOC, cementitious modified silica aggregate offering enhanced coefficient of thermal expansion resulting in better adhesion to concrete.
 - c. Grout Coat: a three component (epoxy resin, modified cycloaliphatic amine, colorant) with greater than 95% solids, lower than 50 g/l VOC. The coating should be fast curing to minimize outgassing typically less than 6-7 hours and modified with adhesion promoters.
 - d. Topcoat: a dimer aliphatic isocyanate urethane coating with UV blockers with greater than 92% solids, lower than 100 g/l VOC. Urethane cannot contain any extenders or diluents that are not reactive or do not come out of the film.
 - e. Skid-Inhibiting Additive: Provide textured slip resistance as selected by Owner.
 - f. Striping: Striping guidelines must be included. Striping shall be four inches in width. Color selected for these guidelines shall be one of three to be used. Reference Finish Plan for colors and layout.
 - g. Physical Strength Qualification: Flooring system must be durable enough to resist the constant loads of heavy engines and apparatus. The floor must be capable of dissipating high temperatures from hot tires and guaranteed to stay bonded and resistant to delamination. The contractor, in conjunction with the manufacturer, is responsible for gathering the data regarding engine weights, load points, and temperature exposure required to guarantee this qualification.
 4. Integral Cove Base: 4 inches high of same composition as resinous floor.
 - a. Install as per manufacturer's instructions.
 5. System Components:
 - a. Primer: Type recommended by manufacturer for substrate and body coat(s) indicated.
 - b. Body Coat(s):
 - 1) Resin: Epoxy
 - 2) Application method: screed box and power troweled.
 - c. Pigmented Grout Coating
 - 1) Resin: Epoxy
 - 2) Application Method: squeegee and back rolled.
 - d. Pigmented Top Coating
 - 1) Aliphatic polyester polyurethane
 - 2) Application method: squeegee and back rolled.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- C. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.
- B. Substrates: Provide sound surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Comply with ASTM C 811 requirements and ICRI Guidelines #310-2-1997, unless resinous flooring manufacturer's written instructions are more stringent.
 - 2. Grind surfaces with an apparatus that abrades the substrate surface, and clean by vacuum pickup.
 - 3. Saw cut and chase perimeter edges to provide a "key-in" of material.
 - 4. Repair damaged and deteriorated substrate according to resinous flooring manufacturer's written recommendations.
 - 5. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates comply with resinous flooring manufacturer's written requirements, in no instance to exceed a maximum 75% relative humidity level measurement.
 - 6. Testing Failure: New floor slabs exceeding the finish manufacturer's limits for alkalinity and/or moisture shall be remedied by the contractor at no cost to the Owner and with no extension to the contract. Submit and use remediation method that is acceptable to the Architect.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.
- F. All isolation/expansion and other joints subject to movement: Movement joints must be honored through the flooring system. Comply with manufacturer's recommendations for movement joints.

3.2 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

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3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
 - a. Apply joint sealant to comply with manufacturer's written recommendations.

B. INSTALLATION

1. Saw cut and chase perimeter edges to provide a “key-in” of materials.
 2. Prepare surface utilizing mechanical means where possible (i.e., self-contained Blastrac, scarifiers, scabblers, etc.).
 3. Prime to create a tenacious bond between the concrete and the new flooring system.
 4. Screed box apply epoxy mortar overlayment at 1/4” minimum thickness.
 5. Grind cured epoxy mortar after initial cure to ensure smooth appearance.
 6. Apply pigmented 100% solids epoxy grout coat.
 7. Broadcast for texture/slip resistance.
 8. Apply pigmented aliphatic polyester polyurethane topcoat.
 9. New flooring system is to terminate at a keyway cut by the contractor keeping the floor inside the building.
 10. Cove base installed as entire perimeter of scheduled spaces.
- C. Apply pre-primer and primer over prepared substrate at manufacturer's recommended spreading rate.
- D. Apply mortar at manufacturer's recommended spreading rate.
- E. Apply bonding/broadcast coat at manufacturer's recommended spreading rate.
- F. Apply seal coat at manufacturer's recommended spreading rate.
- G. Integral Cove Base: Apply cove base mix to wall surfaces at locations indicated. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, troweling, sanding, and topcoating of cove base.
- H. Apply grout coat and seal coat, of type recommended by resinous flooring manufacturer to produce finish indicated. Apply in number of coats and at spreading rates recommended in writing by manufacturer.

3.3 CLEANING AND PROTECTING

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- B. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

END OF SECTION 09 6723

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SECTION 09 6813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes carpet tile and installation.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete": Curing compounds and other concrete treatments compatibility with carpet and carpet cushion adhesives.
 - 2. Division 03 Section "Hydraulic Cement Underlayment": Requirements for preparing existing concrete substrates.
 - 3. Division 09 Section "Resilient Flooring": Wall base and termination strips installed with carpet.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation methods.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge Stripping and Accessory: 12-inch-long Samples.
- D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.
- E. Maintenance Data: For carpet tile to include in maintenance manuals specified in Division 01. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

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1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Mockups: Before installing carpet tile, install mockups for each type of carpet tile installation required to demonstrate aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Install mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect 7 days in advance of dates and times when mockups will be installed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.4 PRODUCT HANDLING

- A. General: Comply with CRI 104, Section 4.0, "Storage and Handling" for delivery, storage and handling of carpet tile.

1.5 PROJECT CONDITIONS

- A. General: Comply with CRI 104, Section 7.1, "Site Conditions; Ambient Temperature and Humidity Suitable Substrates."
- B. Environmental Limitations: Do not install carpet tile until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet tile over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tile, install carpet tile before installing these items.

1.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Carpet Tile Warranty: Written warranty, signed by carpet tile manufacturer agreeing to replace carpet tile that does not comply with requirements or that fails within specified warranty

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period. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

1. Warranty Period: 10 years from date of Substantial Completion.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: One full box of full-size units.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Carpet Products: Subject to compliance with requirements, provide products indicated in Finish Legend on the Drawings.

1. Drawing Type Designation: CPT-1 and CPT-2.
2. For substitutions proposed by Contractor, submit detailed product data for scheduled products and proposed substitutions for comparison.

- B. Performance Characteristics: As follows:

1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm.
2. Dry Breaking Strength: Not less than 100 lbf per ASTM D 2646.
3. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC-165.
4. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) per AATCC-16.
5. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC-174.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and that is recommended by carpet tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Verify that substrates and conditions are satisfactory for carpet tile installation and comply with requirements specified.

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- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 7.1, "Site Conditions; Substrate Conditions," Section 8.0, "Substrate Preparation," and carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 10.0, "Carpet Tile."
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- F. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.

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2. Remove yarns that protrude from carpet tile surface.
 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 15, "Protection of Indoor Installations."
- C. Protect installed carpet tile to comply with CRI 104, Section 11.0, "Post Installation."
- D. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 6813

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SECTION 09 9133 - PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Architectural woodwork and casework.
 - b. Acoustical wall panels.
 - c. Metal lockers.
 - d. Finished mechanical and electrical equipment, unless otherwise indicated.
 - e. Light fixtures.
 - f. Distribution cabinets, except when in corridors or other normally occupied rooms.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Pipe spaces.
 - e. Duct shafts.
 - 3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel, except exposed metal flashing indicated for field-painted finish.
 - c. Chromium plate.
 - d. Copper.
 - e. Bronze and brass.
 - 4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.

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5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 05 Section "Structural Steel": Shop priming structural steel.
2. Division 05 Section "Metal Fabrications": Shop priming ferrous metal; and factory finish for interior sheet metal closures.
3. Division 05 Section "Metal Railings": Shop priming metal railings.
4. Division 06 Section "Rough Carpentry": Exposed exterior wood framing for field-applied stain / bleaching oil finish.
5. Division 06 Section "Architectural Woodwork": Woodwork for field-applied transparent finish.
6. Division 07 Section "Metal Flashing and Trim": Stainless steel step flashing for field-applied painted finish.
7. Division 08 Section "Steel Doors and Frames": Shop priming steel doors and frames.
8. Division 09 Section "Gypsum Board Assemblies": Surface preparation for gypsum board.
9. Division 09 Section "Resilient Flooring": Application of game line markings on resilient flooring.
10. Division 10 Section "Gear Lockers": Refinishing doors of existing lockers.
11. Division 32 Section "Pavement Markings": Traffic-marking paint.

1.2 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat: Lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell: Low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
3. Satin: Low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
4. Semigloss: Medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full Gloss: High-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.3 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.

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2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 3. Submit Samples on the following substrates for Architect's review of color and texture only:
 - a. Concrete Unit Masonry: 4-by-8-inch Samples of masonry, with mortar joint in the center, for each finish and color.
 - b. Finished Wood: 12-inch-square Samples for each species on actual material.
 - c. Metal: 4-inch-square Samples of flat metal and 8-inch-long Samples of solid metal for each color and finish.
- C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type and color of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
1. Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft. of wall surface.
 - b. Small Areas and Items: The Architect will designate an item or area as required.
 2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
 - a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.
 3. Final approval of colors will be from job-applied samples.

1.5 REGULATORY REQUIREMENTS

- A. Comply with the applicable provisions of all codes, standards and specifications referenced in this section.
1. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the limits for VOC content of the Ozone Transport Commission (OTC) effective January 1st, 2005.

1.6 PRODUCT HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Product name or title of material.
 2. Product description (generic classification or binder type).

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3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to area designated by Owner.
 1. Quantity: Furnish the Owner with not less than 1 gal. of each type and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide the product listed in the Room Finish Schedule, one of the products in the paint schedules or a comparable product by one of the manufacturers listed below.
- B. Manufacturers Names: One or more of the following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
 1. Benjamin Moore (BM).
 2. Sherwin Williams (SW).
 3. PPG Paints (PPG).
 4. Samuel Cabot (Cabot).
 5. Minwax Company (Minwax).

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2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Provide systems indicated. Where substrates are required to be finished, but no system is specified for that particular substrate, employ finish system most closely related to that scope of work but modified with appropriate primers. In the case of components on walls, use system for adjacent wall or trim as determined by Architect. In the case of components on or suspended from ceilings or decks, use semigloss paint system.
- C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- D. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Dry-Fog Coatings: 400 g/L.
 - 4. Primers, Sealers, and Undercoaters: 200 g/L.
 - 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - 7. Pretreatment Wash Primers: 420 g/L.
 - 8. Floor Coatings: 100 g/L.
 - 9. Shellacs, Clear: 730 g/L.
 - 10. Shellacs, Pigmented: 550 g/L.
- E. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- F. Colors: Match colors indicated by reference to manufacturer's color designations.

PART-3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

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2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- C. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
 2. Mask surfaces and construction adjacent to paint application areas to prevent paint from spilling or spattering other areas.
- D. Preparing Previously Painted Surfaces: Remove existing paint from surfaces indicated using scrapers or chemical paint stripper as follows:
1. Strip loose, chipped, alligatored or otherwise deteriorated paint using methods that will not damage existing surfaces.
 2. Remove paint to sound substrate. Sound, well-adhered paint may remain on surface.
 3. Rub steel surfaces to remove rust bloom, and solvent clean prior to priming.
 4. Allow surfaces to dry and sand smooth.
 5. Clean surfaces so they are free of dust and dirt.
 6. Fill cracks, gouges and nail holes with suitable filler prior to application of first coat.
 7. Complete surface preparation to produce a smooth, uniform substrate suitable for application of primer and finish coats specified.
 8. Apply test patch to confirm adhesion and compatibility. Check adhesion after 7 days.
- E. Preparing Previously Painted Metal Lockers for Electrostatic Painting: Remove existing paint from ferrous metal surfaces as follows:
1. Scrape to remove paint, exercising care not to damage metalwork.
 2. Clean surfaces with solvent following paint stripping.
 3. Before application of finish paint, clean surfaces so they are free of dust and dirt.
 4. Fill gouges, holes and other surface imperfections with epoxy filler. Spot prime filled areas and allow to dry before application of first finish coat.
- F. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- G. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Materials: Prepare concrete and masonry surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to

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- remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
- a. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
 - b. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
3. Precast Concrete Surfaces: Finish patched or repaired areas to provide a uniform texture and surface. Grind down any ridges or other protrusions flush with surrounding surfaces; remove all grinding sludge and dust. <Retain below for textured paint on precast plank>
- a. Filling Joints in Precast Planks: Apply setting-type joint compound in as many coats as needed to provide a level, crack-free fill without edge joinings that show through finish. Provide a smooth, level surface, free of irregularities.
 - b. After surfaces are prepared and dry, apply a full coat of surface primer specified in Part 2 for precast concrete surfaces, over entire surface. Allow to dry before application of textured paint finish.
4. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
- a. When transparent finish is required, backprime with spar varnish.
5. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
- a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
6. Architectural Exposed Structural Steel (AESS): Fill pits and mill marks with automotive body filler. Sand smooth so no evidence of filling is visible after paint is applied.
7. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
8. Stainless Steel: Mechanically abrade metal surface to create surface profile suitable for adhesion of paint, using No. 80 grit sandpaper and power sander.
- a. Wipe abrade surface with fast-drying thinner such as denatured alcohol or lacquer thinner.
- H. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.

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- I. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.2 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convactor covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

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- a. For electrostatic painting, use spray equipment designed to negatively charge the paint particles, with a connection of spray gun to a generator.
- 4. Use rollers, not spray equipment, for application on sound-absorbing concrete masonry units.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer. Use application rate to achieve finished dry film thickness (DFT) as indicated for each coat.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
 - 1. Cabinet heater enclosures.
 - 2. Piping, pipe hangers, and supports.
 - 3. Heat exchangers.
 - 4. Tanks.
 - 5. Ductwork.
 - 6. Insulation.
 - 7. Supports.
 - 8. Motors and mechanical equipment.
 - 9. Accessory items.
- G. Electrical items to be painted include, but are not limited to, the following:
 - 1. Conduit and fittings.
 - 2. Switchgear.
 - 3. Panelboards.
- H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
 - 1. Provide a smooth, uniform finish, appearance, and coverage. Spotting, laps, roller marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
 - 2. Spray application will not be permitted unless combined with back rolling or squeegeeing. Do not thin filler. Apply sufficient material to allow back rolling or squeegeeing to fill surface.
 - 3. Where two filler coats are scheduled, allow first coat to fully dry before application of second. Back roll or squeegee both coats.
 - 4. Do not use squeegee for scored unit masonry; backroll in manner that prevents buildup of block filler in score joints.
 - 5. Extend block filler coats the full extent of exposed surfaces. Protect adjacent surfaces.
- I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been field prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

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- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.
- L. Electrostatic Painting: Connect target substrate to be painted to ground to create magnetic surface that will attract negatively charged paint particles. Apply paint to prepare surfaces to produce uniform, regular coating layers and a smooth, even finish.
- M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

2.3 CLEANING AND PROTECTION

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.
- B. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- C. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

2.4 EXTERIOR PAINT SCHEDULE

- A. General: Provide the finish systems scheduled for each material type indicated, applied at spreading rate recommended by manufacturer to achieve the total dry film thickness (DFT) listed.
 - 1. Provide 2 finish coats over the listed base coats (primer, filler, bond coat) except as otherwise indicated.
- B. Exterior Ferrous Metal:
 - 1. High Performance Epoxy/Urethane System – Semi-gloss:
 - a. Primer: Provide primer over bare metal and over shop-applied primers.
 - 1) SW: Recoatable Epoxy 646
 - 2) PPG: Amerlock 600 High Build Semi-Gloss Epoxy Coating, AK600-3 Series.
 - 3) BM: Corotech Epoxy Mastic Coating (V160)
 - b. First and Second Coats: Gloss urethane finish.
 - 1) SW: Hi-Solids Urethane coating, semi-gloss
 - 2) PPG Paints: PITTHANE® HB Semi-Gloss Urethane Enamel 95-8800 Series
 - 3) BM: Corotech Acrylic Aliphatic Urethane Gloss (V500)
 - c. Special note: Galvanized exterior stairs and railing assembly are not to be painted.
- C. Exterior Zinc-Coated Metal:
 - 1. Full-Gloss, Siliconized Alkyd-Enamel or Polyurethane Finish:
 - a. Primer: Galvanized metal primer.
 - 1) SW: Pro-Cryl Universal Primer.

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- 2) PPG: Pitt-Tech Plus Interior/Exterior Acrylic DTM Primer/Finish, 4020PF
 - 3) BM: Super Spec Acrylic Metal Primer (P04)
 - b. First and Second Coats: Full-gloss, exterior, siliconized alkyd enamel containing not less than 30 percent silicone or polyurethane finish.
 - 1) SW: Sher-Cryl HP Acrylic, semi-gloss.
 - 2) PPG: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series
 - 3) BM: Ultra Spec HP DTM Acrylic Gloss Enamel (HP28)
- D. Exterior Prefinished Ferrous Metal:
 - 1. Semi-gloss finish
 - a. Primer: Metal primer.
 - 1) SW: DTM Primer.
 - 2) PPG: Pitt-Tech Plus Interior/Exterior Acrylic DTM Primer/Finish, 4020PF
 - 3) BM: Super Spec HP Alkyd Metal Primer (P06)
 - b. First and Second Coats:
 - 1) SW: DTM Acrylic Finish, semi-gloss.
 - 2) PPG: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series
 - 3) BM: Ultra Spec HP DTM Acrylic Semi Gloss (HP29)
- E. PVC Fabrications:
 - 1. Semigloss, Acrylic Finish:
 - a. Primer: Acrylic primer or water based primer/sealer suitable for indicated substrates.
 - 1) SW: Multi-Purpose Primer, B51W450 series.
 - 2) PPG: Seal Grip Gripper Interior/Exterior Universal Acrylic Primer, 17-921XI Series
 - 3) BM: Fresh Start 100% Acrylic Primer (N023)
 - b. First and Second Coats: Semigloss acrylic finish.
 - 1) SW: DTM Acrylic Finish, semi-gloss.
 - 2) PPG: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series
 - 3) BM: Ultra Spec HP DTM Acrylic Semi Gloss (HP29)

2.5 INTERIOR PAINT SCHEDULE

- A. General: Provide the finish systems scheduled for each material type indicated, applied at spreading rate recommended by manufacturer to achieve the total dry film thickness (DFT) listed.
 - 1. Provide 2 finish coats over the listed base coats (primer, filler, bond coat) except as otherwise indicated.
- B. Interior Concrete Masonry Units (CMU):
 - 1. Semigloss, Water Based Epoxy Finish: Provide the following in room Apparatus 100.
 - a. Block Filler: Two Coats acrylic latex high build block filler.
 - 1) SW: PrepRite Block Filler
 - 2) PPG: SPEEDHIDE Int / Ext Masonry Hi Fill Latex Block Filler 6-15XI
 - 3) PPG: PITT-GLAZE WB Int/Ext Block Filler Latex (for high moisture and intermittent moisture areas such as locker and shower rooms)
 - 4) BM: Coronado Super Kote 5000 Block Filler ((958-11)
 - b. First and Second Coats: Semigloss acrylic epoxy finish.

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- 1) SW: ProIndustrial PreCatalyzed water based Epoxy, semi-gloss
- 2) PPG: PITT-GLAZE WB SG Pre-Catalyzed Acrylic Epoxy 16-1510
- 3) BM: Corotech Pre Cat Waterbased Epoxy Semi Gloss ((V341)

C. Gypsum Board Ceilings and Soffits:

1. Flat Acrylic Finish: Provide the following unless otherwise indicated.
 - a. Primer: Latex-based, interior primer.
 - 1) SW: Promar 200 Primer.
 - 2) PPG: SPEEDHIDE® Zero VOC Int Latex Sealer 6-4900XI
 - 3) BM: Ultra Spec 500 Int. Latex Primer (N534)
 - b. First and Second Coats: Flat, acrylic-latex-based, interior paint.
 - 1) SW: ProMar 200 Zero VOC Latex Flat
 - 2) PPG: SPEEDHIDE® Zero VOC Latex Flat 6-5110 series
 - 3) BM: Ultra Spec 500 Int. Latex Flat (N536)

D. Gypsum Board Walls:

1. Eggshell, Acrylic-Enamel Finish: Provide the following unless otherwise indicated.
 - a. Primer: Latex-based, interior primer.
 - 1) SW: Promar 200 Primer
 - 2) PPG: SPEEDHIDE® Zero VOC Int Latex Sealer 6-4900XI
 - 3) BM: Ultra Spec 500 Int. Latex Primer (N534)
 - b. First and Second Coats: Eggshell, scrubbable acrylic-latex, interior enamel.
 - 1) SW: ProMar 200 Latex Eggshell
 - 2) PPG: SPEEDHIDE® Zero VOC Int Latex Eggshell 6-5310 series
 - 3) BM: Ultra Spec 500 Int. Latex Eggshell (N538)

E. Gypsum Board, Moisture Conditions:

1. Water-Reducible Epoxy Coating System: Provide the following for all gypsum surfaces exposed to the Apparatus 100, Wash/Dryer 107 and all toilet rooms.
 - a. Primer: Latex-based, interior primer.
 - 1) SW: ProMar 200 Primer
 - 2) PPG: SEAL GRIP Acrylic Universal Primer/Sealer 17-921XI series
 - 3) BM: Ultra Spec 500 Int. Latex Primer (N534)
 - b. First and Second Coats: Semi-gloss epoxy finish.
 - 1) SW: ProIndustrial Pre-Catalyzed Epoxy, semi-gloss.
 - 2) PPG: PITT-GLAZE WB SG Pre-Catalyzed Acrylic Epoxy 16-1510
 - 3) BM: Corotech Pre Catalyzed Acrylic Epoxy Semi Gloss (V341)

F. Painted Interior Woodwork:

1. Semigloss, Acrylic Enamel Finish:
 - a. Primer: Alkyd or latex-based, interior enamel undercoater.
 - 1) SW: Multi-Purpose Zero VOC Primer
 - 2) PPG: SPEEDHIDE® Zero VOC Int Latex Sealer 6-4900XI
 - 3) BM: Advance Waterborne Int. Alkyd Primer (790)
 - b. First and Second Coats: Semigloss, Acrylic, interior enamel.
 - 1) SW: ProMar 200 Zero VOC, semi-gloss
 - 2) PPG: SPEEDHIDE Zero VOC Latex Semi-Gloss 6-5510 series
 - 3) BM: Ultra Spec 500 Int. Latex Gloss (N540)

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- G. Stained Interior Woodwork:
1. Polyurethane, Satin-Varnish Finish:
 - a. Stain Coat:
 - 1) Minwax 250 interior wood stain.
 - 2) PPG: Rust-Oleum® Varathane® Classic Water-Based Wood Stain VAR-89.
 - b. Sealer Coat: Polyurethane reduced as recommended by manufacturer for use as sanding sealer.
 - c. First and Second Finish Coats: Polyurethane varnish.
 - 1) SW: Wood Classics WB Polyurethane, satin.
 - 2) PPG: Rust-Oleum® Varathane® Crystal Clear Water-Based Polyurethane
 - 3) VAR-34.
- H. Ferrous Metal Components at Ceiling Level: Apply the following coating system to exposed roof trusses and other structural steel in exposed high areas.
1. Dry Fall, Alkyd Flat Finish: Where colors indicated exceed manufacturer's recommended pigment proportions, use semi-gloss paint system specified for interior ferrous metal.
 - a. Primer: Metal primer.
 - 1) SW: Kem Bond HS
 - 2) PPG: Pitt-Tech Plus Interior/Exterior Acrylic DTM Primer/Finish, 4020PF.
 - 3) BM: Super Spec HP Alkyd metal Primer (P06)
 - b. First and Second Coats: Alkyd flat dry fall finish.
 - 1) SW: Waterbased Acrylic Dryfall Eggshell, B42W82
 - 2) PPG: SPEEDHIDE SUPER TECH WB 100% Acrylic Dry-Fog Semi- Gloss Latex 6-724XI
 - 3) BM: Super Kote 5000 Dry Fall Acrylic Flat (N110)
- I. Zinc-Coated Metal Components at Ceiling Level: Apply the following coating system to exposed metal roof deck, exposed galvanized steel ductwork, and similar elements in exposed high areas.
1. Dry Fall, Flat Finish: Where colors indicated exceed manufacturer's recommended pigment proportions, use semi-gloss paint system specified for interior zinc-coated metal.
 - a. Primer: Galvanized metal primer.
 - 1) S/W: DTM Primer
 - 2) PPG: Pitt-Tech Plus Interior/Exterior Acrylic DTM Primer/Finish, 4020PF.
 - 3) BM: Super Spec HP Acrylic Metal Primer (P04)
 - b. First and Second Coats: Acrylic latex dry fall finish.
 - 1) SW: Waterbased Acrylic Dryfall Eggshell, B42W82
 - 2) PPG: SPEEDHIDE SUPER TECH WB 100% Acrylic Dry-Fog Semi- Gloss Latex 6-724XI
 - 3) BM: Coronado Super Kote 5000 Dry Fall Acrylic Flat (N110)
- J. Interior Ferrous Metal: Apply the following coating system to interior ferrous metal not scheduled to receive another coating.
1. Semigloss, DTM Acrylic-Enamel Finish:
 - a. Primer: Metal primer.
 - 1) SW: DTM Primer
 - 2) PPG: Pitt-Tech Plus Interior/Exterior Acrylic DTM Primer/Finish, 4020PF
 - 3) BM: Super Spec HP Acrylic Metal Primer (P04)
 - b. First and Second Coats: Semigloss, alkyd, interior enamel.
 - 1) SW: DTM Acrylic Coating, semi-gloss

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- 2) PPG: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series
 - 3) BM: Ultra Spec HP DTM Acrylic Semi Gloss (HP29)
- K. Interior Zinc-Coated Metal: Apply the following coating system to interior ferrous metal not scheduled to receive another coating.
- 1. Semigloss, Direct to Metal or Acrylic-Enamel Finish: Provide the following for items not within normal reach.
 - a. Primer: Galvanized metal primer or vinyl wash.
 - 1) SW: DTM Primer
 - 2) PPG: Pitt-Tech Plus Interior/Exterior Acrylic DTM Primer/Finish, 4020PF
 - 3) BM: Super Spec HP Acrylic Metal Primer (P04)
 - b. First and Second Coats: Semigloss, acrylic-latex, interior enamel.
 - 1) SW: DTM Acrylic Coating, semi-gloss
 - 2) PPG: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series
 - 3) BM: Ultra Spec HP Acrylic DTM Semi Gloss (HP29)
 - 2. Flat Acrylic Finish:
 - a. First and Second Coats: Flat acrylic finish.
 - 1) SW: A100 Black.
 - 2) PPG: SPEEDHIDE® Interior Latex Flat 6-70 series.
 - 3) BM: Ultra Spec 500 Interior Flat (N536)

SECTION 09 9133

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SECTION 10 1400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Panel signs for room identification.
 - 2. Panel signs for Code-required stairway signs.
 - 3. Dimensional characters of cast aluminum for exterior building signs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls": Temporary project identification signs.
 - 2. Division 23 Sections: Labels, tags, and nameplates for mechanical equipment.
 - 3. Division 26 Sections: Labels, tags, and nameplates for electrical equipment and for illuminated exit signs.
 - 4. Division 32 Section "Asphalt Paving": Parking signs.

1.2 REFERENCES

- A. ASTM D 790-03 -- Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- B. ASTM D 1003-00 -- Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
 - 1. Provide message list for each sign, including large-scale details of wording and lettering layout.
 - 2. Provide sign schedule with interior elevations indicating mounting location for each sign mounted on permanent construction. Show proposed mounting method and height. Include interior elevations showing each sign location relative to adjacent door, frame or other construction.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
- D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:
 - 1. Panel Signs: Full-size Samples of each type of sign required.

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2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter and number) required. Show character style, material, finish, and method of attachment.
3. Show graphic style, and colors and finishes of letters, numbers, and other graphic devices.
4. Approved samples will be returned for installation into Project.

E. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
 1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction.
- B. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.
- C. Source Limitations: Obtain each sign type through one source from a single manufacturer.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
 1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Panel Sign System: The design for panel signs is based the engraved inlayed acrylic products of iSIGN. Subject to compliance with requirements, provide the specified system or comparable product by the following:
 1. ASI Signage Innovations.
 2. Bayuk Graphic Systems Inc.
 3. Innerface Architectural Signage Inc.
 4. FastSigns, Inc.
- B. Basis-of-Design Manufacturer for Dimensional Characters: The design for dimensional characters is based on products of Gemini Incorporated. Subject to compliance with requirements, provide products of the named manufacturer or comparable products by one of the following:

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1. ASI Sign Systems, Inc.
2. Metal Arts; Div. of L&H Mfg.
3. Mohawk Sign Systems.
4. The Southwell Co.
5. FastSigns, Inc.

2.2 MATERIALS

- A. Cast-Acrylic Sheet: Cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet; sizes and thicknesses indicated; minimum flexural strength of 16,000 psi when tested according to ASTM D 790; minimum allowable continuous service temperature of 176 degrees F.
 1. Clear sheet: Colorless transparent sheet, matte finish, with light transmittance of 92 percent when tested per ASTM D 1003.
 2. Colored opaque acrylic sheet.
- B. Colored Coatings for Acrylic Sheet: Use coatings, inks and paints for copy and background colors that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for application intended.
 1. Provide colors as selected by architect from manufacturers stand colors.
- C. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of alloy 5005-H15.
- D. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of alloy 6063-T5.

2.3 PANEL SIGNS

- A. Design Concept: The Drawings and signage schedules indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated.
- B. General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
 1. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch measured diagonally.
- C. Graphic Content and Style: Provide sign copy that complies with requirements indicated for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.
 1. Signs that designate permanent rooms and spaces and signs that provide direction to or information about functional spaces (and other signs required to comply) shall comply with the ADA.
- D. Frameless Panel Signs: Fabricate signs with edges mechanically and smoothly finished to comply with the following requirements:
 1. Edge Condition: Square edge.
 2. Corner Condition: Square.
 3. Panel thickness: 1/8 inch.
 4. Panel finish: Matte.
 5. Letter Style: Helvetica.

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- E. Backing: Permanently laminate face panels to backing sheets of material and thickness indicated using the manufacturer's standard process where required by fabricating process or mounting methods, or where otherwise indicated.
- F. Panel Sign Copy Process and Materials: Provide fused embedded copy for text, graphics and braille required to comply with the ADA. Provide reverse-engraved graphics and text for graphics not required to comply with ADA.
 - 1. Engraving: Form recesses by machine-engraving letters, numbers, symbols, and other graphic devices into sign panel on the face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates in a pantographic system or equivalent process capable of producing characters of the style indicated with sharply formed edges.
 - a. Face-Engraved Copy for Embedded Text: Engrave copy to produce a minimum indentation depth of 1/32 inch.
 - 1) Embed raised copy as specified below, apply opaque background color coating to back face of acrylic sheet.
 - b. Rasterball for Braille: Accurately drill indentations to receive braille raster balls so raster balls protrude as required from face.
 - c. Reverse Engraved Copy: Engrave as above on reverse side of panel.
 - 1) Clear acrylic sheet: Fill engraved copy with enamel. Apply opaque background color coating to the back face of acrylic sheet.
 - 2. Raised Copy: Machine-cut copy characters to fit recesses from white matte-finished opaque acrylic sheet and chemically weld into the acrylic sheet recesses forming embedded text sign panel face. Produce precisely formed characters with cut edges free from burrs and cut marks.
 - a. Raised copy thickness: 1/16 inch.
 - b. Form braille by fusing clear raster balls to drilled holes.

2.4 DIMENSIONAL CHARACTERS

- A. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- B. Cast Characters for Exterior Building Signs: Form individual letters and numbers by casting. Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Comply with requirements indicated for finish, style, and size.
 - 1. Material: Aluminum.
 - 2. Character Style: As indicated on the drawings.
 - 3. Letter Height/size: As indicated on the drawings.
 - 4. Finish: Clear anodized and Prefinished Organic Coating.

2.5 ACCESSORIES

- A. Mounting Methods for Panel Signs: Use silicone adhesive fabricated from materials that are not corrosive to sign material and mounting surface.
- B. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors.

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2.6 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.
- D. Clear Anodic Finish: Manufacturer's standard clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish.
- E. Baked-Enamel Finish: Manufacturer's standard baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1. Color: Custom color to match Architect's RAL sample.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
 - 1. Silicone-Adhesive Mounting: Use liquid-silicone adhesive recommended in writing by sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign in place until adhesive has fully cured.
- C. Glass-Mounted Panel Signs: Where panel signs are mounted on glass, use double-sided adhesive tape recommended by sign manufacturer. Provide matching plate on opposite side of glass to conceal mounting materials, aligned with sign and applied with double-sided tape, using blank panel of same material and color as sign panel unless otherwise indicated.
 - 1. Where blank panel is located on exterior of building, provide 0.050 inch thick aluminum sheet of size and shape matching sign panel, finished to match adjacent aluminum framing.
- D. Dimensional Characters: Mount characters using standard fastening methods recommended in writing by manufacturer for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
 - 1. Projected Mounting: Mount characters at projection distance from wall surface indicated.

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3.2 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 1400

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SECTION 10 2813 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Toilet accessories as scheduled.
 - 2. Shower accessories as scheduled.
- B. This Section includes providing the following:
 - 1. Toilet tissue dispensers.
 - 2. Towel dispensers/waste receptacle combination units.
 - 3. Soap dispensers.
 - 4. Grab bars.
 - 5. Framed mirrors.
 - 6. Sanitary napkin disposal units.
- C. Related Sections include the following:
 - 1. Division 22 Sections: Plumbing fixtures, including shower stalls.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Maintenance Data: For accessories to include in maintenance manuals. Provide lists of replacement parts and service recommendations.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
 - 1. Products of other manufacturers with equal characteristics, as judged solely by Architect, may be considered. See Division 01 Section "Product Requirements" regarding substitution procedures.
 - 2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

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- C. Regulatory Requirements: Comply with provisions Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)" for manufacture and installation of toilet accessories.
- D. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

1.4 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
 - 1. Minimum Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: Provide models by American Specialties, Inc. as indicated for each product in the Schedule at the end of Part 3.
 - 1. Comparable Manufacturers of Toilet Accessories: Subject to compliance with requirements, provide the named products or comparable products by one of the following:
 - a. Bobrick Washroom Equipment, Inc
 - b. Bradley Corporation.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Sheet Steel: ASTM A 366, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- C. Galvanized Steel Sheet: ASTM A 653, G60.

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- D. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- E. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- F. Vitreous Enamel Finish: Manufacturer's standard fired-on vitreous finish over cast iron.
- G. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- H. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

- A. General: One, maximum 1-1/2-inch- diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Coordinate need for recesses and/or blocking prior to wall construction.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET ACCESSORY SCHEDULE

- A. General: Where designations below are indicated on Drawings, provide the toilet accessory item complying with specified requirements.
- B. Toilet Tissue Dispenser, Wall Mounted:
 - 1. Basis-of-Design Product: ASI Roval Twin Hide-a-Roll Toilet Tissue Dispenser – Semi-Recessed. Model # 20031
 - 2. Type: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
 - 3. Mounting: Semi-recessed with concealed anchorage.
 - 4. Material: Stainless steel.
 - 5. Operation: Noncontrol delivery with manufacturer's standard spindle.
 - 6. Capacity: Designed for maximum 5-1/4 inch diameter-core tissue rolls.
 - 7. Locations: One per single occupant toilet room.
- C. Grab Bar:
 - 1. Basis-of-Design Product: ASI 3800 series (Type 01 and Type 02).
 - 2. Description: Stainless-steel grab bar in one piece configurations shown.
 - 3. Sizes: Unless otherwise indicated or necessary to suit conditions, provide one unit 36 inches long, one unit 42 inches long and one minimum 18" vertical at each water closet. Provide one 24 inches long and 78 inches long (field verify length) for each shower.
 - 4. Stainless-Steel Nominal Thickness: Minimum 0.05 inch.
 - 5. Mounting: Concealed with manufacturer's standard flanges and anchors .
 - 6. Gripping Surfaces: Peened slip-resistant texture.
 - 7. Outside Diameter: 1-1/2 inches.

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- D. Combination Towel Dispenser/Waste Receptacle:
1. Basis-of-Design Product: ASI Paper Towel Dispenser & Waste Receptacle – Recessed; Model #0469
 2. Recessed Type: Designed for nominal 4-inch wall depth with continuous, seamless wall flange; towel dispenser in unit's upper compartment designed to dispense minimum of 600 C-fold or 800 multifold paper towels; waste receptacle in unit's lower compartment with minimum 12 gal. capacity, reusable, vinyl liner; and flush doors on upper and lower compartments with continuous hinges and tumbler locksets.
 3. Locations: One per toilet room.
- E. Mirror Unit:
1. Basis-of-Design Product: ASI Stainless Steel Chan-Lok – Plate Glass Mirror
 - a. Tempered Glass, Snap Locking Design
 2. Tempered Glass, Stainless-Steel, Channel-Framed Mirror: Fabricate frame from stainless-steel channels in manufacturer's standard satin or bright finish with square corners mitered to hairline joints and mechanically interlocked.
 3. Mirror Size: 24-by-36 inches, unless otherwise indicated.
 4. Locations: Above each sink as indicated on drawings on first floor.
 5. Installation: Provide marine grade plywood backing at transition between tile wainscot and drywall, such that mounting occurs in the same plane. Recess plywood 1" so it remains hidden from sight.
- F. Mirror Unit-Medicine Cabinet:
1. Basis-of-Design Product: ASI Stainless Steel - Recessed Medicine Cabinet. Model #0952
 - a. Tempered Glass
 2. Stainless Steel - Recessed Medicine Cabinet: Swing door mirror frame type 304 stainless steel with satin finish with full length piano hinge and magnetic catch. Three removable/adjustable stainless steel shelves.
 3. Mirror Size: 18-by-24 inches, unless otherwise indicated.
 4. Locations: Above each sink as indicated on drawings.
 5. Installation: Coordinate installation with required recess, and interior finishes. Provide solid wood infill trim painted black at transition between tile wainscot and drywall – to be flush with housing frame.
- G. Shower Curtain Rod:
1. Basis-of-Design Product: ASI Shower Curtain Rod - 1" diameter, Stainless Steel. Model # 1214-2, and accompanying Flanges – Model #1214-1.
 2. Type: Stainless-steel shower curtain rod with 3-inch diameter stainless-steel flanges designed for exposed fasteners, in length required for shower opening indicated.
- H. Shower Curtain and Hooks:
1. Vinyl Shower Curtain: Minimum 10 ga., opaque, matte vinyl with hemmed edges and nickel-plated brass grommets at minimum 6 inches o.c. through top hem.
 - a. Basis-of-Design Product: ASI – Model #1200-V
 - b. Size: Minimum 6 inches wider than opening by 72 inches high.
 - c. Color: White.
 2. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.
 - a. Basis-of-Design Product: ASI – Model #1200-SHU

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- I. Folding Shower Seat:
1. Basis-of-Design Product: ASI Folding Shower Seat, Rectangular Solid Phenolic Seat. Model #8203-33.
 2. Description: Heavy-duty hinged seat designed to fold up against wall when not in use with stainless-steel support braces, hinges, frame, and fasteners; of all-welded construction; and complying with the following:
 3. Configuration: Rectangular shaped seat designed for wheelchair access.
 4. Seat Material: Phenolic or polymeric composite of slat-type or one-piece construction; color as selected by Architect from manufacturer's full range.
- J. Soap Dispenser:
1. Basis-of-Design Product: ASI Soap Dispenser (Foam) Vertical. Model #0359.
 2. Liquid Soap Dispenser, Vertical-Tank Type: Surface-mounted type, minimum 40-oz. capacity tank with stainless-steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action; and stainless-steel cover with unbreakable window-type refill indicator.
 - a. Soap Valve: Designed for dispensing soap in foam form.
 3. Locations: As indicated and at each sink.
- K. Sanitary Napkin Disposal Unit, Surface-Mounted:
1. Basis-of-Design Product: ASI Roval Surface Mounted Sanitary Waste Receptacle. Model #20852
 2. Surface-Mounted Type: With seamless exposed walls; self-closing top cover; and continuous hinge.
 3. Locations: One per toilet room.
- L. Clothes Hook:
1. Basis-of-Design Product: ASI Single Robe Hook. Model # 7308.
 2. Single-Prong Unit: Stainless-steel, welded-plate type hook with circular wall bracket and concealed fastener mounting.
 3. Finish: Stainless steel with satin finish.
 4. Quantity: Provide two units per toilet room – one on back of door and one in shower.
- M. Towel Bar:
1. Basis-of-Design Product: ASI Round Towel Bar. Model # 7307-24.
 2. Size: 24" width.
 3. Finish: Stainless steel with satin finish.
 4. Quantity: Provide one in each shower.
- N. Shower Soap Basket:
1. Basis-of-Design Product: ASI Soap Basket. Model # 7322.
 2. Finish: Stainless steel with satin finish.
 3. Quantity: Provide one in each shower as directed by Architect.

END OF SECTION 10 2813

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SECTION 10 4400 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Relocation of existing portable fire extinguishers.
 - 2. Relocation of existing defibrillator and cabinet.
 - 3. Relocation of existing bleed kit and cabinet.
 - 4. Fire-protection cabinets for portable fire extinguishers.
 - 5. Fire extinguisher mounting brackets.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Samples for Verification: For exposed cabinet finishes, in sets showing the full range of variations expected.
 - 1. Size: 6-by-6-inch-square Samples.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide extinguishers listed and labeled by FM.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Larsen's Manufacturing Company.

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1. Cabinet Product: Architectural Series.
2. Cabinet Door Lock: Larsen-Loc.

- B. Comparable Manufacturers: Subject to compliance with requirements, equivalent products by one of the following may be provided:
1. J.L. Industries, Inc.
 2. Potter-Roemer; Div. of Smith Industries, Inc.
 3. Watrous; Div. of American Specialties, Inc.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: Carbon steel, complying with ASTM A 366, commercial quality, stretcher leveled, temper rolled.
- B. Stainless-Steel Sheet: ASTM A 666, Type 302 or Type 304 alloy.

2.3 PORTABLE FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.
- B. Typical Locations: Multipurpose dry-chemical type; UL-rated 4A:80B:C, 10-lb nominal capacity, in enameled-steel container.
- C. Kitchen Locations: Wet-chemical type; UL-rated for Class K fires, not less than 16 pound, 6 liter capacity; in stainless-steel container; with pressure-indicating gage.
1. Locations: Provide for kitchen locations as indicated on Drawings; or if not indicated, provide one bracket mounted fire extinguisher for each separate cooking line, in location directed by Architect.

2.4 FIRE-PROTECTION CABINETS

- A. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
1. Cabinet Metal: Enameled-steel sheet.
- B. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
1. Applications: Provide recessed cabinets unless wall thickness cannot accommodate full depth of cabinet.
 2. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend) of 1/4 to 5/16 inch.
- C. Semirecessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
1. Applications: Provide semirecessed cabinets in locations where wall thickness cannot accommodate full depth of recessed cabinet.
 2. Square-Edge Trim: 1-1/4 to 1-1/2 inch backbend depth.

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- D. Cabinet Door and Trim Material: Stainless steel sheet.
- E. Door Style: Fully glazed panel with frame.
- F. Door Glazing: Tempered float glass (clear).
- G. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
 - 1. Hollow-Metal Design: Minimum 1/2-inch-thick door frames, fabricated with tubular stiles and rails.
- H. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

2.5 ACCESSORIES

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish.
 - 1. Provide brackets for wall-mounted extinguishers and for extinguishers located in cabinets.
- B. Lettered Door Handle: Provide one-piece, cast-iron door handle with the word "FIRE" embossed into face.
- C. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- E. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 1. Color: Manufacturer's standard white.
 - 2. Provide manufacturer's standard baked-enamel paint for the following:
 - a. Interior of cabinet.

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- F. Stainless Steel Door Finish: Bright, directional polish; No. 4 finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.
- B. Examine walls and partitions for suitable framing depth and blocking.
- C. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged units.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
 - 1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
 - 2. Fasten mounting brackets to structure and cabinets, square and plumb.
 - 3. Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.
- B. Refinish or replace cabinets and doors damaged during installation.
- C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10 4400

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SECTION 10 5100 – TURNOUT GEAR LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Design, fabrication and installation of wall mounted turnout gear lockers as specified herein.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete": Concrete base for lockers.
 - 2. Division 05 Section "Metal Fabrications": Steel supports for wall-mounted benches.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes and installation instructions.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Show specified accessories.
 - 2. Show groupings of lockers into allotted spaces.
- C. Samples for Initial Selection: For factory-applied color finishes.
- D. Samples for Verification: Provide requested color applied to actual sample portion of locker.
- E. Owner's Manual: Provide maintenance manual at closeout.
- F. Warranty: Submit manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain metal lockers and accessories through one source from a single manufacturer.
- B. Manufacturer shall have a minimum of fifteen years experience in the direct manufacture of lockers.
- C. Installer Qualifications: Installer shall have experience necessary to assure lockers are installed properly and according to manufacturer's instructions.
- D. Reference:
 - 1. A STM A513 – Minimum properties of Electric-Resistance-Welded Carbon Allow Steel Mechanical Tubing.
 - 2. A STM A510 - Minimum properties of Wire Rods and Coarse Round Wire, Carbon Steel and Alloy Steel.

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1.4 PRODUCT HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for metal locker installation.
- B. Deliver materials to site in manufacturer's original, unopened containers with labels identifying product and manufacturer's name.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Coordination: Coordinate size and location of concrete bases.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: The design for metal lockers is based on the following products of GearGrid Corporation, 670 SW 15th Street, Forest Lake, MN 55025. Toll-free 888-643-6694. Phone 651-464-4468. Fax 651-464-4780. Web site www.geargrid.com. Emailsales@geargrid.com.

2.2 TURNOUT GEAR LOCKER FABRICATION

- A. Lockers must be fabricated and manufactured in the U.S.A. Products not manufactured in the U.S.A will be rejected at the time of submittals.
- B. Model: GEARGRID Wall Mounted Storage System.
- C. Locker Sizes in quantity and types indicated on drawings and assembled for groupings indicated:
 - 1. Width: 24"
 - 2. Depth: 20"
 - 3. Height: 74.5"
 - 4. Pre-assembled into banks.
 - a. (1) bank of 5 lockers
 - b. (4) bank of 9 lockers.
- D. Construction: Units shall be welded at all applicable joints. Forming of metal shall be completed by standard cold-forming operations. Use of fasteners will only be required to allow for knock-downshipping, securing units to mounting surface and on applicable accessories. Units to be pre-assembled in banks as indicated on the drawings.
- E. Vertical Dividers:
 - 1. Outer Frames: 1.25" O.D. x 16 gauge wall thickness ASTM A513 steel tubing.
 - 2. Inner Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 - 3. Inner Grid wires must be full length and width of inside vertical divider frame. Wires not running full length or width, thus creating exposed wire ends will not be acceptable.
 - 4. Inner Grid wires must run horizontally and vertically creating a square or rectangular grid

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- pattern only. Grid wires not creating a square or rectangular grid pattern will not be acceptable.
5. Inner Grid wires shall intersect and cross all perpendicular wires, and shall be welded at all intersections.
- F. Back Panel:
1. Required on each locker to protect the locker contents and wall substrate, as well as provide an additional panel for accessory attachment.
 2. Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 3. Back panel must engage and be secured to vertical dividers via horizontal wires which extend into mounting holes pre-drilled in vertical dividers. Back panels are sandwiched between vertical dividers, preventing them from being removed after assembly is complete.
 4. Inner Grid wires must be full length and width of inside vertical divider frame. Wires not running full length or width, thus creating exposed wire ends will not be acceptable.
 5. Inner Grid wires must run horizontally and vertically creating a square or rectangular grid pattern only. Grid wires not creating a square or rectangular grid pattern will not be acceptable.
 6. Inner Grid wires shall intersect and cross all perpendicular wires, and shall be welded at all intersections.
- G. Shelves: (1) Upper, (1) Lower per individual locker unit. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed. Upper shelf shall include an integrated 20 gauge steel bracket to accept a 2" x 16" name placard (not included).
- H. Apparel Hooks: (3) per locker opening. .192" diameter ASTM 510 cold drawn steel wire resistance welded, cold formed and powder coated. Apparel hooks must securely engage and snap onto side or back grid, to prevent unintentional disengagement of hook.
- 2.3 HOSE AND SCBA STORAGE SYSTEM
- A. Model: GEARGRID Custom configured Heavy Duty Mobile Hose & SCBA Bottle rack.
1. (18) Shelf-Kit-Hose-Mobile-GearGrid
 2. (2) Shelf-SCBA-24"Wx20"D
 3. Units to be field assembled.
- 2.3 ACCESSORIES
- A. Hang Bar - (41) units:
1. Hang Bars must be manufactured to allow each locker user to install at their desired height. Hang Bars that span multiple locker openings are not acceptable.
 2. Tube: 1.25"O.D. x 16 gauge 304 stainless steel tubing.
 3. Brackets: Allow Hang Bars to be securely attached to each vertical divider, powder coated.
- B. Secure Box - (41) units:
1. 6" wide x 6" high x 12" deep 6061 Aluminum enclosure with hinged, lockable door at outer end. Design shall include an integrated mail slot. Powder coated finish in specified color.

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2.4 FINISH

- A. General: All system components excluding assembly and mounting hardware and stainless steel components are to receive the standard finish.
- B. Standard Finish: Components to be cleaned using a phosphatized bath, clear water rinse and electro-statically coated with a durable and UV-stable TGIC powder coating process. Thickness of applied finish shall be 3 – 4 mm for added protection.
- C. Color: As indicated or selected by Architect from manufacturers minimum number of seven colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install blocking required for mounting lockers as per manufacture's instructions prior to painting of walls, or paint blocking color of wall prior to locker install.
- B. Install locker in accordance with manufacturer's instructions.
- C. Use manufacturer's hardware for assembly.
- D. Anchor to mounting surface with proper hardware.
- E. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal locker manufacturer.

END OF SECTION 10 5100

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SECTION 11 3100 - RESIDENTIAL APPLIANCES (ALTERNATE #6)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of residential appliances and equipment:
 - 1. Microwave oven, drawer mounted.
 - 2. Side-by-side refrigerator/freezer.
 - 3. Stacked Washer/Dryer.
- B. Related Sections include the following:
 - 1. Division 12 Section "Institutional Casework"
 - 2. Division 22 and 23 Sections: Mechanical services and connections for appliances.
 - 3. Division 26 Sections: Electrical services and connections for appliances.

1.2 SUBMITTALS

- A. Product Data: For each appliance type required indicating compliance with requirements, including installation instructions. Provide complete operating and maintenance instructions for each appliance.

1.3 QUALITY ASSURANCE

- A. Energy Ratings: Provide residential appliances that carry labels indicating energy cost analysis (estimated annual operating costs) and efficiency information as required by Federal Trade Commission.
- B. UL and NEMA Compliance: Provide electrical components required as part of residential appliances that are listed and labeled by UL and comply with applicable NEMA standards.
- C. Single-Source Responsibility: Obtain appliances from a single supplier.
 - 1. To the greatest extent possible, provide appliances by a single manufacturer for entire Project.

1.4 DELIVERY AND STORAGE

- A. Deliver appliances to the Project site in the manufacturer's undamaged protective packaging.
- B. Defer delivery of appliances until utility rough-in is complete and construction in the spaces to receive appliances is substantially complete and ready for installation.

1.5 WARRANTIES

- A. Warranty: Submit written warranties executed by the manufacturer of each appliance specified agreeing to repair or replace units or components that fail in materials or workmanship within the specified warranty period.
 - 1. Microwave Oven: 9-year limited warranty on defects in the magnetron tube.
 - 2. Refrigerator/Freezer: 5-year warranty on the sealed refrigeration system.

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3. Clothes Washer/Dryer: 2-year warranty on the clothes washer and 10-year warranty on the inner wash basket and washer transmission.
- B. Warranties specified above shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Basis-of Design Appliance Manufacturer: General Electric Company (GE) unless otherwise indicated.
 1. For substitutions proposed by Contractor, submit detailed product data for scheduled products and proposed substitutions for comparison.
- B. Appliance Models: Subject to compliance with requirements, provide products indicated below.

2.2 APPLIANCES

- A. Microwave Drawer Oven
 1. Basis-of-Design Product: GE Microwave Drawer Oven.
 2. Model Number: PWL1126SWSS
 3. Color/finish: Fingerprint resistant stainless steel.
 4. Quantity: 1
- B. Side-By-Side Refrigerator/Freezer
 1. Basis-of-Design Product: Energy Star GE Model ~~TFY22ZRB-AA~~.
 2. Model Number: GNE27JYMFS
 3. Color/finish: Fingerprint resistant stainless steel.
 4. Quantity: 1
- C. Vertically Stacked Clothes Washer and Dryer
 1. Basis-of-Design Product: GE Unitized Spacemaker Energy Star Electric Dryer.
 2. Model Number: GUD27EESNWW
 3. Drum: Perforated stainless steel.
 4. Color/finish: Porcelain enamel white.
 5. Quantity: 2

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's instructions and recommendations.
- B. Built-In Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

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- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Utilities: Refer to Divisions 22 and 26 for plumbing and electrical requirements.

3.2 ADJUST AND CLEAN

- A. Testing: Test each item of residential equipment to verify proper operation. Make necessary adjustments.
- B. Accessories: Verify that accessory items required have been furnished and installed.
- C. Cleaning: Remove packing material from residential equipment items and leave units in clean condition, ready for operation.

END OF SECTION 11 3100

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SECTION 12 2413 - WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. Manual roller shades (WT-1).
 - 2. Manual roller shades with light-blocking fabric (WT-2).
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry": Blocking for support of window shades.
 - 2. Division 09 Section Gypsum Board Assemblies: Gypsum board substrate for window shade systems.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and mounting requirements.
- B. Shop Drawings: Include plans, elevations, sections, details, operational clearances, and attachments to other work.
- C. Samples for Initial Selection: For each type of shade material and exposed metal showing full range of colors and patterns available.
- D. Samples for Verification: For each type of roller shade.
 - 1. Shade Material: Not less than 10 inches square. Mark face of material to indicate interior faces.
 - 2. Exposed Metal: Full-size unit, not less than 10 inches long.
- E. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, and instructions for operating hardware to include in operation and maintenance manuals.
- F. Qualification Data: For manufacturer.
- G. Manufacturer's Certificates: For each product, signed by product manufacturer.
- H. Sample warranty.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Minimum 20 years' experience in manufacturing products comparable to those specified in this Section.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.

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- C. Surface-Burning Characteristics: As determined by testing identical products according to NFPA 701 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver shades until concrete, masonry, painting, and other wet work is complete and dry.
- B. Deliver shades to project in protective packaging, labeled to identify each shade for each opening.
- C. Store products in manufacturer's unopened packaging until ready for installation.

1.5 PROJECT CONDITIONS

- A. Do not install shades until building is operating at ambient temperature and humidity and ventilation levels for project upon completion.
- B. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 COORDINATION

- A. Ensure that locating templates and other information required for installation of roller shades are furnished to other trades.
- B. Coordinate construction of surrounding conditions to allow for timely field dimension verification.

1.7 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Hardware and Shade Fabric Warranty: Submit a written limited warranty executed by the manufacturer agreeing to repair or replace hardware and shade fabric that fail in materials or workmanship within the specified warranty period.
 - 1. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by Draper, Inc., or comparable products by one of the following:
 - 1. Lutron Electronics Co., Inc.
 - 2. MechoShade Systems, Inc.

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2.2 MANUALLY OPERATED ROLLER SHADES (WT-1)

- A. Basis-of-Design Product: Manual Clutch-Operated FlexShade NEXD.
- B. Description: Manually operated, vertical roll-up, fabric window shade with all components required for complete installation.
- C. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - 1. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon.
 - a. Color: Black.
 - 2. Bead chain loop: Stainless steel bead chain hanging at side of window.
 - 3. Idler Assembly: Roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.
 - 4. Bead Chain Hold Down: P-Clip (standard).
- D. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal and to eliminate horizontal impressions in fabric.
- E. Shade Slat: Closed pocket elliptical slat encased in heat seamed hem, with plastic end caps.
- F. Mounting:
 - 1. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - a. Endcap covers: Color as selected by Architect from manufacturer's standard range.
- G. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
 - 1. Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
 - 2. Shape: Square Fascia Panel.
 - 3. Color: To match end cap color.
- H. Shade Fabric: Light filtering fabric.

2.3 MANUALLY OPERATED ROLLER SHADES WITH LIGHT-BLOCKING FABRIC (WT-2)

- A. Basis-of-Design Product: Manual FlexShade.
- B. Description: Manually operated, vertical roll-up, fabric window shade with all components required for complete installation.
- C. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - 1. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon.
 - a. Color: Black.

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2. Bead chain loop: Stainless steel bead chain hanging at side of window.
 3. Idler Assembly: Roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.
 4. Bead Chain Hold Down: P-Clip (standard).
- D. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal and to eliminate horizontal impressions in fabric.
- E. Shade Slat: Closed pocket elliptical slat encased in heat seamed hem, with plastic end caps.
- F. Mounting:
1. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - a. Endcap covers: Color as selected by Architect from manufacturer's standard range.
- G. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
1. Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
 2. Shape: Square Fascia Panel.
 3. Color: To match end cap color.
- H. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shade fabric guides or other means of aligning shade fabric with channels at tops.
- I. Sill Channel: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
- J. Shade Fabric: Light-blocking fabric.
- 2.4 SHADE FABRIC
- A. Shade Fabric Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric:
1. Silver Screen: PVC coated fiberglass with ultra-fine layer of aluminum.
 2. Thickness: 0.5 mm thick.
 3. Openness Factor: 4% average.
 4. Color: As selected by Architect from manufacturer's standard range.
- C. Light-Blocking Fabric:
1. Apagon Style III ATF: 3-ply opaque fabric consisting of vinyl and fiberglass with proprietary light block coating.
 2. Thickness: 0.333 mm thick.
 3. Color: As selected by Architect from manufacturer's standard range.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions for compliance with requirements tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.
- C. Install shades to provide smooth operation.

3.3 ADJUSTING

- A. Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 DEMONSTRATION

- A. Demonstrate proper operation and maintenance of window shades to Owner's designated representatives.

3.6 SCHEDULE

- A. Refer to Drawings for shade types and locations.

END OF SECTION 12 2413

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SECTION 12 3213 - INSTITUTIONAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Plastic-laminate-faced wood cabinets of stock design.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry": Wood blocking for anchoring institutional casework.
 - 2. Division 09 Section "Non-Structural Metal Framing": Sheet metal reinforcement for anchoring institutional casework.
 - 3. Division 06 Section "Architectural Woodwork": Custom plastic laminate woodwork, including shelves.
 - 4. Division 09 Section "Resilient Flooring": Resilient base applied to institutional casework.
 - 5. Division 22 Sections: Sinks and faucets.
 - 6. Division 26 Sections: Electrical work, including undercabinet lighting fixtures.

1.2 DEFINITIONS

- A. Exposed Portions of Cabinets: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, and surfaces visible in open cabinets.
- B. Semiexposed Portions of Cabinets: Surfaces behind opaque doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors. Tops of cases 78 inches or more above floor are defined as semiexposed.
- C. Concealed Portions of Cabinets: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for institutional casework. Include plans, elevations, sections, large-scale details of cabinet construction, sink locations, and attachments to other Work.
- C. Samples for Verification: 6 inch square Samples for each type of finish, including countertop material and the following:
 - 1. Section of countertop showing top, front edge, and backsplash construction.
 - 2. For Manufacturers other than Basis-of-Design manufacturer, submit the following:
 - a. One full-size finished base cabinet of each type complete with hardware, doors and drawers, but without countertop.
 - b. One full-size finished wall cabinet complete with hardware, doors, and adjustable shelves.

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3. Maintain full-size Samples at Project site during construction in an undisturbed condition as a standard for judging the completed Work.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of institutional casework manufacturer for installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: An experienced manufacturer with not less than 5 years producing modular casework of type indicated for Project, with a published catalog and national distribution, and a record of successful in-service performance.
- C. Source Limitations: Obtain institutional casework through one source from a single manufacturer.
 1. Manufacturer shall be Certified Participant in AWT's Quality Certification Program.
- D. Quality Standard: Unless otherwise indicated, comply with AWT's "Architectural Woodwork Quality Standards," Section 1600. In addition, criteria of Section 400 shall apply as follows:
 1. Grade: Premium.
 2. Style: 400-G-7; Flush overlay.
 3. Standard Dimensions: 400-G-9.
 4. Countertop Joint Tolerances: 400C-T-1.
 5. Flushness Between Factory Assembled Joints: 400C-T-2.
 6. Where there are differences between Section 1600 and Section 400 for provisions specified, the more restrictive provision shall apply.
- E. Product Designations: Drawings indicate sizes, configurations, and finish material of institutional casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish material, and complying with the Specifications may be considered. Refer to Division 1 Section "Product Requirements."
- F. Hard English Dimensions: Provide base and wall cabinets that establish finished counter top and clearance dimensions without shimming top or expanding or reducing base. Cabinets shall be fabricated in Hard English dimensions to correspond to dimensions indicated on Drawings.
- G. Accessibility: Comply with applicable requirements of the Americans with Disabilities Act "Accessibility Guidelines" (ADAAG), together with ANSI A117.1 "Accessible and Usable Buildings and Facilities."

1.5 PRODUCT HANDLING

- A. Deliver institutional casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

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1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install institutional casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where institutional casework is indicated to fit to other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating institutional casework without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate layout and installation of metal framing and reinforcements in gypsum board assemblies for support of institutional casework.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of institutional casework that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Delamination of components or other failures of glue bond.
 - 2. Warping of components.
 - 3. Failure of operating hardware.
 - 4. Deterioration of finishes.
- B. Warranty Period: 5 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish complete touchup kit for each type and finish of institutional casework provided. Include scratch fillers, stains, finishes, and other materials necessary to perform permanent repairs to damaged casework finish.
- B. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Supply one full sheet, as supplied by plastic laminate manufacturer, for each color plastic laminate used in the work.
 - 2. Supply 5 yards of vinyl edge trim for each thickness and color used in the work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product for Cabinets: The design for institutional casework is based on L44 Series; LSI Corporation of America, Inc. Provide the specified product or a comparable product by one of the following:

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1. TMI.
2. PolyVision.

B. Manufacturer of Plastic-Laminate Material:

1. As indicated by manufacturer's designations on the Drawings.

2.2 MATERIALS

A. General:

1. Softwood Plywood: DOC PS 1.
2. Particleboard: ANSI A208.1, Grade M2-Exterior Glue.
3. Core Material: Formaldehyde-free core material of recycled, annually renewable, blended bio-fiber; ANSI A208.1, Grade M3.
4. Medium-Density Fiberboard: ANSI A208.2, Grade MD-Exterior Glue.
5. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 - a. Laminating Adhesive: Hybrid P.V.A. Type III water resistant adhesives.
6. Edgebanding for Plastic Laminate: Colors selected by Architect from manufacturer's full range, and as follows:
 - a. Edging at Doors, Drawer Faces and Exposed Shelving: Rigid PVC extrusions, through color with satin finish, 3 mm thick. [3mm ABS NaturEdge™ Express Collection banding, machine profiled to 1/8 inch radius.]
 - b. Cabinet Body Edging: 1 mm high-impact color-through PVC for cabinet end panels, top, bottom, door/drawer front spacer rail, and shelf; length beveled both sides.
 - c. Interior Cabinet Edging: Flat edge PVC matching cabinet interior surface color, for interior dividers and top of drawer body.
7. Adhesive: Water based low Volatile Organic Compound (VOC), non-toxic, PVA adhesive.

B. Exposed Cabinet Materials:

1. Plastic Laminate: Type VGS.
 - a. Unless otherwise indicated, provide plastic laminate for exposed surfaces.

C. Semi-exposed Cabinet Materials:

1. Melamine-Faced Particleboard: Particleboard with decorative surface of thermally fused, melamine-impregnated web and complying with LMA SAT-1.
 - a. Provide melamine-faced particleboard for semiexposed surfaces, unless otherwise indicated.

D. Concealed Cabinet Materials: Plastic laminate; Type BKL.

2.3 DESIGN, COLOR, AND FINISH

A. Design: Provide institutional casework of the following design:

1. Flush overlay with wire pulls.

B. Plastic-Laminate Colors, Patterns, and Finishes: As indicated by product designations on the Drawings.

C. Melamine-Faced Particleboard Colors, Patterns, and Finishes: As selected by Architect from casework manufacturer's full range.

D. Powder Coated Metal Finish: As selected by Architect from casework manufacturer's full range.

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2.4 CABINET FABRICATION

A. Plastic-Laminate-Faced Cabinet Construction:

1. Bottoms and Ends of Cabinets, Shelves, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, melamine faced on semiexposed surfaces.
2. Backs of Cabinets: 3/8-inch particleboard, plastic-laminate faced on exposed surfaces, melamine faced on semiexposed surfaces.
 - a. Construct structural cabinet body with backs inset 7/8 inch from rear of cabinet body, fully housed four sides, and back-shimmed.
 - b. Provide 3/4 inch thick stiffeners glued and fastened to back and body; with back perimeter and stiffeners fully sealed with hot melt adhesive.
3. Cabinets Over 36 Inches Wide: Provide mechanically fastened, removable, vertical divider to control horizontal member or shelf deflection.
4. Hang Rails: Provide 3/4 inch thick hang rails glued to backside and mechanically fastened to end panel of wall, base and tall cabinets.
5. Wall Cabinet Interior Depth: 12 inches clear with door closed.
6. Drawer Fronts: 3/4-inch particleboard, plastic-laminate faced on both sides; applied to separate drawer body component subfront.
7. Drawer Bodies: 1/2-inch particleboard, melamine faced on both sides, onset bottoms. Drawer sides dadoed and glued to receive front and back, machine squared and held under pressure while hot melt glued and pinned together. Drawer bottom 1/4 inch minimum, recessed 1/2 inch up from bottom of drawer body, fully captured in dados on 4 sides, sealed with hot melt adhesive. Provide drawer bottom stiffeners glued and mechanically fastened to bottom and body for drawers as follows:
 - a. Drawers less than 24 inches wide: Provide one stiffener from front to back.
 - b. Drawers from 24 to 36 inches wide: Provide two stiffeners from front to back.
 - c. Drawers from 36 to 48 inches wide: Provide three stiffeners from front to back.
8. Paper Storage Drawers: Fitted with full width hood at back.
9. Flat File Drawers: Reinforce inside front inside corners of drawer box with metal angles fastened to drawer body. Provide full width hood at rear top of drawer body extending forward 4 inches.
10. Doors: 3/4-inch particleboard or medium density fiberboard, plastic-laminate faced on both sides.
11. Drill cabinet bodies to receive shelves with holes coordinated with shelf clip pin diameter and spaced at 32 mm on center.
12. Cut recess into door edges with butt hinges to allow for hinge thickness. Gaps at door edges shall be even with no variation between any door edge. Comply with gap allowances of referenced standard.
13. Subbase: Support floor mounted cabinets with subbase of separate, continuous ladder-type platform design, fabricated from exterior grade plywood. Recess at exposed cabinet ends 1/4 inch to permit field installation of base. No continuous sides to floor on cabinets will be permitted.
14. On overhead cabinets provide 1-1/2" apron/valance for accommodating under cabinet lighting.
15. Finished Ends: Provide finished end panels in plastic-laminate casework at locations on Drawings designated "F.E.", or at any location visibly exposed.
16. Colors, Patterns, and Finishes: As indicated in Finish Legend on the Drawings, or if not indicated, as selected by Architect from manufacturer's full range.

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- B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and equipment. Fabricate from same material and with same finish as cabinets.
- C. At microwave drawer location, coordinate complete installation. Provide any needed supplemental supports, framing, fillers and/or modifications to existing unit as needed to accommodate microwave unit.
- D. Provide valance in wall cabinets shown with undercabinet lighting fixtures, and coordinate cabinet construction to accommodate installation, support and wiring for light fixtures.

2.5 CASEWORK HARDWARE

- A. Hardware, General: Provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware complying with requirements indicated.
 - 1. Use threaded metal or plastic inserts with machine screws for fastening to core material except where hardware is through-bolted from back side.
- B. Hinges: Provide Frameless Concealed Hinges (European Type), BHMA A156.9, B01602, with between 135 to 165 degrees of opening, self-closing.
- C. Wire Pulls: Back mounted, 4 inches long, 5/16 inches in diameter brushed solid stainless steel.
- D. Door Catches: Dual, self-aligning, permanent magnet catch. Provide 2 catches on doors more than 48 inches high.
- E. Drawer Slides: Powder-coated, bottom mounted, metal-channel, and self-closing drawer slides with outstop, instop and out-keeper, designed to prevent rebound when drawers are closed, with nylon-tired, ball-bearing rollers, and complying with BHMA A156.9, Type B05091, and rated for the following loads:
 - 1. Box Drawer Slides: 100 lbf. dynamic load, minimum 150 lbf. static load.
 - 2. File Drawer Slides: 200 lbf. dynamic and static load rating.
 - 3. Flat File/Paper Storage Drawer Slides: 200 lbf. dynamic and static load rating, and full extension.
- F. Cabinet Door and Drawer Locks: Cylindrical (cam) type, 5-pin tumbler, brass with chrome-plated finish, complying with BHMA A156.11, Grade 1.
 - 1. Provide a minimum of two keys per lock and six master keys.
 - 2. Provide locks for all drawers in Radio 101.
- G. Adjustable Shelf Supports: 2-pin locking plastic shelf rests complying with BHMA A156.9, Type B04013.
- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Stainless Steel: BHMA 630.
- I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of institutional casework.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

- A. Install plumb, level, and true; shim as required, using concealed shims. Where institutional casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Base Cabinets: Set subbase and cabinets straight, level, and plumb. Secure subbase to floor before installing cabinet bodies. Adjust subtops within 1/16 inch of a single plane. Fasten cabinets to partition framing, wood blocking, or reinforcements in partitions with fasteners spaced 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
 - 1. Fasten subbase to floor with fasteners spaced 24 inches o.c. Secure bottom of cabinets to subbase with no less than two fasteners per cabinet.
- C. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Align similar adjoining doors to a tolerance of 1/16 inch.
 - 1. Fasten through back, near top and bottom, at ends, and not more than 16 inches o.c. with the following:
 - a. Toggle bolts through metal backing, metal framing behind wall finish or cells of concrete masonry.
 - b. No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips. Hanging strips only may be employed when fully concealed at sides of cabinets.
- D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises, unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- E. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- F. Adjust catches to engage doors positively and hold close and for hinges to operate without binding. If catch or hinges cannot be adjusted to meet these criteria, readjust cabinet installation to allow for proper hinge and catch operation.

3.3 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

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- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 12 3213

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SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Protecting existing trees, shrubs, groundcovers, plants and grass to remain.
 - 2. Removing existing trees, shrubs, groundcovers, plants and grass.
 - 3. Protecting elements on adjacent properties.
 - 4. Stripping and stockpiling topsoil.
 - 5. Removing above and below grade site improvements.
 - 6. Disconnecting, capping or sealing, and removing site utilities.
- B. Related Sections include the following:
 - 1. Division 01 Section "Construction Waste Management."

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain on Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

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- B. Record drawings, identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements.

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by the Owner and authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Section 312000, "Earth Moving."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. The contractor, subcontractors, and their personnel shall follow the procedure and practices for waste separation, collection and transport as defined in the contractor's "Waste Management Plan" as required by Division 01 Section "Construction Waste Management."

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3.2 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Provide erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated.
- D. Protect existing site improvements from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
 - 1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

3.4 UTILITIES

- A. Contractor shall arrange for disconnecting and sealing utilities that serve existing structures before site clearing.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.

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- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner/Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without permission.
- D. Excavate for and remove underground utilities indicated to be removed (TBR).
- E. Removal of underground utilities is included in Division 31 Sections covering site utilities.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 35 feet.
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Dispose of excess topsoil as specified for waste material disposal.

3.7 SITE IMPROVEMENTS

- A. Remove existing above and below-grade improvements as indicated and as necessary to facilitate new construction.

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- B. Remove slabs, paving, curbs, stairs, gutters, pole bases, fencing and aggregate base as indicated to nearest joint or as required.
 - 1. Contractor shall take precautions to prevent damage to adjoining features to remain. Contractor will be responsible to repair all damage due to demolition at his own expense.

3.8 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - 1. Dispose of all materials in accordance with Federal, State and Local regulations.

END OF SECTION 311000

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SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Excavating and filling for rough grading the Site.
 - 2. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, and plants.
 - 3. Excavating and backfilling for buildings and structures.
 - 4. Drainage course for concrete slabs-on-grade.
 - 5. Subbase course for concrete walks and pavements.
 - 6. Subbase course and base course for asphalt paving.
 - 7. Subsurface drainage backfill for walls and trenches.
 - 8. Excavating and backfilling trenches for utilities and pits for buried utility structures.
 - 9. Excavating well hole to accommodate elevator-cylinder assembly.
- B. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for recording preexcavation and earth-moving progress.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices for earth moving specified in Section 012200 "Unit Prices."
- B. Quantity allowances for earth moving are included in Section 012100 "Allowances."
- C. Unit prices for earthwork are included in Bid Form "Unit Prices."
- D. No payment will be made for replacement of disturbed soils that would otherwise be satisfactory but are not properly protected by Contractor and maintained at optimum moisture content.
- E. Payment will be made only for soil replacement observed as a result of proofrolling existing subgrades. No payment will be made for soil replacement or excavation and backfill as shown on plans.

1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

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1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
 3. Flowable Fill: Structural flowable fill or lean concrete used at excavated existing fill areas.
- B. Base Course: Aggregate layer placed between the subbase course and warm-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Soil Replacement: Complete removal of offsite disposal of materials within areas indicated, and replacement with engineered fill.
- I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. (0.76 cu. m) for bulk excavation or $\frac{3}{4}$ cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
 2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
 3. Rock excavation for trenches and pits includes removal and disposal of materials and obstructions encountered that cannot be excavated with a track-mounted power excavator, equivalent to Caterpillar Model NO. 329D L, 204 HP, 55,977 lb. drawbar pull and 36 inch bucket rated at 1.0 cubic yard capacity. Trenches in excess of 10 feet in width and pits in excess of 30 feet in either length or width are classified as bulk excavation.
 4. Rock excavation in bulk excavations includes removal and disposal of materials and obstructions encountered that cannot be dislodged and excavated with modern, track-mounted, heavy-duty excavating equipment without drilling or blasting. Rock excavation

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equipment is defined as Caterpillar Model No. 973C or equivalent track-mounted loader, rated at not less than 242 HP flywheel power and developing minimum of 47, 900 pound breakout force (measured in accordance with SAE J732).

- a. Intermittent ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
- J. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material $\frac{3}{4}$ cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.
- K. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- L. Subbase Course: Aggregate layer placed between the subgrade and base course for warm-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or warm-mix asphalt walk.
- M. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- N. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct preexcavation conference at Project site.
 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.
 - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
 - d. Extent of trenching by hand or with air spade.
 - e. Field quality control.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 1. Geotextiles.
 2. Controlled low-strength material, including design mixture.
 3. Geofoam.
 4. Each type of plastic Warning tapes.
 5. Compressive strength tests for flowable fill
 6. Drainage fabric
- B. Samples for Verification: For the following products, in sizes indicated below:
 1. Geotextile: 12 by 12 inches.
 2. Warning Tape: 12 inches long; of each color.

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- C. Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.
 - 3. Test reports on borrow material.
 - 4. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
 - 5. Field test reports for in-place Soil Density Tests.
 - 6. One optimum moisture-maximum density curve for each type of satisfactory soil which may be used as fill.
 - 7. Report of satisfactory proof-rolling and/or testing of natural subgrade.
- D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each borrow soil material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D2487.
 - 2. Laboratory compaction curve according to ASTM D698
- C. Blasting plan approved by authorities having jurisdiction.
- D. Seismic survey report from seismic survey agency.
- E. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.
- F. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.
- G. Engineer Qualifications: A professional Engineer legally registered in the State of Pennsylvania experienced in the design of concrete work and type of construction indicated on the drawings. Engineering services are defined as those performed for formwork, shoring and restoring installations that are similar to those indicated for the Project in material, design and extent.
- H. Testing and Inspection Service: Owner will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform on-site soil testing and inspection service during earthwork operations. Testing and reports required for all off-site fill and all off-site testing shall be the Contractor's responsibility.
- I. Testing Laboratory Qualifications: To qualify for acceptance, the testing laboratory must demonstrate to Engineer's satisfaction, based on evaluation of laboratory-submitted criteria

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conforming to ASTM E 329, that it has the experience and capability to conduct required field and laboratory geotechnical testing without delaying the progress of the Work.

- J. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- K. Any work or material that does not meet the specified values or is determined to be in non-compliance shall be removed and replaced by the contractor at no additional cost to the Owner.

1.8 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.9 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Engineer.
- C. Utility Locator Service: Notify "Call Before You Dig", "One Call" for area where Project is located before beginning earth-moving operations.
 - 1. Locate existing underground utilities in areas of excavation work prior to beginning excavation operations. Visibly mark or stake existing utilities for the duration of construction and renovations. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
 - 2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 3. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.
 - 4. Provide minimum 48-hour notice to Owner and receive written notice to proceed before interrupting any utility.
 - 5. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified are in place.

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- E. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.
- F. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- I. Test borings and other exploratory operations may be performed by the Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.
- J. Vertical Limits of Responsibility: Contractor is responsible for excavation to the required subgrade elevations (cut), not more than 12 inches below existing grade (fill) for bulk excavation and subgrade of structures and bottom of pipe, conduit or footings for trench excavation.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
 - 1. Contractor is responsible for site excess or shortage of fills. Fill must be placed in accordance with the approved Erosion and Sediment Control Plan. Contractor is responsible for verification of all quantities prior to and during construction.”)
- B. Satisfactory Soils: Soil Classification [Groups GW, GP, GM, GC, SM, SW, SP, SC, MIL and CL according to ASTM D2487], or a combination of these groups; free of rock or gravel larger than 3 inches) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Satisfactory soils shall be maintained within $\pm 2.0\%$ optimum moisture content in accordance with ASTM D1557 or applicable proctor density results.
- C. Unsatisfactory Soils: Soil Classification [Groups MH, CH, OL, OH and PT according to ASTM D2487] or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction as determined by ASTM D1557 or applicable proctor density results.

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- D. Subbase Material: Evenly graded mixture of natural or crushed gravel, or crushed stone complying with PennDOT 2A, with 100 percent passing a 2 inch sieve and not more than 10 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Backfill and Fill: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter, or engineered fill.
- G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, natural or crushed stone meeting the standards of PennDOT 2A and natural or crushed sand; ASTM D2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- H. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- I. Drainage Fill: Evenly graded mixture of natural or crushed gravel, or crushed stone complying with AASHTO No. 57 (PennDOT 2B), with 100 percent passing 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve. Wash stone thoroughly.
- J. Drainage Course: Narrowly graded mixture of [washed] crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.
- K. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- L. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state
- M. Sand: ASTM C33; fine aggregate, natural or manufactured sand.
- N. Subbase Material: Evenly graded mixture of natural or crushed gravel, or crushed stone complying with PennDOT 2A, with 100 percent passing a 2 inch sieve and not more than 10 percent passing a No. 200 sieve.
- O. Topsoil: Fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter and free of roots, stumps, stones larger than 2 inches in any dimension and other extraneous or toxic matter harmful to plant growth.
 - 1. As suitable topsoil is not available on-site, obtain additional topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than four (4) inches; do not obtain from bogs or marshes.

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2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
 2. Survivability: As follows:
 - a. Grab Tensile Strength: 157 lbf; ASTM D4632.
 - b. Sewn Seam Strength: 142 lbf; ASTM D4632.
 - c. Tear Strength: 56 lbf; ASTM D4533.
 - d. Puncture Strength: 56 lbf; ASTM D4833.
 3. Apparent Opening Size: No. 40 sieve, maximum; ASTM D4751.
 4. Permittivity: 0.5 per second, minimum; ASTM D4491.
 5. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
 2. Survivability: As follows:
 - a. Grab Tensile Strength: 247 lbf; ASTM D4632.
 - b. Sewn Seam Strength: 222 lbf; ASTM D4632.
 - c. Tear Strength: 90 lbf; ASTM D4533.
 - d. Puncture Strength: 90 lbf; ASTM D4833.
 3. Apparent Opening Size: No. 60 sieve, maximum; ASTM D4751.
 4. Permittivity: 0.02 per second, minimum; ASTM D4491.
 5. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: 2000-psi Self-compacting, low-density, flowable concrete material produced from the following:
1. Portland Cement: ASTM C150, Type I, II, or III.
 2. Fly Ash: ASTM C618, Class C or F.
 3. Normal-Weight Aggregate: ASTM C33, 3/4-inch nominal maximum aggregate size.
 4. Foaming Agent: ASTM C869.
 5. Water: ASTM C94/C94M.
 6. Air-Entraining Admixture: ASTM C260.
- B. Produce low-density, controlled low-strength material with the following physical properties:
1. As-Cast Unit Weight: 36 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C138/C138M.
 2. Compressive Strength: 80 psi, when tested according to ASTM C495.
- C. Produce conventional-weight, controlled low-strength material with 80-psi compressive strength when tested according to ASTM C495.

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2.4 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.
- B. Weed Control: Granular form, Treflan, Ettam, or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
- D. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface or as specified in Section 311000, "Site Clearing."
- E. Provide protective insulating materials to protect subgrade and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

- A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
- B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

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- D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.
- E. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area. Maintain positive slope of site excavation to prevent ponding of water on areas to receive paving or slabs.
- F. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- G. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches. Comply with soil erosion control plan.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Excavation Classifications: The classifications for all excavation will be unclassified excavation, all work (excavated material) shall be removed under this Contract.
- B. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.
- C. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations of dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.
 - 1. Under footing, foundation bases or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation by extending indicated bottom elevation of fitting or base to excavation bottom, without altering required

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- top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Engineer.
2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classifications, unless otherwise directed by Engineer.
- D. Additional Excavation: When excavation has reached required subgrade elevation, notify Engineer who will make an inspection of conditions.
1. If unsuitable bearing materials are encountered at required subgrade elevations, consult with Engineer.
 2. Removal of unsuitable material and its replacement as directed will be paid on basis of Contract Conditions relative to changes in work.
- E. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
1. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- F. Earth Excavation Types: Earth Excavation includes bulk and trench earth excavation:
1. Bulk Earth Excavation: Bulk earth excavation includes excavation of subsoil required to accommodate building foundations, slabs-on-grade, paving, site structures, final site contours and other construction operations by one of the following methods:
 - a. Hand Excavation: Hand excavation is defined as digging soil by hand shoveling, including loosening with a pick and no more than total lift of six (6) feet. Unit prices shall include labor, materials and platforms and shoring if required, and disposal.
 - b. Machine Excavation: Machine excavation is defined as excavation requiring power equipment and includes transportation, set-up/unrigging and disposal.
 2. Trench Earth Excavation: Earth excavation for trenches and pits includes removal and disposal of earth material not defined as rock excavation, required to accommodate footings, utilities, sanitary storm and wastewater piping, culverts and other subgrade site work. Trenches in excess of 10'-0" wide and pits in excess of 30'-0" in either length or width are classified as bulk excavation.
 - a. Hand Excavation: Hand excavation is defined as digging soil by hand shoveling, including loosening with a pick and no more than total lift of six (6) feet. Unit prices shall include labor, materials and platforms and shoring if required, and disposal.
 - b. Machine Excavation: Machine excavation is defined as excavation requiring power equipment and includes transportation, set-up/unrigging and disposal.
- G. Soil Replacement: Removal of Defined Unsuitable Soils. Soil replacement includes fill with compacted satisfactory soils and/or engineered fill.
- H. Rock Excavation Types: Rock excavation includes bulk and trench rock excavation.
1. Bulk Rock Excavation: Bulk rock excavation includes removal and disposal of materials and obstructions, except boulders, which are encountered and cannot be removed with heavy-duty excavating equipment without drilling, blasting, ram hammering or ripping. Excavation equipment equal to Caterpillar Model No. 973 or equivalent track-mounted loader, rated at not less than 54,000 pounds operating weight, 210 HP rated power and developing minimum of 44,000-pound bucket breakout force (measured in accordance with SAE J732). Excavation which can be accomplished with this equipment or equivalent shall be considered as Earth Excavation. Comply with any of the following methods for removal of rock. Method must be approved by the Engineer prior to commencing removal:

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- a. Hand Method: Rock excavation by hand method shall mean removal of rock type materials by a worker using pneumatic vibrating chippers when other rock removal methods are ruled out as too dangerous to nearby buildings and their stability.
 - b. Ram Hammer: Rock excavation by ram hammer method shall mean removal of rock type materials using boom mounted pneumatic, impact hammer equipment, when other rock removal methods are ruled out as too dangerous to nearby buildings and their stability.
 - c. Boulders: Boulder excavation shall mean removal of free floating rock by excavation equipment at least equal to Caterpillar Model No. 973 or No. 320 track mounted equipment. Boulders which cannot be removed with the above equipment shall be removed and compensated for by blasting, ripping, hand method or ram hammer. Boulders encountered shall be set aside for measurement, then removed from the site, including those not qualified as rock. Large boulders shall be split into smaller units as required for disposal at no additional cost.
 - d. Blasting: Blasting shall be performed in compliance with local and state ordinances and regulations.
2. Trench Rock Excavation
- a. See definitions.
 - b. Trenches in excess of 10 feet in width and pits in excess of 30 feet in either length or width are classified as bulk rock excavation.
 - c. Ripping, hand method, ram hammer, and boulder rock removal methods may be used for trench rock removal. Reference Bulk Rock Excavation for description and definition of these methods.
- I. Unauthorized Excavation: Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.
- 1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Engineer.
 - 2. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.
- J. Additional Excavation: When excavation has reached required subgrade elevations or bottom of soil replacement, perform rod penetrations and forward results to Engineer before proceeding with the foundations/footing work. If Engineer determines that bearing materials at required subgrade elevations are unsuitable, continue additional excavation until suitable bearing materials are encountered and replace excavated material as directed by Engineer.
- 1. Removal of unsuitable material and its replacement outside the defined limits of excavation or soil replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

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1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.
4. Unsuitable material below the proposed additions is to be removed as outlined on the Structural plans. There will be no additional compensation for removal of the material within the limits defined on the plan.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades. Unless noted otherwise, maintain subgrade with same slope and pitch as indicated for finish surface.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
1. Clearance: 6 inches minimum of each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
 3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.

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4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- E. Trenches in Tree- and Plant-Protection Zones:
 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.8 SUBGRADE INSPECTION

- A. Notify Engineer when excavations have reached required subgrade.
- B. If Engineer/Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill, engineered fill, flowable fill, or fill material as directed.
- C. Proof-roll subgrade below the building slabs, pavements and special excavation areas with a heavy pneumatic-tired equipment, or as directed by Engineer to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
 3. Proof-roll the footprint of the building and pavement areas plus a 5-foot wide perimeter zone. Proof roll after the site has been stripped and prior to fill/backfill placement. Proof roll areas where it is necessary to excavate to reach the floor or pavement subgrade elevation after the excavation work is complete. Proof rolling not required where foundation or floor of the existing structure remains in place.
 4. Proof roll using a rubber-tire roller or tandem axle dump truck that weighs at least 40,000 pounds and which has a tire pressure of at least 100 psi.
 5. Apply a minimum of four complete coverages to the subgrade consisting of two coverages in one direction followed by two coverages in the transverse direction with the specified equipment.
 6. Over excavate weak or soft areas exposed by pumping, weaving, rolling and/or cracking of the subgrade under the specified proof rolling equipment as follows:
 - a. Over excavate weak or soft areas exposed by pumping, weaving, rolling and/or cracking of the subgrade under the specified proof rolling equipment as follows:
 - b. Pavement Footprint and 5-Foot Wide Perimeter Zone – Over excavate to firm, unyielding stratum or to a depth of 24 inches whichever is less.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

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- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.
- F. Seal the subgrade with a smooth drum roller in the event of predicted precipitation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.10 COLD WEATHER PROTECTION

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.
- B. Comply with the requirements of ACI 306R-88 and in particular, Chapter 4 – Preparation before Concreting.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing for backfill and fill. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- B. General Contractor is responsible for final grading and seeding of the entire stockpile area at final completion unless agreed to otherwise in writing by the Owner.
- C. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
- D. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

3.12 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, damp proofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.

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6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.13 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within up to 18 inches of bottom of footings with satisfactory engineered soil; fill remaining 18" with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
- D. Trenches under Roadways: Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
- E. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- F. Initial Backfill:
1. Soil Backfill: Place and compact initial backfill of [subbase material] [satisfactory soil] engineered fill, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
 2. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.
- G. Final Backfill:
1. Soil Backfill: Place and compact final backfill of satisfactory soil engineered fill to final subgrade elevation.
 2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- H. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.14 SOIL FILL

- A. General: Soil fill shall be used only for landscape areas. All other areas shall employ engineered fill. The Contractor shall protect excavated material which he intends on reusing as fill or backfill.

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Contractor shall stock-pile and protect excavated satisfactory soil and is responsible for maintaining the quality of this soil.

- B. Preparation: Remove vegetation, topsoil, debris, wet and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
- C. Contractor shall place 6" minimum topsoil in areas of the work.
- D. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.
- E. Proof-rolling: Proof roll the natural subgrade under all walls, pavements and concrete slabs prior to placing subbase or compacted fill material.
- F. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- G. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.
 - 6. Where voids are left by boulder removal use subbase or base material or satisfactory soil or borrow material.
 - 7. Under Portland Cement Concrete Paving and steps, use engineered fill material.
 - 8. Under footings, piping, conduit and equipment that come within 6 inches above the rock bearing surface or for correction of unauthorized excavation, use subbase materials or engineered fill as directed by Engineer.
 - 9. Under footings and foundations where poor soil was removed, use engineered fill.
- H. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content. No additional compensation will be made for Contractor to correct soils for optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface to natural subgrade prior to placement

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of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under “Compaction” for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- B. Proof roll natural subgrade with a minimum 7-1/2 ton roller. Areas which indicated a “pumping” action shall be excavated in one (1) foot intervals, or as directed, and re-proof rolled until “pumping” action no longer exists.
- C. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Place backfill and fill soil materials evenly on all sides of structures, piping or conduit to required elevations and uniformly along the full length of each structure. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
- E. Compact soil materials to not less than the following percentages of maximum dry unit weight according to [ASTM D1557]:
 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.
- F. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Engineer if soil density tests indicate inadequate compaction.
 1. Maintain structural fill nominally at Optimum Moisture Content in accordance with ASTM D1557.
 2. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for cohesive soils determined in accordance with ASTM D 1557: and not less than the following relative density for cohesionless soils determined in accordance with ASTM D 4253 and D 4254:
 - a. Under Structures, Building Slabs and Steps: Compact top 12 inches of subgrade and each layer of engineered fill material at 95 percent maximum density.
 - b. Under Lawn or Unpaved Areas: Compact top 6 inches of natural subgrade and each layer of backfill or fill material at 88 percent maximum density.
 - c. Under Walkways and Pavements: Compact top 6 inches (for walkways) and 12 inches (for pavements) of natural subgrade and each layer of backfill or fill material at 95 percent maximum density.

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3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.18 SUBSURFACE DRAINAGE

- A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
 - 1. Compact each filter material layer with a minimum of two passes of a plate-type vibratory compactor.
- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
 - 1. Compact each filter material layer with a minimum of two passes of a plate-type vibratory compactor].
 - 2. Place and compact impervious fill over drainage backfill in 6-inch-thick compacted layers to final subgrade.

3.19 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 - 1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - 2. Place base course material over subbase course under hot-mix asphalt pavement.
 - 3. Shape subbase course and base course to required crown elevations and cross-slope grades.
 - 4. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.

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5. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698.
- C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.20 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place drainage course 6 inches or less in compacted thickness in a single layer.
 3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

3.21 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 2. Determine that fill material classification and maximum lift thickness comply with requirements.
 3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.

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- E. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.
- G. If in opinion of Engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, replace material and perform additional compaction and testing until specified density is obtained.

3.22 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.23 EROSION CONTROL

- A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction.
- B. Soil Erosion Control: Comply with requirements of the Pennsylvania Department of Environmental Resources' "Soil Erosion and Sedimentation Control Manual" (Latest Edition). Secure forms and permits necessary and if required, provide an erosion and sedimentation control plan.

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3.24 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

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SECTION 312301 – EXCAVATION, BACKFILL AND COMPACTION OF UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

- A. Excavation, backfill and compaction associated with utility construction including such related features as protection of adjacent utilities and structures, maintenance and protection of traffic, cutting paved surfaces, support of excavation, control of excavated materials, dewatering, piping, bedding, disposal of excavated materials, and all work related to providing excavation, backfill and compaction for all site utilities and structures in connection with water mains, and storm sewage system.

1.3 QUALITY ASSURANCE

- A. Testing Agent:
 - 1. Compaction testing for this Work shall be performed by the Owner's Testing Agency. Where compaction testing is specified, a soil-testing agent engaged and paid for by the Owner will perform such compaction testing.
 - 2. Compaction testing for this Work that does not meet specified values shall be removed, replaced and or remediated by the contractor at no additional cost to the Owner.
- B. Reference Standards:
 - 1. Pennsylvania Department of Transportation:
 - a. Regulations Governing Occupancy of Highways by Utilities (67 PA Code, Chapter 459)
 - b. Publication 408 Specifications Pennsylvania Test Method, PRM 106 Pennsylvania Test Method, PTM 402.
 - c. Publication 213, Work Zone Traffic Control
 - 2. American Society for Testing and Materials (ASTM):
 - a. ASTM D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft. – lbf/ft³)
 - b. ASTM D6938 Standard Test Method for In-place Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- C. Compaction Testing:
 - 1. Compaction shall be by the testing procedure contained in ASTM D6938 based on previously determined compaction curve data as established by ASTM D1557.

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1.4 SUBMITTALS

A. Certificates:

1. Submit certification attesting that the composition analysis of pipe embedment and select material stone backfill materials meet specification requirements.

1.5 JOB CONDITIONS

A. Permits: Obtain and pay for all permits and inspections required for the work under this Section.

B. Excavation and Rock Removal:

1. Refer to Section 312000 "Earth Moving" relative to removal of rock and classification of excavation. All requirements and classification for excavation, rock removal, earthwork, etc. specified under Section "Earth Moving" shall be made a part of this Work.

C. Compaction of Backfill:

1. Excavations shall be backfilled with lifts, which are individually compacted.
2. The following compaction densities (based on modified Proctor Curve ASTM D 1557) shall be achieved:
 - a. Trench Backfill under asphalt and concrete paving (not including base course materials): 95%
 - b. Trench Backfill within Unpaved Areas: 88%
 - c. Exterior Side of Structures: 95%
3. Contractor shall maintain optimum moisture content $\pm 2\%$ of backfill materials to attain the required compaction density.

D. Protection of Existing Utilities and Structures:

1. Take all precautions and utilize all facilities required to protect existing utilities and structures. In compliance with Act 287 as amended by Act 181 of 2006 by the General Assembly of Pennsylvania, advise each Utility at least three (3) working days in advance of intent to excavate, do demolition work and give the location of the job site. Request cooperative steps of the Utility and suggestions for procedures to avoid damage to its line.
2. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Contractor shall include engineering and installation of any required shoring to perform the required construction.
3. Advise each person in physical control of powered equipment or explosives used in excavation or demolition work of the type and location of utility lines at the job site, the Utility assistance to expect and procedures to follow to prevent damage.
4. Immediately report to the Utility and the Engineer any break, leak or other damage to the lines or protective coatings made or discovered during the work and immediately alert the occupants of premises of any emergency created or discovered.
5. Allow free access to Utility personnel at all times for purposes of maintenance, repair and inspection.

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PART 2 - PRODUCTS

2.1 DETECTABLE WARNING TAPE

- A. Acid and alkali resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, including storm water, 6 inches wide, 4 mils thick, continuously inscribed with a description of the utility with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep, colored as directed by authorities having jurisdiction on the project or as directed by the Engineer.

2.2 PIPE BEDDING OR EMBEDMENT MATERIAL

- A. Water Service Pipe: PennDOT AASHTO No. 10 coarse aggregate, Table C, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.
- B. Sanitary Sewer Pipe: PennDOT AASHTO No. 57 coarse aggregate, Table C, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.

2.3 WATER MAIN, STORM SEWER, SLAB OR BASE MATERIAL

- A. Concrete Slab or Precast Base: PennDOT No. 2A coarse aggregate, Table C, Section 703.2, Publication 408 Specifications.
- B. Water Main or Storm Water: PennDOT No. 2A coarse aggregate, Table C, Section 703.2, Publication 408 Specifications.

2.4 BACKFILL MATERIAL FOR UTILITIES, STORM WATER AND OTHER PIPING AND ACCESSORIES

- A. Acceptable backfill material as shown in details on drawings or defined in Section 312000 – Earth Moving.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Identify required lines, levels, contours and datum.
- B. Notify Engineer of unexpected subsurface conditions and discontinue work in area until notified to resume work.
- C. Maintain and protect existing utilities identified by utility users within the Work area.

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- D. Verify that structure walls are braced to support surcharge forces imposed by backfilling operations.

3.2 PROTECTION OF ADJACENT WORK

- A. Underpin adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.
- B. Grade excavation top perimeter to prevent surface water runoff into excavation or to adjacent properties.

3.3 MAINTENANCE AND PROTECTION OF TRAFFIC

- A. Coordinate the work to ensure the least inconvenience to traffic and maintain traffic in one or more unobstructed lanes unless closing the roadway or driveway is authorized.
- B. Maintain access to all streets and private drives.
- C. Provide and maintain signs, flashing warning lights, barricades, markers and other protective devices as required to conform with construction operations and to keep traffic flowing with minimum restrictions. Traffic control for improvements along public roads shall be conducted in accordance with PennDOT Publication 213.
- D. Comply with State and local Municipal codes, permits and regulations and pay for all permits and inspections that are required for the installation.

3.4 CUTTING PAVED SURFACES

- A. Where installation of pipelines, structures, and appurtenances necessitate breaking a paved surface, make cuts in a neat uniform fashion forming straight lines parallel with the edge of the excavation for full depth of paving. Cut offsets at right angles to the edge of the excavation.
- B. Protect edges of cut pavement during excavation to prevent raveling or breaking; square edges prior to pavement replacement.
- C. The requirement for neat line cuts, in other than state highways, may be waived if the final paving restoration indicates overlay beyond the width of the excavation.

3.5 EXCAVATION

- A. Depth of Excavation:
 - 1. Pipelines: Excavate trenches to the depth and grade shown on the profile drawings for the invert of the pipe plus that excavation necessary for placement of pipe bedding material.
 - 2. Where unsuitable bearing material including shattered rock due to drilling or other operations is encountered in the bottom of the excavation, discontinue excavation until the unsuitable material is observed by the Engineer or the Owner's representative.

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3. Where contractor, by error or intent, excavates beyond the minimum required depth, backfill the excavation to the required depth with pipe bedding/embedment or slab/base material as appropriate without any change in the Contract Price.

B. Width of Excavation:

1. Pipelines:

- a. Excavate trenches, including laterals, to a width necessary for placement and jointing of the pipe or to minimum width specified on drawings, and for placing and compacting pipe embedment under, around and over the pipe.
- b. Shape trench walls completely vertical from trench bottom to at least two (2) feet above the top of the pipe.
- c. For pressure pipeline fittings, excavate trenches to a width that will permit placement of concrete thrust blocks. Provide earth surfaces for thrust blocks that are perpendicular to the direction of thrust and are free of loose or soft material.

2. Structures:

- a. Excavate to the minimum distance necessary for placement/installation of the footings, concrete slab, walls or prefabricated structures and to permit proper backfill procedures to be performed.

C. Length of Open Trench:

1. Do not advance trenching operations more than 200' ahead of completed pipeline or what can be completed in the same day.

3.6 SUPPORT OF EXCAVATION

- A. Support excavations with sheeting, shoring, and bracing or in the case of pipeline construction, "trench box" as required that comply with Federal, State, and local laws and codes.
- B. Install adequate excavation supports to prevent ground movement or settlement to adjacent structures, pipelines or utilities. Damage due to settlement because of failure to provide support or through negligence or fault of contractor in any other manner, shall be repaired at contractor's expense.
- C. Withdraw shoring, bracing, and sheeting as backfilling proceeds unless otherwise directed by the Engineer.
- D. The neglect, failure or refusal of the Engineer or Owner to order the use of bracing or sheeting, or a better quality, grade, or section, or larger sizes of steel or timber, or to order sheeting, bracing, struts, or shoring to be left in place, or the giving or failure to give orders or directions as to the manner or methods of placing or driving sheeting's, bracing, jacks, wales, stringers, etc., shall not in any way or to any extent relieve Contractor of any responsibility concerning the condition of excavation or of any of his obligations under the Contract, nor shall any delay, whether caused by any action or want of action on the part of Contractor, or by any act of Owner and Engineer or their agents, or employees, resulting in the keeping of an excavation open longer than would otherwise have been necessary, relieve contractor from the necessity of properly and adequately protecting the excavation from caving or slipping, nor from any of their obligations under the Contract relating to injury to persons or property, nor entitle them to any claim for extra compensation.

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3.7 CONTROL OF EXCAVATED MATERIAL

- A. Keep the ground surface, within a minimum of 2' of the sides of the excavation, free of excavated material.
- B. Provide temporary barricades to prevent excavated material from encroaching on private property, walks, gutters and storm drains.
- C. Maintain accessibility to all fire hydrants, valve pit covers, valve boxes, curb boxes, fire and police call boxes, and other utility controls at all times. Keep gutters clear or provide other satisfactory facilities for street drainage. Do not obstruct natural watercourses. Where necessary, provide temporary channels to allow the flow of water either along or across the site of the work.
- D. In areas where excavations parallel or cross-streams, ensure that no material slides, is washed, or dumped into the stream course.

3.8 DEWATERING

- A. Keep excavations dry and free of water. Dispose of precipitation and subsurface water clear of the work.
- B. Prevent surface and ground water from entering excavations, provide and install dewatering measures to remove water from all excavations.
- C. Maintain pipe trenches dry until pipe has been jointed, inspected, and backfilled, and concrete work has been completed. Prevent trench water from entering pipelines under construction.
- D. Intercept and divert surface drainage away from excavations. Design surface drainage systems so that they do not cause erosion on or off the site, or cause unwanted flow of water. See Section 312000 for requirements of Sinkhole Development Potential, which shall be made a part of these specifications.
- E. Comply with Federal and State requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.
- F. All pumped water shall be discharged through a pumped water filter bag.

3.9 PIPE LAYING

- A. Provide required pipe bedding placed in accordance with the Drawings and Specifications. A minimum bedding of 6 inches shall be provided.
- B. Shape recesses for the joints or bell of the pipe by hand. Assure that the pipe is supported on the lower quadrant for the entire length of the barrel.
- C. Lay pipe as specified in the appropriate Section of these Specifications for pipeline construction.

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3.10 BACKFILLING EXCAVATIONS

- A. General: It is the intent of the following requirements for the backfilling of pipe trenches to specify materials and methods which will (1) result in thorough compaction of the backfilled material without displacement of the grade or alignment of the sewer or utility line and its appurtenances, and (2) minimize settlement of the backfilled material. If displacement of the piping or facilities or settlement of the backfilled material does occur, it will be considered as conclusive evidence of improper workmanship or the inclusion of unsuitable materials or both and it shall be the Contractor's responsibility to remove and recompact the settled material and regrade and realign the piping and/or facilities (if needed). During the course of the backfilling operation the Engineer may, at any location or depth of trench, make tests to determine whether the Contractor's compaction operations are sufficient to meet the requirements specified below.
- B. Initial Backfilling
 - 1. After the pipe and its appurtenances have been constructed, inspected and approved, including the placement of bedding material under the pipe haunches as specified elsewhere, the trench shall be backfilled to the specified height above the top of the pipe in horizontal layers not to exceed four (4) inches with the class of aggregate specified on the project drawings. This material shall not be frozen nor be placed when the material in the trench is frozen. The material shall be carefully placed to avoid damage to the pipe or geotextile filter, or lateral displacement of the pipe by uneven distribution of material. Each layer shall be compacted with a hand tamper when pipe is not covered or covered with less than 6" of backfill and compacted with a mechanical tamper for layers at least 12" over the pipe.
 - 2. No puddling or jetting will be permitted.
- C. Backfill in Existing or Future Paved Areas
 - 1. After initial backfilling, the remainder of the trench shall be backfilled with PennDOT No. 2A coarse aggregate and compacted by mechanical tampers throughout its full width in layers not to exceed eight (8) inches compacted to produce a density at the bottom of the compacted layer of not less than 95% of maximum dry density as determined by Modified Compaction Test, ASTM D1557.
 - 2. No puddling or jetting will be permitted.
- D. Backfill in Areas not in Existing or Future Paved Areas
 - 1. After initial backfilling, the remainder of the trench shall be backfilled in layers not to exceed six (6) inches, compacted to produce a density at the bottom of the compacted layer of not less than 88% of maximum dry density as determined by the Modified Compaction Test, ASTM D1557. The backfill may consist of the earth excavated from the trench, but shall be subject to the approval of the Engineer, and shall not contain rocks larger than six (6) inches in any dimension. Rocks shall be entirely surrounded by fine material and not constitute more than twenty-five (25) percent of the total volume of backfill. Backfill material shall not be frozen nor placed when the material in the trench is frozen.
 - 2. No puddling or jetting will be permitted.
 - 3. All backfill shall be free of topsoil and organic material.
 - 4. All backfill shall meet the requirements of embankment material as specified by PennDOT Specifications, Section 206.
- E. Employ placement methods that do not disturb or damage foundations, or utilities in trench.

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- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Remove surplus materials from trenching area and stockpile materials suitable for reuse as fill at designated locations.
- H. Remove all unsuitable material from project site.

3.11 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Contractor shall coordinate with Owner's testing laboratory to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.
 - 1. Perform field density tests in accordance with ASTM D 6938 (Nuclear Method) as applicable.
 - a. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages.
 - b. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Engineer.
 - 2. Perform one test at each structure per foot of backfill and one test for each 50 lineal feet of pipe or fractions thereof, per foot of backfill.
 - 3. If in opinion of Engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

3.12 DISPOSAL OF EXCAVATED MATERIAL

- A. Excavated material remaining after completion of backfilling shall remain the property of contractor, removed from the construction area, and disposed of legally, off-site. However, in the event the excavated material can be used in filling and rough grading on the site as determined by the Engineer, it shall remain on the site and be used for grading and filling.

END OF SECTION 312301

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SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes construction dewatering.

1.2 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow and surface runoff flow into excavations and permit construction to proceed on dry, stable subgrades during the life of the contract.

1.3 SUBMITTALS

- A. Shop Drawings for Information: For dewatering system. Show arrangement, locations, and details of wells and/or dewatering pumps; locations of headers and discharge lines; and means of discharge and disposal of water.
 - 1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with pumping and water disposal requirements as shown and specified on the Erosion and Sedimentation Control Plan and Narrative for this project.

PART 2 - EXECUTION

2.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
 - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

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2.2 INSTALLATION (HIGH GROUNDWATER TABLE AREAS)

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
- B. Before excavating below groundwater level, place system into operation to lower water to specified levels. Operate system continuously until drains, pipe, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by the Erosion and Sedimentation Control Plan and Narrative for this project.
- F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
 - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

PART 3 - PAYMENT

- 3.1 "Dewatering" is considered an incidental cost for pipe, inlet and manhole installation, and will be paid for under the appropriate contract Bid Item being installed.

END OF SECTION 312319

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SECTION 312500 – SEDIMENTATION AND EROSION CONTROL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. Extent of sedimentation and erosion control systems work is indicated on drawings and schedules, and by requirements of this section and all regulatory bodies having jurisdiction on this work.
 - 1. See drawings for narrative on sedimentation and erosion control and for additional information related to sedimentation and erosion control.
 - 2. Implement and maintain the Soil and Sedimentation Control Plan prepared for this project.
 - 3. Soil Erosion and Sediment Control Plans have been prepared for the project site.
- B. Contractor shall carry out the construction operations in a manner that soil erosion and resulting turbid storm water runoff and sedimentation are minimized.
- C. Comply with staging of earthmoving activities.
- D. Contractor will be required to be co-permittee for all E&S permitting.
- E. At least 7 days before starting any earth disturbance activities, the Contractor shall invite all Contractors involved in those activities, the landowner, all appropriate municipal officials, the erosion and sedimentation control plan preparer to an on-site pre-construction meeting. Also, at least 3 days before starting any earth disturbance activities, all Contractors involved in those activities shall notify the Pennsylvania One Call system for buried utilities locations.
- F. Compliance with direction of local Conservation District officials.
- G. Sedimentation and erosion control plan shall meet the following objectives:
 - 1. Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protection of topsoil by stockpiling for reuse.
 - 2. Prevent sedimentation of storm sewer or receiving streams.
 - 3. Prevent polluting the air with dust and particulate matter.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of sedimentation and erosion control system products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

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- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with sedimentation and erosion control work similar to that required for project.
- C. Codes and Standards: Comply with all Federal, State and Local regulations on this work.
 - 1. Comply with Pennsylvania Department of Environmental Protection Soil and Erosion and Sedimentation Control Manual.
 - 2. Pennsylvania Department of Transportation Publication 408 Specification.
- D. Environmental Compliance: Comply with applicable portions of the respective County Conservation District regulations pertaining to sedimentation and erosion control systems.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for all sedimentation and erosion control materials and products.
- B. Permits: Contractor shall apply and pay for all permits required for this work from all agencies and authorities having jurisdiction on this project and work. Contractor shall comply with and maintain all permits until the date of Substantial Completion.

1.5 PROJECT/SITE CONDITIONS

- A. Associated work activities include but are not limited to the following items:
 - 1. Temporary and permanent measures will have to be undertaken before, during and after construction to control sediment from being carried onto adjoining properties and into swales or watercourses as a result of stormwater runoff.
 - 2. The use of temporary control devices as shown on the Drawings and as described in these Specifications are for providing the trapping of sediment resulting from construction activities and to reduce the velocities of the temporary stormwater courses to minimize erosion.
 - 3. The erosion and sediment control devices shall be inspected weekly and at every storm event and maintained throughout the life of this project. These shall include, but are not limited to, silt barrier fences, temporary sediment basins and traps, rock energy dissipaters, inlet protection, temporary seeding, etc. as shown on the Drawings or other measures that are required for the construction of this project.
 - 4. Upon completion of the project and after the temporary erosion control devices have served their purpose, these temporary devices shall be removed from the project by Contractor.
 - 5. Soil erosion and sedimentation control practices shall be consistent with the procedures outlined in the latest edition of the "Soil Erosion and Sedimentation Control Manual". Commonwealth of Pennsylvania, Department of Environment Protection, and as shown on the drawings.
 - 6. Contractor shall keep all public thoroughfares and all on-site paved areas free of mud and similar debris from construction activities throughout the entire construction period.

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Silt Barrier Fence:
 - 1. As indicated on the drawings.
- B. Inlet Filters:
 - 1. As indicated on drawings
- C. Temporary Seeding, Rock Filters, Sedimentation Basins and/or Traps with Appurtenances, Inlet Protection, etc.:
 - 1. As indicated on drawings
- D. Water Filter Bag
 - 1. As indicated on the drawings
- E. Soil Erosion Control Matting
 - 1. North American Green, or equal as indicated on the drawings
- F. Geotextile Material
 - 1. As indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Erection and maintenance of a silt barrier fence as indicated on the drawings.
- B. Installation of Inlet Filtering Devices as indicated on the drawings.
- C. Limiting the removal of natural ground cover to the minimum area required for grading and construction.
- D. Performing temporary seeding and mulching as soon as possible, within seasonal constraints, of disturbed areas which are expected to remain bare of vegetation for over twenty (20) days until final grading and stabilization can be accomplished.
- E. The dewatering or pumping out of excavated areas directly into existing storm ditches or natural channels, which cause silt deposition, turbidity and/or possible erosion of banks is prohibited. Contractor must make use of filters or other methods acceptable to the Conservation District.
- F. Provide geotextile fabric under rocks where shown. Place rocks carefully in the fabric to produce an even distribution with a minimum of voids and without tearing the geotextile fabric. Arrange rocks in full thickness in one operation in a manner to prevent segregation and re-arranged as necessary to ensure uniform distribution.

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- G. Construct the Work in accordance with the general sequence of operations for each work area, as described on the Project Drawings or in the Narrative Report.

3.2 FIELD MODIFICATIONS

- A. Owner reserves the right to add to, delete, or modify any or all sediment control measures described herein as required to establish proper soil erosion and sedimentation control and comply with all agencies and regulatory bodies having jurisdiction on this work and project.

END OF SECTION 312500

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SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes temporary excavation support and protection systems.
- B. Related Requirements:
 - 1. Section 013233 "Photographic Documentation" for recording preexisting conditions and excavation support and protection system progress.
 - 2. Section 312000 "Earth Moving" for excavating and backfilling, for controlling surface-water runoff and ponding, and for dewatering excavations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review geotechnical report.
 - 2. Review existing utilities and subsurface conditions.
 - 3. Review coordination for interruption, shutoff, capping, and continuation of utility services.
 - 4. Review proposed excavations.
 - 5. Review proposed equipment.
 - 6. Review monitoring of excavation support and protection system.
 - 7. Review coordination with waterproofing.
 - 8. Review abandonment or removal of excavation support and protection system.

1.4 FIELD CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility-serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 - 1. Notify Engineer no fewer than one day in advance of proposed interruption of utility.
 - 2. Do not proceed with interruption of utility without Engineer's written permission.
- B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks, and record existing elevations.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design excavation support and protection systems to resist all lateral loading and surcharge, including but not limited to, retained soil, groundwater pressure, adjacent building loads, adjacent traffic loads, construction traffic loads, material stockpile loads, and seismic loads, based on the following:
 - 1. Compliance with OSHA Standards and interpretations, 29 CFR 1926, Subpart P.
 - 2. Compliance with AASHTO Standard Specification for Highway Bridges or AASHTO LRFD Bridge Design Specification, Customary U.S. Units.
 - 3. Compliance with requirements of authorities having jurisdiction.
 - 4. Compliance with utility company requirements.
 - 5. Compliance with railroad requirements.

2.2 MATERIALS

- A. Provide materials that are either new or in serviceable condition.
- B. Structural Steel: ASTM A36/A36M, ASTM A690/A690M, or ASTM A992/A992M.
- C. Steel Sheet Piling: ASTM A328/A328M, ASTM A572/A572M, or ASTM A690/A690M; with continuous interlocks.
 - 1. Corners: Site-fabricated mechanical interlock or Roll-formed corner shape with continuous interlock.
- D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches.
- E. Shotcrete: Comply with Section 033713 "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.
- F. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.
- G. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- H. Tiebacks: Steel bars, ASTM A722/A722M.
- I. Tiebacks: Steel strand, ASTM A416/A416M.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

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1. Shore, support, and protect utilities encountered.

3.2 INSTALLATION - GENERAL

- A. Locate excavation support and protection systems clear of permanent construction, so that construction and finishing of other work is not impeded.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

3.3 TIEBACKS

- A. Drill, install, grout, and tension tiebacks.
- B. Test load-carrying capacity of each tieback, and replace and retest deficient tiebacks.
 1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.
- C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.4 BRACING

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
 1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Engineer.
 2. Install internal bracing if required to prevent spreading or distortion of braced frames.
 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 MAINTENANCE

- A. Monitor and maintain excavation support and protection system.
- B. Prevent surface water from entering excavations by grading, dikes, or other means.
- C. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

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3.6 FIELD QUALITY CONTROL

- A. Survey-Work Benchmarks: Resurvey benchmarks regularly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open.
 - 1. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions.
 - 2. Promptly notify Engineer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
- B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.
- C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.7 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures.
 - 1. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
 - 2. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction, and abandon remainder.
 - 3. Fill voids immediately with approved backfill compacted to density specified in Section 312000 "Earth Moving."
 - 4. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by removing excavation support and protection systems.
- B. Leave excavation support and protection systems permanently in place.

END OF SECTION 315000

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SECTION 321216 – ASPHALT PAVING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The work under this Section shall consist of the application of base courses, binder courses, asphalt tack coat, leveler course or scratch coat, and wearing course as indicated on plans and as directed by the Engineer, and in accordance with these specifications, and will generally consist of, but not be limited to, the following:
1. Cleaning of asphalt pavement and conditioning existing surface.
 2. Adjustment of all utility appurtenances, e.g. valve boxes, manholes, etc., using adjustment rings meeting current utility owner standards. Contractor to provide and install adjustment rings for all utilities and streets within this projects scope of work.
 3. Tack coat application.
 4. Application of leveler course, as directed by the Owner or Engineer.
 5. Keyway into existing pavement, consisting of a 4 foot wide mill the entire width of intersecting streets.
 6. Application of asphalt base course.
 7. Application of asphalt wearing course. Sealing of curb, inlets, manholes, valves and gate boxes, and pavement joint match.

1.2 MATERIALS

- A. Asphalt tack coat shall conform to PennDOT Form 408, Section 460, and Bulletin No. 25. Asphalt paving material, Class E-6 or Class E-8, Section 401.3.
- B. Superpave asphalt mixture design, WMA 9.5 mm fine graded course as a leveling PG 64S-22, 0 to 0.3 M ESALs, SRL H course, shall conform to PennDOT Form 408, Section 413.
- C. Superpave asphalt mixture design, WMA 9.5 mm wearing course PG 64S-22, 0 to 0.3 M ESALs, SRL H, shall conform to PennDOT Form 408, Section 413.
- D. Superpave asphalt mixture design, WMA 25 mm base course PG 64S-22, 0 to 0.3 M ESALs, shall conform to PennDOT Form 408, Section 413.
- E. Joint sealer shall be asphalt material, conforming to PennDOT Form 408, Section 413.3(k).

1.3 CONSTRUCTION MATERIALS

- A. Refer to PennDOT Form 408, Section 413, for Superpave mixture design and construction of plant-mixed asphalt courses.
- B. At least ten (10) days prior to start of construction, submit to Engineer for review:
1. Paving operation quality control plan.
 2. Job mix formula for all proposed mixes (JMF).

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C. Surface Preparation

1. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving. Sweep loose, granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
2. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base course before applying paving materials.
3. Tack Coat: PennDOT Form 408, Section 460. Apply uniformly to surfaces of existing pavement at a rate of 0.9 L/m² to 2.25 L/m² (0.2 gal/yd.² to 0.5 gal/yd.²) for AE-Pac E-1 prime, emulsified asphalt. Apply the tack coat only when the air temperature is 40°F and rising. Do not apply to a wet surface or during wet weather.
 - a. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - b. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Superpave 9.5 mm fine graded leveling course shall be placed to a compacted depth as required and determined in the field, and compacted per PennDOT Form 408, Section 413.

E. Paint existing vertical surfaces of curbs, structures, gutters and pavement in contact with asphalt mixture, conforming to PennDOT Form 408, Section 461. Sealant shall extend a minimum of 1" vertically and 4" horizontally above and beyond proposed paving.

F. Where the asphalt overlay matches existing asphalt pavement, a four (4) wide mill shall be cut into the existing pavement so as to form a smooth transition.

G. Warm-Mix Asphalt Paving

1. Refer to PennDOT Form 408, Section 413.3.h, Construction. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross-section and thickness when compacted.
 - a. Spread mix within the temperature range specified in the JMF.
 - b. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
2. Place paving in consecutive strips not less than 10 feet wide unless in fill edge strips of a lesser width are approved by the Engineer.
3. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

H. Compaction

1. Refer to PennDOT Form 408, Section 413.3.i – j. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
2. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements of PennDOT Form 408, Section 413.
3. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until

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hot-mix asphalt course has been uniformly compacted to the densities specified in PennDOT form 408, Section 413.

4. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
5. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
6. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

I. Installation Tolerances

1. Thickness: Compact each course to produce the thickness indicated on the plans within the following tolerances:
 - a. Base Course: Plus or minus ½ inch (12 mm).
 - b. Surface Course: Plus or minus ¼ inch (6 mm).
2. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 12-foot straightedge applied transversely or longitudinally to paved areas [PennDOT 408, Section 413.3(1)].
 - a. Base Course: ½ inch (12 mm).
 - b. Surface Course: 3/16 inch (5 mm).
3. If a deficiency is suspected by the Owner/Engineer, testing will be required by the Engineer. Costs of the testing will be the responsibility of the Contractor and will be observed and reviewed by the Owner/Engineer.

J. All joints – longitudinal, curb, transverse, and other – shall be constructed and treated per PennDOT Form 408, Section 413.3(k).

K. All joints, seams, curbs, inlets and other similar structures shall be sealed with asphalt material, PennDOT 408, Section 413.3(k).

L. Project area shall be cleaned of all debris and materials prior to final acceptance.

1.4 MEASUREMENT AND PAYMENT

- A. Superpave WMA 25 mm base course will be paid at the contract unit price per square yard, complete in place. Contractor shall provide all delivery slips to the Owner and/or Engineer.
- B. Superpave WMA 9.5 mm wearing course will be paid at the contract unit price per square yard, complete in place. Contractor shall provide all delivery slips to the Owner and/or Engineer.
- C. No measurement or payment shall be made for sealing or sealant installations, and shall be considered part of the unit costs relative to the leveler course and/or the final wearing course.
- D. Tack coat shall be considered incidental and included in the unit price per square yard for Superpave 9.5 mm wearing course.
- E. Superpave WMA 9.5 mm leveling course will be paid at the contract unit price per ton, complete in place. Contractor shall provide all delivery slips to the Owner and/or Engineer.
- F. All of the above unit prices include cleaning, preparation of pavement and adjacent surfaces, corrective work, keyways, sealing, equipment, tools, materials, and labor incidental thereto.

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END OF SECTION 321216

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SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
 - 1. Curbs and gutters.
 - 2. Sidewalks.
 - 3. Driveways.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag (GGBFS), and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
 - 1. Cementitious materials and aggregates.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Bonding agent or adhesive.
 - 6. Joint fillers.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

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- B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM C 548.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- F. Concrete Testing Service: Owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcement Bars: ASTM A 615, Grade 60, deformed.
- C. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
- D. Bar Supports: Bolsters, chairs, spacers and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- E. All steel reinforcement to contain minimum 90 percent combined post-consumer and pre-consumer recycled content.
- F. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

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- G. Deformed-Steel Wire: ASTM A 496/A 496M.
- H. Retain option in first paragraph below if required or if retaining wheel stops secured with galvanized dowels. Plastic-surfaced or reinforced-paper-covered dowels are suitable from proprietary sources. Indicate joint-dowel lengths on Drawings.
- I. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, Class I coating. Cut bars true to length with ends square and free of burrs.
- J. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- K. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- L. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

- A. General: Use the following cementitious materials, of the same type, brand, source, throughout the Project:
 - 1. Portland Cement: ASTM C 150, gray portland cement Type I or Type II.
 - a. Fly Ash: ASTM C 618, Class C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 2. Blended Hydraulic Cement: ASTM C 595, Type IP, portland-pozzolan cement.
- B. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
 - 1. Class: 4S.
 - 2. Maximum Aggregate Size: 1 inch nominal.
 - 3. Do not use fine or coarse aggregates containing substances that cause spalling.
- C. Water: ASTM C 94.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

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- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, and non-redispersible, acrylic emulsion or styrene butadiene.

2.7 CONCRETE MIXES

- A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
 - 1. Do not use Owner's field quality-control testing agency as the independent testing agency.
- C. Proportion mixes to provide concrete with the following properties:
 - 1. Compressive Strength (28 days): PennDOT Class AA (3,750 psi).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: 3 inches maximum.
 - a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches after adding admixture to plant or site-verified, 2 to 3 inch slump.
- D. Cementitious Materials: Provide composite mix of Portland Cement and Ground Granulated Blast-Furnace Slag or Blended Hydraulic Cement and reduce percentage, by weight, of Portland Cement (ASTM C150) relative to total cementitious material weight for each design mix to at least 40 percent less than standard regional concrete mix designs.
 - 1. Limit percentage, by weight, of standard Portland cement (C-150), to the following maximum percentages of the cementitious portion of the mix while maintaining the above 40% required reduction in Portland cement across the project's total quantity of concrete.
 - 2. Exterior Concrete – 65 percent except as noted in paragraph E below.

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- E. Cementitious Materials for Exterior Concrete: For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than Portland cement according to ACI 301 requirements as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 - 5. Silica Fume: 10-percent.
 - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent portland cement minimum, with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent.
 - 1. Air Content: 6.0 percent for 1-inch maximum aggregate.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.

2.9 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, colors complying with FS TT-P-1952.
 - 1. Color: As indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.
- C. Preparation work, including finish grading (rough grade should be within 1/10 of finish grade), setting forms, and furnishing and installing of reinforcing steel shall also be done by the Contractor.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

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- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.4 JOINTS

- A. General: Construct construction, isolation and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
 - 1. Install concrete joints in sidewalks at 5'-0" on center in both directions, unless otherwise indicated. Install perpendicular to curbs or building walls.
 - 2. Verify exact joint placement with the Engineer prior to installation.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
 - 1. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 - 2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 3. Install construction joints at a maximum of 20'-0" on center.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler less than ½ inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. Protect top edge of joint filler during concrete placement with metal, plastic or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

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- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces. Provide ¼ inch radius.
- E. Edging: Tool edges of pavement, curbs and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces. Provide ¼ inch radius.

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery, at Project site, or during placement.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.
- I. Cold-Weather Placement: Comply with ACI 306.1 and as follows: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

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1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- J. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 GENERAL CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic, at ramps and similar sloped surfaces.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq.ft. x h before and during finishing operations. Apply according to manufacturers written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

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1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining-cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117, ICC/ANSI A117.1 – 2009, and as follows:
 1. Elevation: ¼ inch.
 2. Thickness: Plus 3/8 inch, minus ¼ inch.
 3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed ¼ inch.
 4. Joint Spacing: 3 inches.
 5. Contraction Joint Depth: Plus ¼ inch, no minus.
 6. Joint Width: Plus 1/8 inch, no minus.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.
- B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Services: Testing shall be performed according to the following requirements:
 1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
 2. Slump: ASTM C 143, one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.

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4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg. F and below and when 80 deg. F and above, and one test for each set of compressive-strength specimens.
 5. Compression Test Specimens: ASTM C 31; one set of five standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu.yd., but less than 25 cu.yd., plus one set for each additional 50 cu.yd. Two specimens shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
 7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as the sole basis for approval or rejection.
- E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- B. Drill test cores where directed by Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

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- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.
- E. Exposed concrete edges shall be backed with topsoil and seeded

END OF SECTION 321313

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SECTION 321370 – DETECTABLE WARNING SURFACE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Cast-in-Place Detectable/Tactile Warning Surface Tiles.
- B. Related Sections include the following:
 - 1. Division 01 Section “Construction Waste Management.”
 - 2. Section 321313 “Concrete Paving” for cement concrete substrate.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include literature describing products, installation procedures and routine maintenance.
- B. Samples for Initial Selection: For each type of exposed finish requiring color selection.
- C. Samples for Verification Purposes: For Detectable/Tactile Warning Surface Tiles; approximately 6 inches by 6 inches of the kind proposed for use.
- D. Shop Drawings: Include fabrication details, composite structural system, tile surface profile, sound on cane contact amplification feature, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.
- E. Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratory to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated on the specifications.
 - 1. Tests shall be conducted on a Detectable/Tactile Warning Surface Tile system as certified by a qualified independent testing laboratory and be current within a 24 month period.
- F. Maintenance Data: For Detectable/Tactile Warning Surface Tiles to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board’s “Americans with Disabilities Act (ADA) and ICC/ANSI A117.1 for Detectable/Tactile Warning Surface Tiles.

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1.5 DELIVERY AND STORAGE

- A. Detectable/Tactile Warning Surface Tiles shall be suitably packaged to prevent damage in shipping or handling. Finished surfaces shall be protected by sturdy plastic wrappings to protect tile from concrete residue during installation and tile type shall be identified by part number.

1.6 PROJECT CONDITIONS

- A. Maintain minimum temperature of 40° in areas to receive Detectable/Tactile Warning Surface Tiles for at least 24 hours prior to installation, during installation, and for not less than 24 hours after installation.

1.7 WARRANTY

- A. Submit written warranty covering all materials and workmanship against defects or failures of any nature for the period indicated. Warranty shall include defective work, breakage, deformation, fading and loosening of tiles.
 - 1. Period: Five years from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - 1. Engineered Plastics, Inc.: Armor-Tile

2.2 MATERIALS

- A. Verified Polymer Corporation (VPC) Detectable/Tactile Warning Surface Tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2 inch height, 0.9 inch base diameter, and 0.45 inch top diameter, spaced center-to-center 2.35 inches as measured on a diagonal and 1.67 inches as measured side by side.
 - 1. Size: As indicated on the contract drawings.
 - 2. Color: As selected by the Architect using one color for the entire project.
 - a. Sika Corporation.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. The contractor, subcontractors, and their personnel shall follow the procedures and practices for waste separation, collection and transport as defined in the constructor's "Waste Management Plan" as required by Division 01 Section "Construction Waste Management."

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3.2 EXAMINATION

- A. Prior to placement of the Detectable/Tactile Warning Surface Tile system, review manufacturer and contract drawings with the Contractor prior to the construction and refer any and all discrepancies to the Engineer.

3.3 INSTALLATION

- A. The physical characteristics of the concrete shall be consistent with the contract specifications while maintaining a slump range of 4 – 7 to permit solid placement of the Detectable/Tactile Warning Surface Tile system. An overly wet mix will cause the tile to float. Under these conditions, suitable weights such as 2 concrete blocks or sandbags (25 lb.) shall be placed on each tile.
- B. The concrete pouring and finishing operations require typical mason's tools, however, a 4' long level with electronic slope readout, 25 lb. weights, and a large non-marring rubber mallet are specific to the installation of the Detectable/Tactile Warning Surface Tile system. A vibrating mechanism such as that manufactured by Vibco can be employed, if desired. The vibrating unit should be fixed to a soft base such as wood, at least 1 foot square.
- C. The factory-installed plastic sheeting must remain in place during the entire installation process to prevent the splashing of concrete onto the finished surface of the tile.
- D. When preparing to set the tile, it is important that no concrete be removed in the area to accept the tile. It is imperative that the installation technique eliminates any air voids under the tile. Holes in the tile perimeter allow air to escape during the installation process. Concrete will flow through the large holes in each embedment flange on the underside of the tile. This will lock the tile solidly into the cured concrete.
- E. The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is achieved. The tile shall be placed true and square to the curb edge in accordance with the contract drawings. The Detectable/Tactile Warning Surface Tiles shall be tamped (or vibrated) into the fresh concrete to ensure that the field level of the tile is flush to the adjacent concrete surface. The embedment process should not be accomplished by stepping on the tile as this may cause uneven setting which can result in air voids under the tile surface. The contract drawings indicate that the tile field level (base of truncated dome) is flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes.
- F. While concrete is workable, a 3/8-inch radius edging tool shall be used to create a finished edge of concrete, then a steel trowel shall be used to finish the concrete around the tile's perimeter, flush to the field level of the tile.
- G. During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning or external forces placed on the tile that may rock the tile causing a void between the underside of tile and concrete.

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- H. Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets. Two (2) weights of 25 lb. each may be required to be placed on each tile as necessary to ensure solid contact of the underside of tile to concrete.
- I. Following the concrete curing stage, protective plastic wrap is to be removed from the tile surface by cutting the plastic with a sharp knife, tight to the concrete/tile interface. If concrete bled under the plastic, a soft brass wire brush will clean the residue without damage to the tile surface.

3.4 CLEANING, PROTECTING AND MAINTENANCE

- A. Protect tiles against damage during construction period to comply with Tactile Tile manufacturer's specification.
- B. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.
- C. Clean Tactile Tiles not more than four (4) days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean Tactile Tile by method specified by Tactile Tile manufacturer.
- D. Comply with manufacturers maintenance manual for cleaning and maintaining tile surface and it is recommended to perform annual inspections for safety and tile integrity.

END OF SECTION 321370

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SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Expansion and contraction joints within cement concrete pavement.
 - 2. Joints between cement concrete and asphalt pavement.
- B. Related Sections include the following:
 - 1. Division 01 Section “Construction Waste Management.”

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- D. Qualification Data: For Installer.
- E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

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- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the commencement of the Work.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 degree F.
 - 3. When joint substrates are wet or covered with frost.
 - 4. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 5. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Engineer from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Multicomponent Jet-Fuel-Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:
 - 1. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
 - a. Products:
 - 1) Pecora Corporation; Urexpan NR-300.
 - b. Manufacturers:
 - 1) Sika Corporation.
- B. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
 - 1. Products:
 - a. Sonneborn, Div. of ChemRex, Inc.; Sonomeric 1.
 - 2. Manufacturers:
 - a. Sika Corporation.

2.4 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

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2.5 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 – EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. The contractor, subcontractors, and their personnel shall follow the procedures and practices for waste separation, collection and transport as defined in the constructor's "Waste Management Plan" as required by Division 01 Section "Construction Waste Management."

3.2 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.4 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of backer materials.
 - 2. Do not stretch, twist, puncture, or tear backer materials.
 - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

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- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.5 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 321373

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SECTION 321823 – ASPHALT BASKETBALL COURT COLOR COATING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Application of acrylic color coating system over prepared asphalt concrete pavement.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. C 136 Method of Sieve Analysis of Fine and Course Aggregates
 - 2. D 870 Resistance to Water
 - 3. D 4214 Resistance to Chalking
 - 4. D 4587 Resistance to Color Fading
 - 5. D 2939 Section 7 Test Method to Determine Residue by Evaporation

1.3 SYSTEM DESCRIPTION

- A. Provide one (1) coat of Acrylic Resurfacer over prepared surface.
- B. Provide two (2) coats of Acrylic Color Coating over prepared surface after Acrylic Resurfacer has dried thoroughly.
- C. Place lines on surface.
- D. Colors selected shall match existing courts, and shall be subject to Township approval.

1.4 SUBMITTALS

- A. Product Data
 - 1. Submit Manufacturers printed Product Data Sheets, stating that coating meets the above ASTM and EPA standards, and application specifications.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Apply coating in dry weather when pavement and atmosphere temperatures are fifty (50) degrees F. or above and are anticipated to remain above fifty (50) degrees F., and good drying conditions are present and expected for the next eight (8) hours.
- B. Do not apply if freezing temperatures are expected within at least forty-eight (48) hours of application.

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1.6 WARRANTY

- A. A two (2) year written warranty signed by the contractor and materials manufacturer is available.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Neyra Industries, Inc., Cincinnati, Ohio
1. Materials are listed as standard of quality.

2.2 MATERIALS

- A. Color Coating: Dynaflex Acrylic or Center Court Acrylic.
- B. Resurfacer: Dynaflex Acrylic Resurfacer
1. An Acrylic latex modified with synthetic fibers and fillers.
- C. Line Paint: Dynastripe
1. A water-based acrylic striping paint.
- D. Aggregate
1. Washed, dry silica sand free of dust, trash, clay, organic materials or other contaminants.
2. Gradation: To have an American Foundry Society grain fineness number that is no less than seventy (70) and no greater than one hundred (100) when tested in accordance with ASTM C 136 for color coat and not less than fifty (50) or greater than one hundred (100) for Acrylic Resurfacer.
- E. Court Patch Binder: Dynabinder
1. A water-based acrylic, polymer/Portland cement/sand patching material.
- F. Acrylic Crack Sealant: AcrylaSeal Acrylic Crack Sealant
1. Minimum dry solids volume sixty-nine (69) percent.
- G. Mixing Water
1. Potable and free from harmful soluble salts.
2. Temperature of the water: minimum fifty (50) degrees F.

2.3 MIXES

- A. Color Coating Slurry Mixes: Per one hundred (100) gallons of color concentrate, add forty (40) to fifty (50) gallons of water, then add and mix from four (4) to eight (8) pounds per gallon of silica sand as per manufacturer's written specification. (If Center Court is used, no additional sand is required).

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- B. Acrylic Resurfacer: Per one hundred (100) gallons of concentrate add forty-five (45) to fifty (50) gallons of water. Then add and mix six (6) to twelve (12) pounds of silica sand as per manufacturer's recommendation.

2.4 EQUIPMENT

- A. All equipment, tools, and machinery used for handling materials and executing work shall be in good working condition and capable of applying required coating weights evenly to provide a smooth, uniform coated surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect existing pavement surfaces for condition and defect that will adversely affect quality of work, and which cannot be put into an acceptable condition through normal preparatory work as specified. Do not place coating in defects exist, notify Architect/Engineer.
- B. Starting installation constitutes contractor's acceptance of surface as suitable for installation.

3.2 PREPARATION – NEW BASKETBALL COURTS

- A. Cleaning
 - 1. Thoroughly clean surfaces to be coated to remove all foreign debris (dirt, silt, gravel, leaves, etc.) using mechanically powered forced air sweepers, mechanical street sweepers, steel bristle brooms and/or high pressure water.
 - 2. Thoroughly scrape mud areas and scrub wash with clean water.
- B. Protection: Protect adjacent curbs, walks, fences, and other items from receiving color coat or resurfacer.
- C. New pavements which have been accepted by Architect/Engineer/Owner shall be allowed to cure and pass the "no water break" test before application. Cast one or two gallons of clean water from suitable clean container (such as a 5 gallon pail) out on the surface. The water should sheet out and wet the surface uniformly without ribboning, crawling, or showing oil rings. (Comparable to water on very clean glass vs. dirty or greasy glass.) If clean water does not wet the surface uniformly, the asphalt is not ready for coating and should age longer.

3.3 APPLICATION

- A. When making mixes add water first while agitating, add silica sand slowly. Keep mixture homogeneous prior to beginning application and during entire time mixture is being applied.
- B. Apply acrylic resurfacer uniformly over entire pavement per manufacturer's specifications.
- C. Allow adequate time between applications for prior coat to dry thoroughly before applying next coat. Acrylic resurfacer can normally be re-coated after four (4) hours of good drying with sun.

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Color coats can normally be re-coated after two to four (2 to 4) hours of good drying with sun. Upon completion of final coat, keep all foot traffic off seal surface. Allow the final coat to cure at least twenty-four (24) hours, under good drying conditions, before allowing foot traffic on surface. Less favorable conditions will require longer drying times.

- D. Playing lines: Base lines shall be two (2) inches wide and playing lines not more than two (2) inches wide, accurately located and marked, and painted with a paint recommended or approved by the manufacturer of the color finish material; however, use of traffic, oil, alkyd, or solvent-vehicle type paint is prohibited.

The painting shall be done by skilled mechanics in a workmanlike manner in accordance with manufacturer's standard printed instructions. Prior to white line paint application, line paint tape gap filler shall be applied to reduce incidence of fuzzy lines.

3.4 PROTECTION

- A. Barricade coated areas until coating has dried sufficiently for foot traffic.

END OF SECTION 321823

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SECTION 323113 – CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Zinc Coated Fabric: ASTM A392
 - 2. Type II with zinc coating applied.
- B. Applications for chain-link fencing include the following:
 - 1. General perimeter fencing.
- C. Related Sections include the following:
 - 1. Division 31 Section “Earth Moving”: Filling and for grading work.
 - 2. Division 32 Section “Decorative Metal Fences and Gates”: Tubular steel fences and gates.
 - 3. Division 03 Section “Cast-in-Place Concrete”: Post footings.

1.2 SUBMITTALS

- A. Product Data: Material descriptions, construction details, dimensions of individual components and profiles, and finishes for the following:
 - 1. Fence and gate posts, rails, and fittings.
 - 2. Chain-link fabric, reinforcements, and attachments.
 - 3. Gates and hardware.
- B. Shop Drawings: Show locations of fence, each gate, posts, rails, and details of gate swing, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, elevations, sections, gate swing and other required installation and operational clearances, and details of post anchorage and attachment and bracing.
- C. Samples for Initial Section: Manufacturer’s color charts or 6-inch lengths of actual units showing the full range of colors available for components with factory-applied color finishes.
- D. Maintenance Data: For polymer finishes to include in maintenance manuals specified in Division 1.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance
- B. Source Limitations for Chain-Link Fences and Gates: Obtain each color, grade, finish, type, and variety of component for chain-link fences and gates from one source with resources to provide chain-link fences and gates of consistent quality in appearance and physical properties.

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1.4 PROJECT CONDITION

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated in Division 01.
- B. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

- A. Steel Chain-Link Fence Fabric: Height indicated on Drawings. Provide fabric fabricated in one-piece widths for fencing in height of 12 feet and less. Comply with CLFMI's "Product Manual" and with requirements indicated below:
 - 1. Mesh and Wire Size: 2-inch mesh, 0.192-inch diameter.
 - 2. Zinc-Coated Fabric: ASTM A 392, with zinc coating applied to steel wire with the following minimum coating weight:
 - a. Class 2: Not less than 2 oz./sq. ft. of uncoated wire surface.
- B. Selvage: Knuckled at both selvages, unless otherwise indicated.
 - 1. Selvage for Fences More than 60 Inches High: Twisted at top selvage and knuckled at bottom.

2.2 INDUSTRIAL FENCE FRAMING

- A. Round Steel Pipe: Permafused II polyolefin, 10 mils minimum, over standard weight, Schedule 40, galvanized steel pipe complying with ASTM F 1083. Comply with ASTM F 1043, Material Design Group IA, external and internal coating Type A, consisting of not less than 1.8-oz./sq. ft. zinc; and the following strength and stiffness requirements:
 - 1. Applications: Provide round steel pipe for fence framing unless otherwise indicated.
 - 2. Line, End, Corner, and Pull Posts and Top Rail: Per requirements for Light Industrial Fence.
- B. Post Brace Rails: Match top rail for coating and strength and stiffness requirements. Provide brace rail with truss rod assembly for each gate, end, and pull post. Provide two (2) brace rails extending in opposing directions, each with truss rod assembly, for each corner post and for pull posts. Provide rail ends and clamps for attaching rails to posts.
- C. Top Rails: Fabricate top rail from lengths 21 feet or longer, with swaged-end or fabricated for expansion-type coupling, forming a continuous rail along top of chain-link fabric.
- D. Intermediate Rails: Match top rail for coating and strength and stiffness requirements.
- E. Bottom Rails: Match top rail for coating and strength and stiffness requirements.

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2.3 SWING GATES

- A. General: Comply with ASTM F 900 for the swing-gate types indicated.
 - 1. Gate Leaf Width: 60 inches
 - 2. Framework Member Sizes and Strength: Based on gate height of 84 inches.
- B. Metal Pipe and Tubing: Galvanized Steel. Comply with ASTM F 1083 and ASTM F 1043 for materials and protective coatings.
- C. Frames and Bracing: Fabricate members from round/square galvanized steel tubing with outside dimension and weight according to ASTM F 900 for the gate fabric height indicated.
- D. Frame Corner Construction: Welded.
- E. Gate Posts: Fabricate members from round galvanized steel pipe with outside dimension and weight according to ASTM F 900 for the gate fabric heights and leaf widths indicated.
- F. Hardware: Latches permitting operation from both sides of gates, hinges, center gate stops for double gates and, for each gate leaf more than 5 feet wide, keepers and wheel rollers. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.4 FITTINGS

- A. General: Provide fittings for a complete fence installation, including special fittings for corners. Comply with ASTM F626.
- B. Post and Line Caps: Hot-dip galvanized pressed steel or hot-dip galvanized cast iron. Provide weather-tight closure cap for each post.
- C. Rail and Brace Ends: Hot-dip galvanized pressed steel or hot-dip galvanized cast iron. Provide rail ends or other means for attaching rails securely to each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: Hot-dip galvanized pressed steel or round steel tubing. Not less than 6 inches long.
 - 2. Rail Clamps: Hot-dip galvanized pressed steel. Provide line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line to line post.
- E. Tension and Brace Bands: Hot-dip galvanized steel rod and turnbuckle or other means of adjustment.
- F. Truss Tod Assemblies: Hot-dip galvanized steel rod and turnbuckle or other means of adjustment.
- G. Tie Wires, Clips, and Fasteners: Provide the following types according to ASTM F 626:
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Hot-Dip Galvanized Steel: 0.148 inch-diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.

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- H. Pipe Sleeves: For posts set into new concrete, provide preset hot-dip galvanized steel pipe sleeves complying with ASTM A 53, not less than 6 inches long with inside dimensions not less than ½ inch more than outside dimension of post, and flat steel plate forming bottom closure.

2.5 CAST-IN-PLACE CONCRETE

- A. General: Comply with ACI 301 for cast-in-place concrete.
- B. Materials: Portland Cement complying with ASTM C 150, aggregates complying with ASTM C 33, and potable water for ready-mixed concrete complying with ASTM C 94.
 - 1. Concrete Mixes: Normal-weight concrete with not less than 3000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

2.6 GROUT AND ANCHORING CEMENT

- A. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with potable water at project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for earthwork, pavement work, and other conditions affecting performance.
 - 1. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

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3.3 INSTALLATION, GENERAL

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
 - 1. Install fencing on established boundary lines inside property line.
- B. Post Setting: Hand-excavate holes for post foundations in firm, undisturbed or compacted soil. Set terminal, line and gate posts in concrete footing. Protect portion of posts aboveground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.
 - 1. Dimensions and Profile: As indicated on Drawings.
 - 2. Concealed Concrete Footings: Stop footings 2 inches below grade, unless otherwise indicated, to allow covering with surface material.
 - 3. Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
 - 4. Posts Set into Existing Concrete: Form or core drill holes not less than 5 inches deep and $\frac{3}{4}$ inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped o drain water away from post.

3.4 CHAIN-LINK FENCE INSTALLATION

- A. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and as indicated.
- B. Line Posts: Space line posts uniformly at 10 feet o.c. unless otherwise indicated.
- C. Post Bracing Assemblies: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at mid height of fabric on fences with top rail and at two-thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- D. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.
- E. Intermediate Rails: Install in one piece as indicated on Drawings, spanning between posts, using fittings, special offset fittings, and accessories.
- F. Bottom Rails: Install, spanning between posts, using fittings and accessories.
- G. Chain-Link Fabric: Apply fabric to outside of enclosing framework, unless otherwise indicated. Leave 1 inch between finish grade or surface and bottom selvage, unless otherwise indicated. Pull

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fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

- H. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- I. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM 626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to braces 24 inches o.c.
- J. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.5 GATE INSTALLATION

- A. General: Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION 323113

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SECTION 323300 – WALK, ROAD, AND PARKING APPURTENANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. All permanent traffic control signage.
- B. Related Sections include the following:
 - 1. Division 01 Section “Construction Waste Management.”

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer’s written certification that all materials comply with the specifications and with all regulatory bodies having jurisdiction on this work
- B. Shop Drawings: Include details showing sign layout and mounting details.

PART 2 - PRODUCTS

2.1 TRAFFIC CONTROL SIGNS

- A. Manufacturers: Signage products shall be manufactured by firms authorized and acceptable to the Commonwealth of Pennsylvania, Department of Transportation (PennDOT).
- B. Sign Blanks: Aluminum sign blanks shall conform to ASTM B 209 Alloy 5052-H38. The sign faces shall be fabricated from materials conforming to PennDOT Specifications Publication No. 408, Section 931 – Post Mounted Signs, Type B and Section 1103 – Traffic Signing and Marking. Each sign shall have three (3) mounting holes.
 - 1. Obtain any permits and approvals required for this work.
 - 2. Refer to contract drawings for extent of work for traffic control signage.

2.2 TRAFFIC CONTROL SIGNPOSTS

- A. Steel Posts: Signposts shall be PennDOT Type B breakaway steel posts in accordance with PennDOT Specification Publication No. 308, Section 1103.08.

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1. Anchor Posts: U-shaped, 12 gage galvanized steel anchor posts, sized to receive signpost, and punched on front face of the post.
 - a. Length: 36 inches.
 2. Signpost: U-shaped, 12 gage galvanized steel post. The sign post shall have holes punched on front face of the post.
 - a. Length: Provide length as necessary to accommodate the proper sign mounting height. See Drawings for additional information.
 3. Color: Apply a green polyester coating in accordance with PennDOT Specifications Publication No. 408, Section 1103.08(c).
- B. All posts and brackets shall be cut, bent, and holes punched and drilled prior to galvanizing.
- C. The steel posts shall be certified by the manufacturer to conform to the breakaway requirements of AASHTO “Standard Specifications for Structural Supports for Highway Signs”.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for bolts, nuts, and washers.
- B. Bolts: All bolts, nuts and washers shall be stainless steel, Type 304.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FINISH

- A. All parts of the permanent site signage shall have a fully sealed, 2 mil thick, and oven baked polyester powder.
1. Color: As selected by the Architect from manufacturer’s standard colors.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. The contractor, subcontractors, and their personnel shall follow the procedures and practices for waste separation, collection and transport as defined in the contractor’s “Waste Management Plan” as required by Division 01 Section “Construction Waste Management.”

3.2 INSTALLATION

- A. Steel Posts: Signs shall be mounted on steel posts with stainless steel nuts, bolts, and washers. Place signs in accordance with PennDOT standards. Post mounted signs shall be secured with three (3) bolts.

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3.3 PROTECTION

- A. Protect installed materials until date of Substantial Completion.

END OF SECTION 323300

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SECTION 329200 – LAWNS, GRASSES AND EXTERIOR PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Seeding.
 - 2. Trees.
 - 3. Shrubs.
 - 4. Ground cover.
- B. Related Sections include the following:
 - 1. Section 311000, "Site Clearing" for topsoil stripping and stockpiling.
 - 2. Section 312000, "Earth Moving" for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

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- G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- H. Finish Grade: Elevation of finished surface of planting soil.
- I. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- J. Planting Soil: Imported topsoil or manufactured topsoil, mixed with soil amendments.
- K. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.
- L. Date of acceptance: The contractor shall contract Landscape Architect to schedule a final site walk through.
- M. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- N. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- O. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- P. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- Q. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- R. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including soils.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
 - 3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 10 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

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- B. Samples for Verification: For each of the following:
1. Trees and Shrubs: Three samples of each variety and size delivered to the site for review. Maintain approved samples on-site as a standard for comparison.
 2. Compost Mulch: 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
 3. Mineral Mulch: 2 lb of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.
 4. Weed Control Barrier: 12 by 12 inches.
 5. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.
 6. Tree Grates, Frames and Accessories: Manufacturer's standard size delivered to the site for review, to verify design selected.
 7. Root Barrier: Width of panel by 12 inches.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates for each material.
- B. Qualification Data: For landscape Installer.
- C. Planting Schedule: Indicating anticipated planting dates for each type of planting.
- D. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns and exterior plantings during a calendar year. Submit before expiration of required maintenance period.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and exterior plant establishment. Installer must be registered with the Pennsylvania Landscape and Nursery Association or similar agency and be in business for more than five years.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish at a minimum four (4) soil samples, analyzed by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil. Soil tests must be taken and analysis results presented to Architect prior to any landscape work. Indicate on plan locations of sampling.
 1. Report suitability of topsoil for lawn/plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.
- B. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sunscald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.
- C. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants in shade, protect from weather and mechanical damage, and keep roots moist.

1.8 SCHEDULING

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: 4/1 – 5/15.
 - 2. Fall Planting: 8/15 – 10/15.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.9 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continue until the Engineer has confirmed its acceptance. Following the Date of Acceptance, Contractor shall maintain lawn areas for a period of three months.
- B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.
 - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water lawn at a minimum rate of 1 inch per week.
- D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the following grass height:
 - 1. Mow grass 2-1/2 to 3 inches high.

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- E. Lawn Post fertilization: Apply fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area or as directed by soil test.

1.10 EXTERIOR PLANT MAINTENANCE

- A. Trees and Shrubs: Maintain by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease.
- B. Ground Cover and Plants: Maintain by watering, weeding, fertilizing, and other operations as required to establish healthy, viable plantings
- C. Time: Maintain all plantings for a period of twelve months following date of Substantial Completion.

1.11 WARRANTY

- A. The site contractor shall guarantee all plant material to be in healthy and flourishing condition for a period of eighteen (18) months from the date of acceptance. Any plant material found to be dying or in poor condition (i.e., dead main leader, 20% or greater branch die back) shall be removed and replaced immediately at no charge.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
 - 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

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- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.
- E. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: As indicated on plans.

2.3 EXTERIOR PLANTS

- A. Tree and Shrub Material: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, and disfigurement.
 - 1. Provide balled and burlapped, container-grown trees and shrubs as indicated on plans.
 - 2. All trees must have plant identification tags for identification from the nursery on each tree.
 - 3. At a minimum, one shrub/groundcover of each species must be labeled from the nursery, certifying genus and species.
- B. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.
- C. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.

2.4 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
 - 1. Topsoil Source: Import satisfactory soil. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

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- a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from local, naturally well-drained construction or mining sites where topsoil occurs at least 6 inches deep; do not obtain from agricultural land, bogs or marshes.

2.5 INORGANIC SOIL AMENDMENTS

- A. Lime: As recommended by the soil test report.
- B. Sulfur: As recommended by the soil test report.
- C. Iron Sulfate: As recommended by the soil test report.
- D. Perlite: As recommended by the soil test report.
- E. Agricultural Gypsum: As recommended by the soil test report.
- F. Sand: As recommended by the soil test report.

2.6 ORGANIC SOIL AMENDMENTS

- A. Leaf mould. Well decomposed, ground, weed free.

2.7 PLANTING ACCESSORIES

- A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.8 FERTILIZER

- A. Use fertilizer indicated on plans or as recommended by soil test report.

2.9 MULCH

- A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - 1. Type: Shredded hardwood.
- B. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth or germination inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.10 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with the following soil amendments per recommendation of soil test. Plus mix ¼ leaf mould with topsoil.

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2.11 WEED BARRIER

- A. Non-woven Fabric: Polypropylene or polyester fabric, 3 oz. per sq. yd. minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected. Landscaping Contractor will submit a letter of acceptance prior to beginning work. If discrepancies or issues are found, they should be outlined and documented in writing to the Engineer. All issues shall be corrected prior to spreading topsoil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate with vertical sides and with bottom of excavation slightly raised at center to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 1. Excavate approximately three times as wide as ball diameter for balled and burlapped, balled and potted, container-grown, fabric bag-grown stock.
 - 2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - 3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - 5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - 6. Maintain supervision of excavations during working hours.
 - 7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
- B. Subsoil and topsoil removed from excavations may not be used as planting soil as they have been impacted by arsenic. The top 6 inches of soil tested appears to be impacted.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

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1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.4 TREE, SHRUB, AND VINE PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
 1. Use planting soil for backfill.
 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Set balled and potted and container-grown stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
 1. Use planting soil for backfill.
 2. Carefully remove root ball from container without damaging root ball or plant.
 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Set fabric bag-grown stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
 1. Use planting soil for backfill.
 2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.

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3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- F. Set and support bare-root stock in center of planting pit or trench with root flare 2 inches above adjacent finish grade.
1. Use planting soil for backfill.
 2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.
 3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch from root tips; do not place tablets in bottom of the hole or touching the roots.
 4. Continue backfilling process. Water again after placing and tamping final layer of soil.
- G. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.5 MECHANIZED TREE SPADE PLANTING

- A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
- B. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
- C. Cut exposed roots cleanly during transplanting operations.
- D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.
- E. Plant trees as shown on Drawings, following procedures in "Tree, Shrub, and Vine Planting" Article.
- F. Where possible, orient the tree in the same direction as in its original location.

3.6 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.

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- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

- A. Install trunk stabilization as follows unless otherwise indicated:
 - 1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - 2. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
 - 3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
 - 4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- B. Staking and Guying: Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes 30 inches long, driven to grade.
 - 1. Site-Fabricated Staking-and-Guying Method:
 - a. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
 - b. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
 - c. Support trees with strands of cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
 - d. Retain one of first two subparagraphs below.
 - e. Attach flags to each guy wire, 30 inches above finish grade.
 - f. Paint turnbuckles with luminescent white paint.
 - 2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.
- C. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.
 - 1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.

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- a. Install stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation. Saw stakes off at horizontal stake.
 - b. Install screws through horizontal hold-down and penetrating at least 1 inch into stakes. Pre-drill holes if necessary to prevent splitting wood.
 - c. Install second set of stakes on other side of root trunk for larger trees as indicated.
2. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.8 ROOT-BARRIER INSTALLATION

- A. Install root barrier where trees are planted within 60 inches of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.
- B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.
- C. Install root barrier continuously for a distance of 60 inches in each direction from the tree trunk, for a total distance of 8 feet per tree. If trees are spaced closer, use a single continuous piece of root barrier.
 1. Position top of root per manufacturer's recommendations.
 2. Overlap root barrier a minimum of 12 inches at joints.
 3. Do not distort or bend root barrier during construction activities.
 4. Do not install root barrier surrounding the root ball of tree.

3.9 LAWN PREPARATION

- A. Limit lawn subgrade preparation to areas to be planted.
- B. Fine Grading: All fine grading shall be inspected and approved by the Landscape Architect prior to planting, mulching, or seeding. Site contractor shall clean topsoil of roots, plants, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth. Soil amendments as recommended by the soil sample test shall be tilled into the top 6" of topsoil.
- C. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.10 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 1. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at the rate noted on drawings.

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- C. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding and 1:3 with erosion-control blankets installed and stapled according to manufacturer's written instructions.
 - 1. Protect seeded areas with slopes not exceeding 1:3 as indicated on plans.
- E. Protect seeded areas from hot, dry weather or drying winds by applying topsoil within 24 hours after completing seeding operations. Soak and scatter uniformly to a depth of 3/16 inch and roll to a smooth surface.

3.11 HYDROSEEDING

- A. Hydro seeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydro seed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Mix slurry with tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch as indicated in soil test report.

3.12 SATISFACTORY LAWNS

- A. The Engineer shall inspect all work for acceptance upon written request of the Landscape Contractor.
- B. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

3.13 EXTERIOR PLANTING

- A. Bed Establishment:
 - 1. Outline all proposed planting beds for approval by landscape architect 3 days prior to starting work.
 - 2. Loosen subgrade of planting beds to depths and widths indicated on plans.
 - 3. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 4. Amend topsoil as per soil test results and add 1/4 leaf mould and mix thoroughly.
- B. Trees and Shrubs:
 - 1. Stake/locate all trees and shrubs on site for approval by landscape architect 3 days prior to start of work.
 - 2. Install plants as indicated on plans and by details.
- C. Ground Cover and Plant Planting:
 - 1. Set out and space ground cover and plants as indicated.
 - 2. Dig holes large enough to allow spreading of roots, and backfill with planting soil.
 - 3. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

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4. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
 5. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.
- D. Planting Bed Mulching:
1. Completely cover bed area with a minimum 4" cover of mulch.
- E. Tree Mulching
1. Provide a minimum 4" cover of mulch for a minimum diameter of 5 feet around each tree.
- F. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.
- G. Provide and maintain a water bag for each tree.
- H. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

3.14 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove erosion-control measures after grass establishment period.
- D. Instruct Owner's personnel in maintenance.

END OF SECTION 329200

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SECTION 334100 – STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Extent of storm systems work is indicated on drawings and by requirements of this section.
 - 2. Include all piping, manholes, inlets, catch basins, etc. in conjunction with storm sewer work.
- B. Related Sections include the following:
 - 1. Section 033053, "Cast-in-Place Concrete Utilities."
 - 2. Section 31200, "Earth Moving."
 - 3. Section 312301, "Excavation, Backfill and Compaction of Utilities."

1.3 QUALITY ASSURANCE

- A. Codes and Standards: All work shall be performed in accordance with methods and details indicated on the plans, local ordinance, PennDOT Publication 408 latest edition as amended and all regulatory bodies having jurisdiction on this work.
- B. Environmental Compliance: Comply with applicable portions of respective County Conservation District regulations pertaining to storm sewage systems.
- C. Concrete Materials: Concrete materials, reinforcing, testing, etc. shall conform to Specification Section 033053 "Cast-in-Place Concrete for Utilities."
- D. American Society for Testing and Material (ASTM)
 - 1. F677 Standard Specifications for Large Diameter Corrugated Polyethylene Pipe and Fitting.
- E. AASHTO Specifications:
 - 1. M294 Standard Specifications for Corrugated Polyethylene Pipe.
 - 2. M170 Standard Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for all storm sewage system materials and products.

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- B. Shop Drawings: At project closeout, submit record drawings of installed storm sewage piping and products, in accordance with requirements of Division 1.
- C. Maintenance Data: Submit maintenance data and parts list for storm sewage system materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 1.

PART 2 - PRODUCTS

2.1 PVC PIPE

- A. PVC Sewer Pipe, NPS 15 and Smaller: ASTM D 3034, SDR 26, with push-on type integral bell with elastomeric gasket, ASTM F477, joint.

2.2 STORMWATER CHAMBERS SYSTEMS

- A. Material – All chambers shall be stamped with:
 - 1. Name of Manufacturer
 - 2. Size
- B. Manufacturer: Supplier for all chambers and related components shall be:
 - 1. Advanced Drainage Systems.

2.3 PRECAST STRUCTURES

- A. Materials:
 - 1. Precast: Conform to ASTM C 478. Concrete shall be air-entrained. Form flow channels in bases.
 - 2. Masonry Mortar: Conform to ASTM C 270
 - 3. Castings: Conform to ASTM A48, Class 30. Frames and covers shall be heavy duty AASHTO Highway Loading Class HS-20. Cover shall have word “ STORM SEWER” inscripted with 2: high, raised letters and have 2 pick holes.
 - a. Covers shall be bolt-down type.
 - 4. Manhole Steps: Extruded aluminum alloy or PVC coated steel as indicated.

2.4 CONCRETE WORK

- A. Class AA Concrete:
 - 1. 28-Day Compressive Strength: 3750 psi.
 - 2. Slump: 1 to 3 inches.
 - 3. Use for all precast and site cast concrete.
- B. Cement factor and maximum water cement ratio shall conform to Table A, Section 704.1 (b) PennDOT Publication 408 Specifications.

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PART 3 - EXECUTION

3.1 CONNECTION TO PUBLIC UTILITY

- A. Install utilities in strict compliance with municipality requirements.

3.2 INSTALLATION

- A. General: No pipe shall be laid on frozen or thawing material or during wet weather conditions. Each pipe shall be subject to observation by the Architect/Engineer, and those not meeting the specified requirements shall be removed from the work site. Delivery slips from the pipe suppliers shall be kept on the work and furnished, upon request, to the Architect/Engineer. The Architect/Engineer shall have the right to make changes in the line and grade of all storm sewers as may be necessary or advantageous.
- B. Lay pipe proceeding upgrade with the bell or groove pointing upstream.
- C. Line and Grade Checks: The Contractor shall check each section of pipe from the string line and grade board or other approved methods. A variation of one quarter (1/4) inch or more from the true invert grade and a variation of one (1) inch or more from the true line will be sufficient reason for the Architect/Engineer to order the work to be rejected.

3.3 CORRUGATED POLYETHYLENE PIPE (PEP) AND REINFORCED CONCRETE PIPE (RCP) LAYING

- A. All pipes shall be laid and maintained to the required lines and grades shown on the Contract Drawings.
- B. Following the trench preparation, pipe lying shall proceed from the downgrade end. Pipe ends shall be carefully cleaned before pipes are lowered into the trench.
- C. Each section of the pipe shall be placed so that the full length of the barrel rests on six inches of bedding material. Each section of pipe shall be firmly held in position so that its invert forms a continuous grade with the invert of the previously laid pipe.
- D. The end of the pipe shall be protected with a stopper to prevent the entrance of water, earth stones, or other debris. Any debris entering the pipe shall be removed immediately to the satisfaction of the Architect/Engineer.
- E. Walking or working on the completed pipeline, except as may be necessary in tamping or backfilling, shall not be permitted until the trench has been backfilled to a height of at least eighteen inches over the top of the pipes.
- F. Storm sewer pipe that has its grade or joints disturbed after lying shall be taken up and re-laid. Any section of pipe already laid and found to be defective shall be taken up and replaced with new pipe by the Contractor.
- G. Joints in corrugated polyethylene pipe shall be made with specified couplings.
- H. Joints in reinforced concrete pipe shall be made with gasket type jointing material.

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3.4 INLET AND OUTLET STRUCTURES AND MANHOLES

- A. Inlets shall conform to the lines and grades given, and to the dimensions and design as indicated on the drawings.
- B. Inlet and outlet structures shall be constructed using precast units. All reinforcing shall conform to PennDOT Standard Construction Details as indicated on the drawings.
- C. Cement concrete construction shall comply with the applicable requirements of Section 713, PennDOT Publication 408 and be air-entrained concrete.
- D. Masonry construction shall comply with applicable requirements of Section 713, PennDOT Publication 408.
- E. Inlets shall be constructed in accordance with the requirements specified for the class of concrete or type of masonry for the work as required. Concrete foundations and walls shall be placed monolithically; except when permitted by the Architect, they may be constructed separately if the Contractor places #4 reinforcement bars, at least 23 inches in length and spaced 8 inches center-to-center, as dowels between the foundation and walls placed thereon, at no expense to the Owner.
- F. The pipe inlets shall be flush with the inside face of the structure.
- G. Spaces excavated for but not occupied by these structures, shall be backfilled with acceptable material in uniform loose layers not exceeding eight (8) inches in depth, and be compacted by means of approved mechanical tampers.

END OF SECTION 334100