

CITY OF NORTH TONAWANDA, NEW YORK

PROJECT 2023-01

**PAYNE PARK AQUATIC FACILITY
MEMORAL POOL REVITALIZATION**

Grant No. EPF 230185



Mayor

Austin J. Tylec

Common Council President

Joseph Lavey Jr., Alderman

COMMON COUNCIL

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Joe Loncar
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Alderman-at-Large
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John Urban**



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BCI Project Number: 23065



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PAYNE PARK AQUATIC FACILITY
NORTH TONAWANDA, NY

PROJECT NO. 23065
CITY PROJECT NO. 2023-01

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LEGAL NOTICE
CITY OF NORTH TONAWANDA, NEW YORK
ENGINEERING DEPARTMENT

NOTICE TO BIDDERS

SEALED PROPOSALS for the **PAYNE PARK AQUATIC FACILITY** as called for by the Contract, in accordance with plans and specifications thereof, will be received by the City Clerk/Treasurer of the City of North Tonawanda, New York, until **11:00 am, Prevailing Time, TUESDAY, JANUARY 27, 2026** at which time they will be publicly opened.

A copy of the Contract Documents is on file and is available for inspection during the usual business hours at the office of the City Engineer in the City Hall, 216 Payne Avenue, North Tonawanda, New York; and at Construction Exchange of Buffalo and Western New York, 2660 William Street, Cheektowaga, NY 14227.

The project consists of the construction of a new aquatic facility including a new seasonal Pool House, outdoor swimming pool, pool deck, pool slide, water features, pool accessories, fencing, sidewalk, parking lot, utilities, and landscaping.

Copies of the above-mentioned documents may be viewed and ordered through the following website on or after **December 23, 2025**: www.avalonplanroom.com in the Public Bid Section. If you do not have Internet access or have questions on ordering from the site, please contact Avalon Document Services at (716) 995-7777. Drawings and specifications can be picked up at Avalon Document printing at 741 Main Street, Buffalo, NY 14203. Payment can be made by credit card or by a check made payable to Avalon Document Services.

Each proposal must be accompanied by cash, a certified check payable to the City of North Tonawanda, or bid bond, having as surety thereon a surety company acceptable to the City Attorney, in an amount not less than five percent (5%) of the amount of the base bid, conditioned that, if his proposal is accepted, he will enter into a contract for the same, and that he will execute any such further security as may be required for the faithful performance of the contract.

An optional **pre-bid meeting** will be held at **1:00 pm, Prevailing Time on January 8, 2026** at North Tonawanda City Hall, 216 Payne Avenue, North Tonawanda, New York. Attendance at the pre-bid meeting is recommended but is not mandatory.

The City of North Tonawanda has been and will continue to be an equal opportunity organization. All qualified Minority and Women-Owned Business Enterprise (MWBE) suppliers, contractors and/or businesses will be afforded equal opportunity without discrimination because of race, religion, national origin, sex, age, disability, sexual preference or Vietnam Era Veterans status.

This project is funded in part by a grant from the NYS Office of Parks, Recreation and Historic Preservation through Title 9 of the Environmental Protection Act of 1993. Under Article 15A,

NOTICE TO BIDDERS

Executive Law, the State of New York is committed to providing Minority and Women Owned Business (MWBE) equal opportunity to participate in government contracts. Though there are no required goals for MWBE participation in this grant funded project, the successful bidder will be required to make a Good Faith Effort in the utilization of MWBE's and furnish reports showing the participation of various business enterprises of subcontractors and suppliers on the contract.

Vendor Responsibility Questionnaire: Upon selection, for all contracts that equal or exceed \$100,000, the contractor will be required to submit to the State a Vendor Responsibility Questionnaire: Construction – For Profit. The questionnaire can be found online at: http://www.osc.state.ny.us/vendrep/forms_vendor.htm

Insurance Certificates: Upon selection, all contractors and subcontractors must provide proof of Workers' Compensation and Disability Benefits Insurance Coverage for employees, or proof of exemption from the New York State Workers' Compensation Board.

All bids shall be submitted to the **City Clerk/Treasurer's office in a sealed envelope addressed to the City of North Tonawanda** and shall be plainly marked on the outside with the Contractor's name and title of the bid. Bids for contracts shall be designated as, **PROJECT NUMBER 2023-01, PAYNE PARK AQUATIC FACILITY.**

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

The minimum wage rates to be paid to laborers and mechanics engaged in the construction of this project shall be the latest wage rates established by the State Industrial Commissioner.

The Owner reserves the right to reject any or all bids for failure to comply with the requirements of the Contract Documents but may, at its discretion, waive any informalities or irregularities.

The Owner further reserves the right to reject any or all bids or to award a contract which, in its judgment, is in the best interest of the Owner.

No bidder may withdraw his bid within sixty (60) days after the opening thereof, but may withdraw same at any time prior to the opening thereof. Bidder must sign the statement of non-collusion in accordance with Chapter 751 of the Laws of the State of New York.

Donna Braun
City Clerk/Treasurer
City of North Tonawanda

SECTION 001116 - INVITATION TO BID

1.1 PROJECT INFORMATION

- A. Notice to Bidders: Bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.
- B. Project Identification: Payne Park Aquatic Facility
 - 1. Project Location: 830 Payne Avenue, North Tonawanda, NY 14120
- C. Owner: City of North Tonawanda, North Tonawanda, NY 14120
 - 1. **Owner's Representative:**
 - a. Chelsea L. Spahr, PE
City Engineer
216 Payne Avenue
North Tonawanda, NY 14120
Phone: 716-695-8565
Email:
cspahr@northtonawanda.org
- D. Architect: Brandstetter Carroll, Inc., 1220 West 6th Street, Suite 300, Cleveland, OH 44113
216.241.4480.
 - 1. Architect's Representatives:
Ms. Nancy Nozik, Project Manager nnozik@bciaep.com, 216-241-4480.
- E. Project Description: Project consists of a new outdoor swimming pool and pool house as well as associated site demolition, site utilities, and site improvements.
- F. Construction Contract: Bids will be received for the following Work:
 - 1. Single Prime Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

- A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
 - 1. Bid Date: January 27, 2026
 - 2. Bid Time: 11:00 a.m, local time
 - 3. Location: Clerk Office, North Tonawanda City Hall, 216 Payne Avenue, North Tonawanda, New York 14120
- B. Bids will be thereafter publicly opened and read aloud.

C. Documents required at Bid:

1. BID FORM
2. ALLOWANCE FORM
3. UNIT PRICE FORM
4. ALTERNATES FORM
5. NON-COLLUSIVE BIDDING CERTIFICATION
6. BID BOND

Documents required within seven (7) day of award notification:

1. EQUAL EMPLOYMENT OPPORTUNITY POLICY STATEMENT
2. CONTRACTOR'S SOLICITATION LOG

1.3 BID SECURITY

- A. Bid security shall be submitted with each bid in the amount of 5 percent in the City of the bid amount. No bids may be withdrawn for a period of 60 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

1.4 PREBID CONFERENCE

- A. A pre-bid conference for all bidders will be held at 1:00pm on January 8, 2026, local time.

1.5 DOCUMENTS

Copies of bidding and contract documents are available for purchase from Avalon Document Services, 741 Main Street, Buffalo, NY 14203
Phone: 716-995-7777
Website: www.avalonplanroom.com

1.6 TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. Bidders shall begin the Work on receipt of the Notice to Proceed. Construction Submittals and material orders shall occur prior to any work in the field. Work in the field shall be completed within the Contract Time. Work beyond the Contract Time is subject to liquidated damages. Time of Completion is designated in the Bid Form.

1.7 BIDDER'S QUALIFICATIONS

- A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. The Bid Bond will convert to a Performance Bond in the amount of the bid. A Maintenance Bond will be required for one year after construction. Insurance in a form acceptable to Owner will be required of the successful Bidder.

1.8 PREVAILING WAGE

- A. The minimum wage to be paid to all labor and mechanics employed on this construction project shall be in accordance with the prevailing wage rates of the State of New York. See following attachment.

1.9 City of Tonawanda, New York EEO Language: The City of Tonawanda, New York has been and will continue to be an equal opportunity organization. All qualified Minority and Women-Owned Business Enterprise (MWBE) suppliers, contractor and/or businesses will be afforded equal opportunity without discrimination because of race, religion, national origin, sex, age, disability, sexual preference or Vietnam Era Veterans status.

1.10 GRANT FUNDING

- A. This project is funded in part by a grant from NYS Office of Parks, Recreation and Historic Preservation through Title 9 of the Environmental Protection Act of 1993.
- B. See attached documents related to the funding source:
1. Notice to Contractors, Subcontractors, Suppliers and Vendors
 2. Attachment A-1: Agency Specific Terms and Conditions
 3. Attachment A-2: Program Specific Terms and Conditions Environmental Protection Fund
 4. Statement for Legal Notice – Bidding Process

1.11 **Vendor Responsibility Questionnaire:** Upon selection, for all contracts that equal or exceed \$100,000, the contractor will be required to submit to the State a Vendor Responsibility Questionnaire: Construction – For Profit. The questionnaire can be found online at http://www.osc.state.ny.us/vendrep/forms_vendor.htm

1.12 **Insurance Certificates:** Upon selection, all contractors and subcontractors must provide proof of Workers' Compensation and Disability Insurance Coverage for employees, or proof of exemption from the New York State Workers' Compensation Board.

1.13 The Contractor shall be responsible for assuring that the project is designed and constructed in conformance with the Uniform Federal Accessibility Guidelines (UFAS Appendix A to 41 CFR part 101 19.6), the Americans with Disabilities Act Accessibility Guidelines (ADAAG Appendix A to 28 CFR part 36) and the New York State Uniform Fire Prevention and Building (I) (Code (part 1219 1228 of Title 19 NYCRR). Where there are discrepancies among the sets of standards with regard to a particular design/construction requirement, the one providing for the greatest degree of accommodation for the disabled shall apply.

1.14 It is the Contractor's responsibility to assure that all work on the project complies with the State Environmental Quality Review Act, receives all required permits in advance, and complies with all applicable Federal, State and/or local laws including, but not limited to, zoning ordinances and building codes.

END OF DOCUMENT 001116

NOTICE TO CONTRACTORS, SUBCONTRACTORS, SUPPLIERS AND VENDORS

This project is funded in part by a grant from the NYS Office of Parks, Recreation and Historic Preservation through Title 9 of the Environmental Protection Act of 1993. All contracts and subcontracts for the project are subject to the terms of the State of New York Contract for Grants (SNYCG) -- Standard Terms and Conditions, which can be found online at <https://grantsmanagement.ny.gov/state-agency-resources>, Appendix A (A), Attachment A-1 (A1) and Attachment A-2 (A2), attached hereto. *If any other funding sources are involved in the project, the grantee is responsible for compliance with the program requirements for those funding sources.*

Note particularly the following requirements:

- The State's right to review and approve every subcontract in excess of \$100,000. *SNYCG III (B)(2)*
- The requirement that subcontracts contain provisions specifying (1) that work accord with the terms of the State of New York Contract for Grants, (2) that nothing in the subcontract shall impair the rights of the State under the State of New York Contract for Grants, and (3) that nothing in the subcontract, nor under the State of New York Contract for Grants creates any contractual relationship between the subcontractor and the State. *SNYCG III (B)(2)*
- Contractor's responsibility to submit vendor responsibility information to the State, including a Vendor Responsibility Questionnaire for subcontracts that equal or exceed \$100,000. *SNYCG III (B)(4)*
- Non-discrimination requirements *A(5) and A1(F)*
- Equal Opportunity provisions, including a requirement that the following provisions be included in construction subcontracts in excess of \$25,000:
 - The Contractor shall not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status;
 - The Contractor shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on State contracts;
 - The Contractor shall undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. Affirmative action shall mean recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation;
 - At the request of the State, the Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union or representative shall not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative shall affirmatively cooperate in the implementation of the Contractor's obligations herein; and
 - The Contractor shall state, in all solicitations or advertisements for employees, that, in the performance of the State contract, all qualified applicants shall be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status. *A(12) and A1(F)*
- Wages and Hours Provisions *A(6)*
- New York State business requirement *A(20)*
- Worker's Compensation and Disability Benefits Insurance coverage *SNYCG III (I) (L), A (4), A1(E)*
- **NEW Effective December 30, 2024.** Department of Labor Public Work Contractor and Subcontractor Registry *A1 (O)*

ATTACHMENT A-1
AGENCY SPECIFIC TERMS AND CONDITIONS

- A. Notice.** For purposes of notice as contained in this State of New York Contract for Grants (Contract), Standard Terms and Conditions, Section I(G):
1. The **State's designee** shall be the STATE AGENCY identified on the Face Page. Document submission and inquiries should be directed to the designated STATE AGENCY representative.
 2. The **Contractor's designee** shall be the CONTRACTOR NAME at the CONTRACTOR PRIMARY MAILING ADDRESS, as identified on the Face Page.
- B. Payment** shall be made to the NYS Vendor ID Number at the CONTRACTOR PAYMENT ADDRESS identified on the Face Page.
- C. Changes to Budget and Program Work Plan.** Changes shall not be made in the work described in Attachment C (Work Plan) or the proposed expenditure of funds as shown in Attachment B (Budget), without the prior written approval of the State. Such approval will be granted if the changes are not substantive and do not alter the scope, intent or basic elements of the contract. Changes in the Work Plan or Budget that are substantive or alter the scope, intent or basic elements of the contract, if agreed to by the State, will be implemented by an amendment that may require approval and filing with the New York Attorney General Contract Approval Unit (AG) and the Office of the State Comptroller (OSC or State Comptroller), per Section I(D) of this Contract.
- D.** It is the Contractor's responsibility, pursuant to Sections 57 and 220 (8) of the Workers' Compensation Law, to maintain for State audit and review either proof that they have **Workers' Compensation and Disability Benefits Insurance** coverage for any employees, or proof of exemption from the New York State Workers' Compensation Board. The Contractor must also obtain from any contractor or subcontractor hired to provide a service pursuant to this Contract, similar proof or waivers from the contractor or subcontractor, and must maintain such documentation on file for audit.
- E. Non-Discrimination:**
1. If the project involves development or acquisition of public facilities, the Contractor shall not limit access or discriminate in the operation of the facilities on the basis of place of residence, race, creed, color, national origin, sex, age, disability or marital status.
 2. The Contractor agrees to comply with all applicable Federal, State, and local Civil Rights and Human Rights laws with reference to equal employment opportunities and the provisions of service.
- F. Termination.** In addition to the options available to the State in the Contract, in the event the Contractor fails to comply with its terms and conditions regarding completion of the project, the State at its option may require the Contractor to bring the project to a point of educational/interpretive, historical, recreational or conservation usefulness as determined by the State.
- G.** Documents submitted to the State may be subject to disclosure under the **Freedom of Information Law**.
- H. Non-Sectarian Purposes.** The Contractor agrees that funds made available as shown in Attachment B will only be used to achieve the intended public benefit and will not be used for any sectarian purposes.
- I. Archeology.** In the event of any unanticipated archeological discoveries, the Contractor shall stop all work and notify the State immediately. Work shall not resume until the State determines how any previously undiscovered archeological remains will be treated. Special attention shall be given to any discovery of burials, graves, or human remains.

J. Preservation of Historic Properties. It is the public policy and in the public interest of the State to preserve New York's historical, archeological, architectural and cultural heritage. All activities under this Contract shall be reviewed under either Section 106 of the National Historic Preservation Act or Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law to ensure that adverse effects or impacts on significant properties are avoided or mitigated. Any work that affects historic properties shall conform to The Secretary of the Interior's Standards for the Treatment of Historic Properties 1995, The Secretary of the Interior's Standards and Guidelines for Archeological Documentation or any other applicable Secretary of the Interior's Standards (collectively referenced as STANDARDS), which are available from the State.

K. Post-Completion Requirements. Where the project involves acquisition of equipment or acquisition of or improvement of real property, the Contractor shall be responsible for maintaining and operating the equipment, property, and/or improvements; providing public access; maintaining public signage related to the project; and seeking any required State approvals. The State shall have the right and responsibility to inspect the project and property for compliance.

L. Construction Requirements. If the Project described in this Contract includes construction, the following shall apply:

1. Contract plans, specifications, and cost estimates shall be submitted to the State for review prior to the letting of any construction contract by the Contractor. The State shall verify that the plans, specifications and cost estimates are in conformance with the work described in Attachment B and shall so notify the Contractor in writing; the State shall further verify that appropriate documents have been prepared by a professional licensed to practice in the State of New York. All plans and specifications as reviewed shall become part of this Contract, and no change or revision may be made to such plans and specifications without the express written consent of the State.
2. The Contractor shall be responsible for assuring that the project is designed and constructed in conformance with the Uniform Federal Accessibility Standards (UFAS Appendix A to 41 CFR part 101 19.6), the Americans with Disabilities Act Accessibility Guidelines (ADAAG Appendix A to 28 CFR part 36) and the New York State Uniform Fire Prevention and Building (I) (Code (parts 1219 1228 of Title 19 NYCRR). Where there are discrepancies among the sets of standards with regard to a particular design/construction requirement, the one providing for the greatest degree of accommodation for the disabled shall apply.
3. It is the Contractor's responsibility to assure that all work on the project complies with the State Environmental Quality Review Act, receives all required permits in advance, and complies with all applicable Federal, State and/or local laws including, but not limited to, zoning ordinances and building codes.

M. At the discretion of the State, an **Agreed Upon Procedure Review** may be required of the grant performed by a representative of the STATE or a certified public accountant procured by the STATE or the CONTRACTOR currently licensed by the NYS Board of Public Accountancy, in accordance with attestation standards established by the American Institute of Certified Public Accountants and in accordance with Government Auditing Standards issued by the Comptroller General of the United States of America to the satisfaction of the STATE.

N. The State may make **periodic inspections** of the project both during its implementation and after its completion to assure compliance with this Contract. The Contractor shall allow the State unrestricted access to work during the preparation and progress of the work and provide for such access and inspection by the State in all construction contracts relating to the project.

O. Department of Labor Public Work Contractor Registry. Effective December 30, 2024, all contractors and subcontractors submitting bids or performing construction work on public work projects or private projects covered by Article 8 of the Labor Law are required to register with the

New York State Department of Labor under Labor Law Section 220-i. Private projects subject to Article 8 of the Labor Law include those covered by Labor Law Sections 224-a (public subsidy funded projects), 224-d (renewable energy systems), 224-e (broadband projects), 224-f (climate risk-related and energy transition projects, and roadway excavations). A Certificate of Registration with a unique registration number will be issued to the applicant electronically through the Contractor Registry portal. A digital copy of the certificate must be submitted with bid submission or bidder may be found to be non-responsive. Contractors are responsible for verifying that any subcontractors they work with are registered. Please refer to this website for information: <https://dol.ny.gov/contractor-and-subcontractor-landing>. The registration login page is found here: [Log In - Management System for Protecting Workers' Rights](#).

ATTACHMENT A-2
PROGRAM SPECIFIC TERMS AND CONDITIONS
ENVIRONMENTAL PROTECTION FUND

- A.** Funding for this project is provided pursuant to the terms of the Environmental Protection Act, Title 9 of Article 54 of the Environmental Conservation Law and governed by the Rules and Regulations set forth in 9 NYCRR Sections 439-443.
- B. Procurement:** All goods and services required for this project must be procured in a manner so as to assure the prudent and economical use of grant moneys, to facilitate the acquisition of goods and services of maximum quality at the lowest possible cost under the circumstances, and to guard against nepotism, favoritism, improvidence, extravagance, fraud and corruption.
1. If the Contractor is subject to General Municipal Law, documentation of the Contractor's compliance with the procurement and bidding requirements of General Municipal Law shall be included with the applicable request for reimbursement.
 2. If the total amount of the goods or services is less than the dollar threshold for competitive bidding, as outlined in section 103 of General Municipal Law, or if the Contractor is not subject to General Municipal Law, the Contractor must follow procurement procedures designed to achieve the purpose of this clause. Such procedures may include, but are not limited to, competitive bidding, the solicitation of three price quotes, written requests for proposals, etc. When submitting a request for reimbursement, the Contractor must include a copy of the organizational procurement policy applicable to the relevant expenditures and/or documentation of the specific procurement process used for those expenditures.
- C. Retroactive funding.** Notwithstanding the provisions of Section A (2) of the Attachment D: Payment and Reporting of this State of New York Contract for Grants ("Contract"), program regulations set forth in 9 NYCRR 440.5 (Project sponsor's match) permit retroactive reimbursement of certain expenses, when those expenses are included in the project Budget.
- D. Project Sign.** At the commencement of the work described in the Work Plan, the Contractor shall erect a sign at the project site noting the State's assistance to the project. The project sign specifications and term length for this requirement are set forth in Attachment E (Special Conditions and Requirements).
- E. Public Benefit Requirements.**
1. In order to ensure a public benefit accrues from an acquisition, development or construction project that is being funded the Contractor shall:
 - a. Afford the public reasonable access to or use of the project as specified by the State;
 - b. Include a provision that no rule or regulation of a municipality shall restrict the use of, or access to, a project by non-residents of the municipality;
 - c. Not impose a fee for use of or access to the project without the prior written approval of the State;
 - d. Own or hold by lease or maintain and operate the project as specified by the State;
 - e. Not allow operation of the project, or any portion thereof, by any other person, entity, or organization pursuant to any management agreement, license or other arrangement without first obtaining the written approval of the State;

- f. Not alter, demolish, sell, lease or otherwise convey the project, in whole or in part, or permit a change in use of the project, without the prior written approval of the State; and
 - g. Submit all plans in writing for restoration, rehabilitation, improvement, demolition or other physical change to the completed project for State approval before work commences.
2. Other public benefit requirements specific to this project, including the term length of any property restriction (e.g., preservation covenant or public access covenant) and the legal mechanism for enforcing the restriction as specified by the State are set forth in Attachment E (Special Conditions and Requirements).
 3. Parkland acquired or improved by a municipality shall not be sold, leased, exchanged or otherwise disposed of (collectively, “disposed of”) or converted to other than public park purposes without the express authority of an act of the Legislature, which shall provide for the substitution of other land of equal environmental value and fair market value and reasonably equivalent usefulness and location to those to be discontinued, sold or disposed of, and such other additional requirements as shall be required by the State.
 4. Land acquired for recreation or conservation purposes by a not-for-profit organization shall be subject to a conservation easement (see, Title 3 of Article 49 of the Environmental Conservation Law) to be held by the State. Parkland shall not be disposed of by the not-for-profit organization except to the State, a local government unit or another qualifying tax-exempt not-for-profit organization that shall be required to use it for recreation or conservation purposes. Disposal to any other entity of parkland acquired for recreation or conservation purposes by a not-for-profit corporation shall require the express authority of an act of the Legislature.

F. Planning Requirements.

1. All planning documents, plans and specifications must be accepted by the State before the Contractor awards contracts for the project or the subject property. These must be prepared by a qualified professional accepted by the State.
2. Any documents developed under this Contract shall include recognition of funding through the Environmental Protection Fund from the Office of Parks, Recreation and Historic Preservation.

- G.** In the case that this grant involves **State-owned land**, the grant recipient shall have in place a current, approved agreement with the agency of jurisdiction that specifies compliance for the elements funded with this grant as set forth in all Attachments included as part of this Contract.

Statement for Legal Notice – Bidding Process

Language required to be used in all advertisements for
Supplies, Materials, and/or Contracts

Project Name & Grant Number must be included on ALL documentation

EEO Language:

The ***Grantee Name*** has been and will continue to be an equal opportunity organization. All qualified Minority and Women-Owned Business Enterprise (MWBE) suppliers, contractors and/or businesses will be afforded equal opportunity without discrimination because of race, religion, national origin, sex, age, disability, sexual preference or Vietnam Era Veterans status.

Funding Credit/MWBE Language:

This project is funded in part by a grant from the NYS Office of Parks, Recreation and Historic Preservation through Title 9 of the Environmental Protection Act of 1993. Under Article 15A, Executive Law, the State of New York is committed to providing Minority and Women Owned Business (MWBE) equal opportunity to participate in government contracts. Though there are no required goals for MWBE participation in this grant funded project, the successful bidder will be required to make a Good Faith Effort in the utilization of MWBE's and furnish reports showing the participation of various business enterprises of subcontractors and suppliers on the contract.

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

You have selected the For-Profit Construction questionnaire, commonly known as the “CCA-2,” which may be printed and completed in this format or, **for your convenience, may be completed online using the [New York State VendRep System](#).**

COMPLETION & CERTIFICATION

The person(s) completing the questionnaire must be knowledgeable about the vendor’s business and operations. An owner or owner’s official representative authorized to legally bind the Reporting Entity, must certify the truth of the questionnaire answers.

NEW YORK STATE VENDOR IDENTIFICATION NUMBER (VENDOR ID)

The Vendor ID is a ten-digit identifier issued by New York State when the vendor is registered on the Statewide Vendor File. This number must now be included on the questionnaire. If the business entity has not obtained a Vendor ID, contact the IT Service Desk at ITServiceDesk@osc.state.ny.us or call 866-370-4672.

DEFINITIONS

All underlined terms are defined in the “New York State Vendor Responsibility Definitions List,” found at <http://www.osc.state.ny.us/vendrep/documents/questionnaire/definitions.pdf>. These terms may not have their ordinary, common, or traditional meanings. Each vendor must read the respective definitions for any and all underlined terms. By submitting this questionnaire, the vendor agrees to be bound by the terms as defined in the "New York State Vendor Responsibility Definitions List" existing at the time of certification.

RESPONSES

Every question must be answered fully. Each response must provide all relevant information to appropriately explain the answer. If you have concerns as to the legal requirements behind your answers, please seek clarification from your counsel. However, information regarding a determination or finding made in error which was subsequently corrected or overturned, and/or was withdrawn by the issuing government entity, is not required to be identified. Individuals and Sole Proprietors may use a Social Security Number but are encouraged to obtain and use a federal Employer Identification Number (EIN).

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

BUSINESS ENTITY INFORMATION				
<u>Legal Business Name</u>		<u>EIN</u> _____		
Address of the <u>Principal Place of Business</u> (street, city, state, zip code) NO P.O. Boxes		<u>New York State Vendor Identification Number</u>		
		Telephone ext.		Fax
		Website (include all)		
Authorized Contact for this Questionnaire				
Name		Telephone ext.		Fax
Title		Email		
Additional <u>Business Entity</u> Identities: If applicable, list any other <u>DBA</u> , <u>Trade Name</u> , <u>Former Name</u> , Other Identity, or <u>EIN</u> used in the last five (5) years, the state or county where filed and the status (active or inactive).				
Type	Name	EIN	State or County where filed	Status

I. BUSINESS CHARACTERISTICS	
1.0 <u>Business Entity</u> Type – Check appropriate box and provide additional information:	
a) ☐ <u>Corporation</u> (including <u>PC</u>)	Date of Incorporation
b) ☐ <u>Limited Liability Company (LLC or PLLC)</u>	Date Organized
c) ☐ <u>Limited Liability Partnership</u>	Date of Registration
d) ☐ <u>Limited Partnership</u>	Date Established
e) ☐ <u>General Partnership</u>	Date Established County (if formed in NYS)
f) ☐ <u>Sole Proprietor</u>	How many years in business?
g) ☐ Other	Date Established
If Other, explain:	
1.0 Was the <u>Business Entity</u> formed in New York State?	
☐ Yes ☐ No	
If “No,” indicate jurisdiction where the <u>Business Entity</u> was formed:	

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

I. BUSINESS CHARACTERISTICS				
☐ United States	State			
☐ Other	Country			
1.2 Is the <u>Legal Business Entity</u> publicly traded?				☐ Yes ☐ No
If "Yes," provide the <u>CIK code</u> or Ticker Symbol:				
1.3 Is the <u>Business Entity</u> currently <u>registered to do business in New York State</u> ?				☐ Yes ☐ No
Note: Select "Not Required" if the Business Entity is a Sole Proprietor or General Partnership				☐ Not Required
If "No," explain why the <u>Business Entity</u> is not required to be <u>registered to do business in New York State</u> :				
1.4 Is the responding <u>Business Entity</u> a <u>Joint Venture</u> ? Note: If the submitting <u>Business Entity</u> is a <u>Joint Venture</u> , also submit a separate questionnaire for each <u>Business Entity</u> comprising the <u>Joint Venture</u> .				☐ Yes ☐ No
1.5 If the <u>Business Entity's Principal Place of Business</u> is not in New York State, does the <u>Business Entity</u> <u>maintain</u> an office in New York State? (Select "N/A" if <u>Principal Place of Business</u> is in New York State.)				☐ Yes ☐ No ☐ N/A
If "Yes," provide the address and telephone number for one office located in New York State.				
1.6 Is the Business Entity a New York State certified <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> , <u>Service-Disabled Veteran-Owned Business</u> , <u>New York State Small Business</u> , or federally certified <u>Disadvantaged Business Enterprise</u> ?				☐ Yes ☐ No
If "Yes," check all that apply: ☐ New York State certified <u>Minority-Owned Business Enterprise</u> (MBE) ☐ New York State certified <u>Women-Owned Business Enterprise</u> (WBE) ☐ New York State certified <u>Service-Disabled Veteran-Owned Business</u> (SDVOB) ☐ <u>New York State Small Business</u> ☐ Federally certified <u>Disadvantaged Business Enterprise</u> (DBE)				
1.7 Identify each person or Business Entity that is or has been within the past five (5) years, a Business Entity Official, or a <u>Principal Owner</u> of 5.0% or more of the Reporting Entity's shares; or one of the five largest shareholders, if applicable. (Attach additional pages if necessary.) <u>Joint Ventures</u> : Provide information for all firms involved. Each Business Entity identified as a Principal Owner must also submit a Vendor Responsibility Questionnaire. (Add additional sheets if necessary.) For each person, include name, title, date of birth, percentage of ownership, and employment status. For each Business Entity that is a Principal Owner, include name, address, EIN, and percentage of ownership. If there is no person or <u>Business Entity</u> that owns 5% or more of the Reporting Entity, check here: ☐				
Name (For each person, include a middle initial)	Title	Date of Birth	Percentage of ownership (Enter 0%, if not applicable)	Employment status with the firm

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

I. BUSINESS CHARACTERISTICS

				☐ Current ☐ Former ☐ N/A
				☐ Current ☐ Former ☐ N/A
				☐ Current ☐ Former ☐ N/A
				☐ Current ☐ Former ☐ N/A
Name of <u>Each Business Entity</u> owning 5% or more of <u>Reporting Entity</u>	Address	EIN	Percentage Ownership	

II. AFFILIATE and JOINT VENTURE RELATIONSHIPS

2.0 Are there any other <u>construction</u> -related firms in which, now or in the past five years, the submitting <u>Business Entity</u> or any of the individuals or business entities listed in question 1.7 either owned or owns 5.0% or more of the shares of, or was or is one of the five largest shareholders or a director, officer, partner, or proprietor of said other firm? If yes, identify below and if there is more than one, <i>attach additional pages with required information.</i>			☐ Yes ☐ No
Firm/Company Name	Firm/Company EIN (If available)	Firm/Company's Primary Business Activity	
Firm/Company Address			
Explain relationship with the firm and indicate percent of ownership, if applicable (enter N/A, if not applicable):			
Are there any shareholders, directors, officers, owners, partners or proprietors that the submitting <u>Business Entity</u> has in common with the disclosed firm(s)?			☐ Yes ☐ No
Individual's Name <i>(Include middle initial)</i>		Position/Title with Firm/Company	

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

II. AFFILIATE and JOINT VENTURE RELATIONSHIPS

2.1 Does the <u>Business Entity</u> have any <u>construction</u> -related <u>affiliates</u> not identified in the response to question 2.0 above? If yes, identify below and if there is more than one, <i>attach additional pages with the required information.</i>		☐ Yes ☐ No
Affiliate Name	Affiliate EIN (If available)	Affiliate's Primary Business Activity
Affiliate Address		
Explain relationship with the affiliate and indicate percent of ownership, if applicable (<i>enter N/A, if not applicable</i>):		
Are there any shareholders, directors, officers, owners, partners or proprietors that the submitting Business Entity has in common with the disclosed affiliate(s)?		☐ Yes ☐ No
Individual's Name (<i>Include middle initial</i>)	Position/Title with Firm/Company	
2.2 Has the <u>Business Entity</u> participated in any <u>construction</u> -related <u>Joint Ventures</u> within the past three (3) years? If yes, identify below and if there is more than one, <i>attach additional pages with the required information.</i>		☐ Yes ☐ No
Joint Venture Name	Joint Venture EIN (If available)	Identify parties to the Joint Venture

III. CONTRACT HISTORY

3.0 Has the <u>Business Entity</u> completed any <u>construction</u> contracts?	☐ Yes ☐ No
<i>If "Yes," list the ten most recent <u>construction</u> contracts the <u>Business Entity</u> has completed for <u>government</u> clients using Attachment A – Completed Construction Contracts, found at www.osc.state.ny.us/vendrep/documents/questionnaire/ac3294s.doc. At the <u>Business Entity</u>'s option, it may include <u>construction</u> contracts completed for private clients. If less than ten, include most recent subcontracts on projects up to that number.</i>	
3.1 Does the <u>Business Entity</u> currently have uncompleted <u>construction</u> contracts?	☐ Yes ☐ No
<i>If "Yes," list all current uncompleted <u>construction</u> contracts for <u>government</u> clients by using Attachment B – Uncompleted Construction Contracts, found at www.osc.state.ny.us/vendrep/documents/questionnaire/ac3295s.doc. Note: Ongoing projects must be included. At the <u>Business Entity</u>'s option, it may include <u>construction</u> contracts uncompleted for private clients.</i>	

IV. INTEGRITY – CONTRACT BIDDING

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

4.0 Been <u>suspended</u> or <u>debarred</u> from any <u>government contracting process</u> or been <u>disqualified</u> on any government procurement?	☐ Yes ☐ No
4.1 Been subject to a denial or revocation of a government prequalification?	☐ Yes ☐ No
4.2 Had any bid rejected by a <u>government entity</u> for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid?	☐ Yes ☐ No
4.3 Had a proposed subcontract rejected by a <u>government entity</u> for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid?	☐ Yes ☐ No

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

IV. INTEGRITY – CONTRACT BIDDING

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

4.4 Had a bid rejected on a <u>government contract</u> for failure to make <u>good faith efforts</u> on any <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> , <u>Service-Disabled Veteran-Owned Business</u> or <u>Disadvantaged Business Enterprise</u> goal or <u>statutory affirmative action requirements</u> on a previously held contract?	☐ Yes ☐ No
4.5 Agreed to a voluntary exclusion from bidding/contracting with a <u>government entity</u> ?	☐ Yes ☐ No
4.6 Requested or been permitted to withdraw a bid submitted to a <u>government entity</u> or made any claim of an error on a bid submitted to a <u>government entity</u> ?	☐ Yes ☐ No

For each “Yes,” provide an explanation of the issue(s), the Business Entity, affiliate, predecessor company or entity involved, the relationship to the submitting Business Entity, the government entity involved, project(s), relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses to explain each “YES” response.

V. INTEGRITY – CONTRACT AWARD

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

5.0 Defaulted on or been <u>suspended</u> , cancelled or <u>terminated for cause</u> on any contract?	☐ Yes ☐ No
5.1 Been subject to an <u>administrative proceeding</u> or civil action, including arbitration, seeking specific performance or restitution (except any disputed work proceeding) in connection with any <u>government contract</u> ?	☐ Yes ☐ No
5.2 Entered into a formal monitoring agreement, integrity agreement, consent decree, or stipulation, settlement as specified by, or agreed to with, any <u>government entity</u> ?	☐ Yes ☐ No
5.3 Had its surety called upon to complete any contract whether government or private sector?	☐ Yes ☐ No
5.4 Forfeited all or part of a standby letter of credit in connection with any <u>government contract</u> ?	☐ Yes ☐ No

For each “Yes,” provide an explanation of the issue(s), the Business Entity, affiliate, predecessor company or entity involved, the relationship to the submitting Business Entity, the government entity/owners involved, project(s), contract number(s), relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses to explain each “YES” response.

VI. CERTIFICATIONS/LICENSES

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

6.0 Had a revocation or <u>suspension</u> of any business or professional permit and/or license?	☐ Yes ☐ No
6.1 Had a denial, decertification, revocation or forfeiture of New York State certification of <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> , <u>Service-Disabled Veteran-Owned Business</u> or a federal certification of <u>Disadvantaged Business Enterprise</u> status, for other than a change of ownership?	☐ Yes ☐ No

For each “Yes,” provide an explanation of the issue(s), the Business Entity affiliate, predecessor company or entity involved, the relationship to the submitting Business Entity, the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses to explain each “YES” response.

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

VII. LEGAL PROCEEDINGS/GOVERNMENT INVESTIGATIONS

Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:

7.0 Been the subject of a criminal <u>investigation</u> , whether open or closed, or an indictment for any business-related conduct constituting a crime under local, state or <u>federal</u> law?	☐ Yes ☐ No
7.1 Been the subject of: (i.) An indictment, grant of immunity, <u>judgment</u> or conviction (including entering into a plea bargain) for conduct constituting a crime; or (ii.) Any criminal <u>investigation</u> , felony indictment or conviction concerning the formation of, or any business association with, an allegedly false or fraudulent <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> , Service-Disabled Veteran-Owned Business, or a <u>Disadvantaged Business Enterprise</u> ?	☐ Yes ☐ No
7.2 Received any <u>OSHA</u> citation, which resulted in a final determination classified as <u>serious</u> or <u>willful</u> ?	☐ Yes ☐ No
7.3 Had a <u>government entity</u> find a willful prevailing wage or supplemental payment violation?	☐ Yes ☐ No
7.4 Had a New York State Labor Law violation deemed willful?	☐ Yes ☐ No
7.5 Entered into a consent order, monitoring agreement or other type of oversight with the New York State Department of Environmental Conservation, or a <u>federal</u> , state or local government enforcement entity involving a violation of <u>federal</u> , state or local environmental laws?	☐ Yes ☐ No
7.6 Other than previously disclosed, been the subject of any <u>citations</u> , notices or violation orders; a pending administrative hearing, proceeding or determination of a violation of: • <u>Federal</u> , state or local health laws, rules or regulations; • <u>Federal</u> , state or local environmental laws, rules or regulations; • Unemployment insurance or workers compensation coverage or <u>claim</u> requirements; • Any labor law or regulation, which was deemed willful; • Employee Retirement Income Security Act (ERISA); • <u>Federal</u> , state or local human rights laws; • <u>Federal</u> , state or local security laws; • <u>Federal, state, or local tax laws</u> ?	☐ Yes ☐ No

For each "Yes," provide an explanation of the issue(s), the Business Entity, affiliate, predecessor company or entity involved, the relationship to the submitting Business Entity, the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses to explain each "YES" response.

Note: Information regarding a determination or finding made in error, which was subsequently corrected or overturned, and/or was withdrawn by the issuing government entity, is not required.

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

VIII. LEADERSHIP INTEGRITY

If the Business Entity is a Joint Venture Entity, answer "N/A - Not Applicable" to questions in this section.

Within the past five (5) years has any individual previously identified or any individual currently or formerly having the authority to sign, execute or approve bids, proposals, contracts or supporting documentation on behalf of the Business Entity with any government entity been:

8.0 <u>Sanctioned</u> relative to any business or professional permit and/or license?	☐ Yes ☐ No ☐ N/A
8.1 <u>Suspended, debarred or disqualified</u> from any <u>government contracting process</u> ?	☐ Yes ☐ No ☐ N/A
8.2 The subject of a criminal <u>investigation</u> , whether open or closed, or an indictment for any business-related conduct constituting a crime under local, state or <u>federal</u> law?	☐ Yes ☐ No ☐ N/A
8.3 Charged with a misdemeanor or felony, indicted, granted immunity, convicted of a crime or subject to a judgment for: (i.) Any business-related activity, including but not limited to theft, fraud, coercion, extortion, bribe or bribe-receiving, giving or accepting unlawful gratuities, immigration or tax fraud, racketeering, mail fraud, wire fraud, price-fixing or collusive bidding; or (ii.) Any crime, whether or not business-related, the underlying conduct of which related to truthfulness, including but not limited to the filing of false documents or false sworn statements, perjury or larceny	☐ Yes ☐ No ☐ N/A

For each "Yes," provide an explanation of the issue(s), the individual involved, the relationship to the submitting Business Entity, the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses to explain each "YES" response.

IX. FINANCIAL AND ORGANIZATIONAL CAPACITY

9.0 Within the past five (5) years, has the <u>Business Entity</u> or any <u>affiliate</u> received any <u>formal unsatisfactory performance assessment(s)</u> from any <u>government entity</u> on any contract?	☐ Yes ☐ No
<i>If "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> or affiliate involved, the relationship to the submitting <u>Business Entity</u>, the <u>government entity</u> involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses to explain the "Yes" response.</i>	
9.1 Within the past five (5) years, has the <u>Business Entity</u> or any <u>affiliate</u> had any <u>liquidated damages</u> assessed over \$25,000 for any reason, including failure to meet <u>Minority-Owned Business Enterprise, Women-Owned Business Enterprise, Service-Disabled Veteran-Owned Business, or Disadvantaged Business Enterprise goals</u> ?	☐ Yes ☐ No
<i>If "Yes," provide an explanation of the issue(s), the name of the <u>Business Entity</u> or affiliate involved, the relationship to the submitting <u>Business Entity</u>, relevant dates, the contracting party involved, the amount assessed and the current status of the issue(s), and the balance of the assessment not yet paid. Provide answer below or attach additional sheets with numbered responses.</i>	
9.2 Within the past five (5) years, has the <u>Business Entity</u> or any <u>affiliate</u> had any <u>liens, claims or judgments</u> over \$25,000 filed against the <u>Business Entity</u> which remain undischarged or were unsatisfied for more than 90 days? (Note: Including but not limited to tax warrants or liens. Do not include UCC filings.)	☐ Yes ☐ No

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

IX. FINANCIAL AND ORGANIZATIONAL CAPACITY

If "Yes," provide an explanation of the issue(s), the name of the Business Entity or affiliate involved, the relationship to the submitting Business Entity, relevant dates, the Lien holder or Claimants' name(s), the amount of the lien(s), the current status of the issue(s), and the balance of the lien, claim or judgment not yet paid. Provide answer below or attach additional sheets with numbered responses.

9.3 In the last seven (7) years, has the Business Entity or any affiliate, or official initiated or been the subject of any bankruptcy proceedings, whether or not closed, or is any bankruptcy proceeding pending? ☐ Yes ☐ No

If "Yes," provide the name of the Business Entity, affiliate or official involved, the relationship to the submitting Business Entity, the bankruptcy chapter number, the court name and the docket number. Indicate the current status of the proceedings as "Initiated," "Pending" or "Closed." Provide answer below or attach additional sheets with numbered responses to explain the YES response.

9.4 What is the Business Entity's Bonding Capacity?

a. Single Project

b. Aggregate (All Projects)

9.5 List Business Entity's Gross Sales for the previous three (3) Fiscal Years:

1st Year (Indicate year) Gross Sales	2nd Year (Indicate year) Gross Sales	3rd Year (Indicate year) Gross Sales

9.6 List Business Entity's Average Backlog for the previous three (3) fiscal years:
(Estimated total value of uncompleted work on outstanding contracts)

1st Year (Indicate year) Amount	2nd Year (Indicate year) Amount	3rd Year (Indicate year) Amount

9.7 Attach Business Entity's most recent annual financial statement and accompanying notes or complete Attachment C – Financial Information, found at www.osc.state.ny.us/vendrep/documents/questionnaire/ac3296s.xls.

(This information must be attached.)

X. FREEDOM OF INFORMATION LAW (FOIL)

10.0 Indicate whether any information provided herein is believed to be exempt from disclosure under the Freedom of Information Law (FOIL). ☐ Yes ☐ No

Note: A determination of whether such information is exempt from FOIL will be made at the time of any request for disclosure under FOIL. Attach additional pages if necessary.

If "Yes," indicate the question number(s) and explain the basis for the claim.

Authorizee

XI. AUTHORIZED CONTACT FOR THIS QUESTIONNAIRE

Name	Telephone ext.	Fax
Title	Email	

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
FOR-PROFIT CONSTRUCTION (CCA-2)****Certification**

The undersigned: (1) recognizes that this questionnaire is submitted for the express purpose of assisting New York State government entities (including the Office of the State Comptroller (OSC)) in making responsibility determinations regarding award or approval of a contract or subcontract and that such government entities will rely on information disclosed in the questionnaire in making responsibility determinations; (2) acknowledges that the New York State government entities and OSC may, in their discretion, by means which they may choose, verify the truth and accuracy of all statements made herein; and (3) acknowledges that intentional submission of false or misleading information may result in criminal penalties under State and/or federal law, as well as a finding of non-responsibility, contract suspension or contract termination.

It being acknowledged and agreed that all responses included in this questionnaire are to the knowledge, information and belief of the Business Entity, the undersigned certifies under penalties of perjury that they:

The undersigned certifies that he/she:

- are knowledgeable about the submitting Business Entity's business and operations;
- have legal authority to bind the Business Entity;
- have read and understand all of the questions contained in the questionnaire, including all definitions;
- have not altered the content of the questionnaire in any manner;
- have reviewed and/or supplied full and complete responses to each question;
- have provided true, accurate and complete responses, including all attachments, if applicable;
- understand that New York State government entities will rely on the information disclosed in the questionnaire when entering into a contract with the Business Entity; and
- are under an obligation to update the information provided herein to include any material changes to the Business Entity's responses at the time of bid/proposal submission through the contract award notification, and may be required to update the information at the request of the New York State government entities or OSC prior to the award and/or approval of a contract, or during the term of the contract.

Signature of Owner/Official _____

Printed Name of Signatory _____

Title _____

Name of Business _____

Address _____

City, State, Zip _____

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT A – COMPLETED CONSTRUCTION CONTRACTS

Vendor Name:

NYS Vendor ID:

Question 3.0: List the ten most recent construction contracts the Business Entity has completed. If less than ten, include most recent subcontracts on projects up to that number:

1.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable
2.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable
3.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable
4.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable
5.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT A – COMPLETED CONSTRUCTION CONTRACTS

Vendor Name:

NYS Vendor ID:

Question 3.0: List the ten most recent construction contracts the Business Entity has completed. If less than ten, include most recent subcontracts on projects up to that number:

6.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
7.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
8.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
9.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	
10.	Agency/Owner			Award Date	Amount	Date Completed
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer		
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable		EIN of JV, if applicable	

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:**NYS Vendor ID:**
Question 3.1: List all current uncompleted construction contracts:

1.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		
2.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		
3.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		
4.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:**NYS Vendor ID:**
Question 3.1: List all current uncompleted construction contracts:

5.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		
6.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		
7.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		
8.	Agency/Owner					Award Date	Completion Date
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable			EIN of JV, if applicable	
			Total Contract Amount	Amount Sublet to others	Uncompleted Amount		

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name:**NYS Vendor ID:**

Question 3.1: List all current uncompleted construction contracts:

9.	Agency/Owner				Award Date		Completion Date	
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable	
				Total Contract Amount		Amount Sublet to others		Uncompleted Amount
10.	Agency/Owner				Award Date		Completion Date	
	Contact Person		Telephone No.	Designer Architect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable				EIN of JV, if applicable	
				Total Contract Amount		Amount Sublet to others		Uncompleted Amount

Grand Total All Uncompleted Contracts	\$0.00

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION

NYS Vendor ID: _____

As of Date: _____

ASSETS

Current Assets

1. Cash		\$	_____	-
2. Accounts receivable - less allowance for doubtful accounts	\$	_____	-	
Retainers included in accounts receivable	\$	_____	-	
Claims included in accounts receivable not yet approved or in litigation	\$	_____	-	
Total Accounts Receivable		\$	_____	-
3. Notes receivable - due within one year		\$	_____	-
4. Inventory - materials		\$	_____	-
5. Contract costs in excess of billings on uncompleted contracts		\$	_____	-
6. Accrued income receivable				
Interest	\$	_____	-	
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Accrued Income Receivable		\$	_____	-
7. Deposits				
Bid and Plan _____	\$	_____	-	
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Deposits		\$	_____	-
8. Prepaid Expenses				
Income Taxes	\$	_____	-	
Insurance	\$	_____	-	
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Prepaid Expenses		\$	_____	-
9. Other Current Assets				
Other (list) _____	\$	_____	-	
_____	\$	_____	-	
Total Other Current Assets		\$	_____	-
10. Total Current Assets				\$ _____ -
11. Investments				
Listed securities-present market value	\$	_____	-	
Unlisted securities-present value	\$	_____	-	
Total Investments				\$ _____ -

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION

NYS Vendor ID: _____

12. Fixed Assets

Land	\$	-	
Building and improvements	\$	-	
Leasehold improvements	\$	-	
Machinery and equipment	\$	-	
Automotive equipment	\$	-	
Office furniture and fixtures	\$	-	
Other (list) _____	\$	-	
	\$	-	
Total		\$	-
Less: Accumulated depreciation		\$	-
Total Fixed Assets - Net			\$ -

13. Other Assets

Loans receivable			
Officers	\$	-	
Employees	\$	-	
Shareholders	\$	-	
Cash surrender value of officers' life insurance	\$	-	
Organization expense – net of amortization	\$	-	
Notes receivable - due after one year	\$	-	
Other (list) _____	\$	-	
	\$	-	
Total Other Assets		\$	-

14. TOTAL ASSETS

\$ -

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION**

NYS Vendor ID: _____

LIABILITIES

Current Liabilities

15. Accounts payable	\$	_____	-
16 a. Loans from shareholders - due within one year	\$	_____	-
16 b. Other Loans - due within one year	\$	_____	-
17. Notes payable - due within one year	\$	_____	-
18. Mortgage payable - due within one year	\$	_____	-
19. Other payables - due within one year			
Other (list) _____	\$	_____	-
_____	\$	_____	-

Total Other Payables - due within one year	\$	_____	-
20. Billings in excess of costs and estimated earnings	\$	_____	-
21. Accrued expenses payable			
Salaries and wages	\$	_____	-
Payroll taxes	\$	_____	-
Employees' benefits	\$	_____	-
Insurance	\$	_____	-
Other	\$	_____	-
Total Accrued Expenses Payable	\$	_____	-
22. Dividends payable	\$	_____	-
23. Income taxes payable			
State	\$	_____	-
Federal	\$	_____	-
Other	\$	_____	-
Total Income Taxes Payable	\$	_____	-
24. Total current liabilities	\$	_____	-
25. Deferred income taxes payable			
State	\$	_____	-
Federal	\$	_____	-
Other	\$	_____	-
Total Deferred Income Taxes	\$	_____	-
26. Long Term Liabilities			
Loans from shareholders - due after one year	\$	_____	-
Other Loans - due within one year			
Principle	\$	_____	-
Interest	\$	_____	-
Notes payable - due after one year	\$	_____	-
Mortgage - due after one year	\$	_____	-
Other payables - due after one year	\$	_____	-
Other (list) _____	\$	_____	-
_____	\$	_____	-

Total Long Term Liabilities	\$	_____	-

**NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT C - FINANCIAL INFORMATION**

NYS Vendor ID: _____

27. Other Liabilities

Other (list) _____	\$ _____
_____	\$ _____
_____	_____

Total Other Liabilities

\$ _____

28. TOTAL LIABILITIES

\$ _____

NET WORTH

29. Net Worth (if proprietorship or partnership)

\$ _____

30. Stockholders' Equity

Common stock issued and outstanding	\$ _____
Preferred stock issued and outstanding	\$ _____
Retained earnings	\$ _____
Total	\$ _____
Less: Treasury stock	\$ _____

31. TOTAL STOCKHOLDERS' EQUITY

\$ _____

32. TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY

\$ _____

DOCUMENT 003132 - GEOTECHNICAL DATA

1.1 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 Glynn Group dated August 6, 2024 is included in 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. Owner is not responsible for interpretations or conclusions drawn from the data.
 - 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.

END OF DOCUMENT 003132

Payne Park Aquatic Facility Payne Avenue North Tonawanda, New York Geotechnical Engineering Report

GGEA 24-1110

Prepared for:
Brandsetter Carrol Inc.
1220 West 6th Street, Suite 300
Cleveland, Ohio 44113

Prepared by:
Glynn Group Engineering & Architecture, PLLC
415 South Transit Street
Lockport, New York 14094



August 6, 2024

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- A Subsurface Exploration Logs
- B Project Location Plan
- C Subsurface Exploration Plan
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1.0 INTRODUCTION

1.1 SCOPE

This report provides subsurface exploration data and geotechnical recommendations for the proposed construction of the Payne Park Aquatic Facility in the City of North Tonawanda, New York. Glynn Group Engineering & Architecture, PLLC (GGEA) has provided the following scope of services:

1. Performed a site visit to examine site topography and establish seven (7) soil boring locations to provide a representative profile of subsurface conditions at key locations throughout the footprint of the proposed park.
2. Cleared utilities with UDig NY through drilling subcontractor Earth Dimensions Inc. (EDI).
3. Mobilized EDI with a track mounted ATV drill rig and support crew.
4. Provided SPT soil sampling at each boring location in accordance with ASTM D1586 "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils". Borings located within the proposed building and pool areas were advanced to refusal, while the borings located within the proposed parking area were advanced to a depth of 10 feet.
5. Extracted 5.0 feet of rock core at boring B-2 in accordance with in accordance with ASTM D2113 "Standard Practice for Rock Core Drilling and Sampling".
6. Provided soil boring logs (prepared by EDI) to include SPT data, N values, soil classification, refusal depth and encountered groundwater conditions.
7. Performed laboratory testing on select representative samples consisting of natural moisture content, grain size analysis and plasticity index to properly classify the retrieved soils and identify engineering properties. All soils were assigned USCS classifications in accordance with ASTM D2487 "Classification of Soils for Engineering Purposes" and/or ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedures)".
8. Prepared geotechnical report in accordance with the 2020 NYS Building Code to include subsurface design parameters, seismic site class and design category, groundwater conditions, foundation recommendations, slab on grade recommendations, construction recommendations and pavement recommendations.

1.2 CONTRACT

GGEA performed this study in accordance with a written proposal to Brandsetter Carroll Inc. dated February 26, 2024. GGEA received the notice to proceed via signed contract from Mr. Benjamin Brandsetter on March 23, 2024. All services provided by GGEA are subject to the Standard Terms and Conditions included in the geotechnical proposal.

1.3 EXCLUSIONS

The project efforts exercised by GGEA include geotechnical analysis, design recommendations and the preparation of this report. The scope of this report specifically excludes any review of former site use, in particular, environmental or pollution related concerns.

2.0 PROJECT BACKGROUND

2.1 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The project site is located on the west side of Payne Avenue approximately 600 feet north of Walck Road at Payne Park in the City of North Tonawanda, New York (refer to the Project Location Plan included in Appendix B). The property is relatively flat and covered primarily by mowed grass with interspersed large trees as well as an asphalt paved parking area. The property includes an existing splash pool, basketball court, pavilion, playground equipment and the Memorial Pool, which initially opened in 1948 but has been permanently closed due to safety concerns. The proposed construction is to consist of a new single story building with a slab on grade floor and frost depth shallow foundation, as well as a new activity pool, a new lap pool and a new asphalt parking lot (refer to the Boring Location Plan included in Appendix C for proposed footprints).

2.2 GEOLOGIC SETTING

The Surficial Geologic Map of New York identifies site soils to be composed of lacustrine sediment. The soil profile at this site is the result of the last glacial advance of the Pleistocene Epoch, referred to as the Wisconsinan Glacial Stage, which ended approximately 12,000 years ago. As the glacier advanced over the Western New York terrain, the mass carved and crushed the underlying soil and rock to form glacial till, which typically consists of a dense matrix of silt, sand, rock and clay deposited beneath the ice. As the climate warmed and the glacier receded, meltwater was impounded by the receding glacier and local topography to create proglacial lakes throughout much of the area. Sediments were deposited from these lakes in the form of sands, silts and clays. The soils encountered at this site are composed of lacustrine sediment associated with Lake Tonawanda, followed by lacustrine sediment associated with Lake Warren (ancestral Lake Erie) and glacial till at depth. Shale bedrock of the Upper Silurian Salina Group is located at depths ranging from 19.9 to 35.8 feet below existing grade.

3.0 FIELD EXPLORATION AND ANALYSIS

3.1 METHODOLOGY

The subsurface exploration consisted of seven (7) SPT soil borings performed at select locations to provide a representative soil profile throughout the footprint of the proposed building, pools and parking lot as identified on the Boring Location Plan included in Appendix C. GGEA performed an initial site visit on May 31, 2024 to examine the site topography and establish soil boring locations in accordance with the boring location plan. Shortly thereafter, GGEA was notified the boring stakes were removed (by unknown party), resulting in GGEA's return to the site on June 13, 2024 to re-stake the boring locations. EDI mobilized to the site on June 24, 2024 and completed drilling operations on June 25, 2024. Boreholes were backfilled with soil cuttings upon drilling completion.

Soil boring and sampling operations were performed using hollow stem augers to advance through overburden materials in accordance with ASTM D1586 "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils". Resistance values, or blow counts, were recorded for each six-inch advancement of a twenty-four inch long, two inch diameter split spoon sampler. "N" values were calculated by totaling the resistance values for the 6/12 and 12/18 inch intervals. All data recorded during drilling operations can be found on the soil boring logs included in Appendix A.

Retrieved soil samples were logged and visually classified by EDI in accordance with the ASEE System of Definition for Visual Identification of Soils (Burmister Classification System) and ASTM D2488 “Standard Practice for Description and Identification of Soils (Visual – Manual Procedure)”. Recovered soil samples were visually examined by GGEA to establish Unified Soil Classification System (USCS) classifications in accordance with ASTM D2488 “Description and Identification of Soils (Visual-Manual Procedure)” and select samples were subjected to laboratory testing to establish USCS classifications in accordance with ASTM D2487 “Classification of Soils for Engineering Purposes”.

3.2 SUBSURFACE CONDITIONS

Auger refusal or split spoon refusal was encountered on shale bedrock at depths ranging from a minimum of 19.9 feet at boring B-3 to a maximum of 35.8 feet at boring B-5. Overburden soils were found to consist of loose to compact granular soils to a depth of approximately 8.0 feet, followed by stiff cohesive soil to a depth of approximately 13.0 feet and soft cohesive soil to a depth of approximately 17.0 feet, all of which were derived from slackwater or lacustrine depositional environments. Soils thereafter were typically found to consist of compact to dense granular glacial till. Boring B-5 was found to have a different profile, with glacial till encountered at a depth of approximately 10.0 feet and no soft lacustrine soil. Specific subsurface conditions can be found on the soil boring logs included in Appendix A.

It is GGEA’s opinion the extent of this exploration was sufficient to accurately characterize the subsurface conditions and provide information necessary for the preparation of this report. The soil borings portray the subsurface conditions encountered at the soil boring locations at the time of exploration. The stratification lines shown on the soil boring logs are approximate, whereas in-situ the changes between strata may be more gradual. Sample recovery was limited to the diameter of the sampling equipment, such that in-situ materials with dimensions that exceed 2 inches such as large diameter gravel, cobbles and boulders were not recovered.

3.3 GROUNDWATER

Groundwater was not encountered in the augers upon the completion of drilling efforts at borings B-1, B-3, B-6 and B-7. Groundwater was initially encountered at depth of 5.5 feet at boring B-2 and measured at a depth of 14.6 feet in the augers upon the completion of rock coring at boring B-2. Approximately 400 gallons of water was lost to the rock formation during coring, indicating a network of fractures within the rock. Groundwater was initially encountered at depth of 16.0 feet at boring B-4 and measured at a depth of 24.2 feet in the augers upon the completion soil sampling at boring B-4. Likewise, groundwater was initially encountered at depth of 5.3 feet at boring B-5 and measured at a depth of 23.5 feet in the augers upon the completion soil sampling at boring B-5.

All seven boring locations identify wet soils at a depth of approximately 5.0 to 7.0 feet, which is indicative of a perched groundwater condition. Soils typically become wet again at a depth of 13.0 feet. The augers did not remain in the ground for an extended period of time to allow groundwater to migrate through the soils and stabilize in the augers, however based on the moisture content of recovered soil samples, the stabilized groundwater elevation is estimated at a depth of 13.0 feet, where soils transition from moist to wet. Perched groundwater should be anticipated within excavations below a depth of 5.0 feet.

3.4 LABORATORY TESTING

Select soil samples from representative strata were subjected to geotechnical laboratory testing to establish USCS classifications and index properties. Testing consisted of Grain Size Analysis (ASTM D422), Atterberg Limits (ASTM D4318) and Natural Moisture Content (ASTM D2216). Specific laboratory test reports have been included in Appendix D, however laboratory test results have been summarized in the following table:

Lab No.	Boring No.	Depth (ft)	USCS	NMC (%)	LL	PL	PI
24-01	B-1	4.0 - 6.0	ML	3.5	NV	NP	NP
24-02	B-2	6.0 - 8.0	SP-SM	8.9	NV	NP	NP
24-03	B-3	8.0 - 13.0	CL	25.9	47	23	24
24-04	B-2	13.0 - 15.0	CL	36.4	36	18	18
24-05	B-6	2.0 - 4.0	ML	16.5	NV	NP	NP

USCS = Unified Soil Classification System
NMC = Natural Moisture Content
NV = Non-viscous
NP = Non-plastic

PI = Plasticity Index
PL = Plastic Limit
LL = Liquid Limit

4.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

4.1 FOUNDATIONS

Although soft cohesive soils were encountered below a depth of 13.0 feet within the footprint of the proposed building at borings B-1, B-2 and B-3, the structural quality of the soil above 13.0 feet is sufficient to provide for the construction of a shallow foundation system consisting of reinforced concrete strip and spread footings. GGEA provides design recommendations for building foundations as follows:

1. Foundations should be advanced through topsoil and existing fill materials to engage undisturbed native soil. Based on conditions encountered at the soil boring locations, foundations should be advanced to a minimum depth of 3.0 feet below existing grade to engage native soils.
2. Foundations should be constructed at a minimum depth of greater than 3.5 feet below final grade to provide frost protection in accordance with regional practices. GGEA recommends a minimum depth of 4.0 feet below final grade.
3. Once excavations are advanced to the design elevation, the exposed subgrade should be compacted by "knuckling" with the underside of the excavator bucket.
4. Based on conditions identified on the soil boring logs, undisturbed native soil subgrade prepared in accordance with the recommendations of this report will provide for a net allowable bearing capacity of 1,500 psf.
5. Once the foundation subgrade has been established, bearing verification should be performed by a qualified geotechnical professional using an proving ring cone penetrometer. In the event the subgrade is found to be unsuitable, overexcavation should be performed to a competent subgrade elevation and the subgrade should be reconstructed to the design bearing elevation using properly installed

Engineered Fill (Select Structural Fill or Flowable Fill). The excavation should extend 1.0 foot horizontally beyond the edge of footing for every 1.0 foot of excavation depth.

6. Based on a finished floor elevation similar to that of existing grade and a foundation bearing depth of 4.0 feet, continuous strip footing width should be limited to 4.0 feet and square spread footing width should be limited to 7.0 feet to avoid significant load distribution into soft soils below a depth of 13.0 feet (based on Boussinesq pressure distribution).

In regards to the proposed pool construction, significantly different subsurface conditions were encountered at the proposed activity pool (B-4) and the proposed lap pool (B-5). In regards to boring B-4, soft cohesive soils were encountered from 13.0 to 16.0 feet, similar to the subsurface conditions encountered within the proposed building footprint. Depending on the depth of the pool, excavation may engage these soft soils below a depth of 13.0 feet. However, the effective overburden pressure of existing soil will exceed that of the pool (estimated 120 pcf for soil, 62.4 pcf for water), therefore there should be no net increase in pressure on the soft soil and no consolidation settlement. In regards to boring B-5, stiff cohesive soils and compact granular soils were encountered throughout the full depth, providing for soil of good structural quality.

Considering perched groundwater was encountered within the upper 10 feet at both locations, the pools should be designed to resist buoyant forces from perched groundwater conditions. While this is not a concern when the pool is filled, if the pool is drained for cleaning or maintenance, uplift forces related to hydrostatic pressure may crack the pool basin if not addressed during design. The pool basin should be designed to resist hydrostatic pressure or include pressure relief valves designed to release at a specified uplift pressure.

4.2 SLAB ON GRADE

GGEA provides design and construction recommendations for the building interior concrete slab as follows:

1. All slabs should be designed using a recognized standard procedure, such as identified in the text "Designing Floor Slabs on Grade" by Ringo and Anderson (ISBN 0-924659-34-3). The thickness of the concrete slab should be determined based on the intended usage and proposed loading.
2. Topsoil should be removed beneath the footprint of the slab as well as any organic subsoil.
3. The exposed subgrade should be compacted thoroughly with multiple passes from a smooth drum vibratory roller to produce a uniform density throughout. In place density testing of the subgrade is not required. The top surface of the subgrade should be pitched to drain to prevent ponding of stormwater.
4. Proof roll the compacted subgrade with a fully loaded 10 wheel dump truck weighing at least 30 tons or a smooth drum roller having an effective force of at least 600 pounds per linear inch of roller width. Any area exhibiting weaving, yielding, rutting ($>3/4$ inch) or boiling should be reworked and compacted to produce an acceptable response or over excavated and replaced with Structural Fill (refer to Appendix F). The depth of the undercut and type of Structural Fill will depend on the bearing condition at the base of the undercut, the weather at the time of construction and the soil material encountered. Proof rolling operations should be observed and directed by a qualified geotechnical professional.
5. After proof rolling of the prepared subgrade is successfully performed (including overexcavation and replacement of failing areas), Structural Fill should be installed as necessary to achieve the design subgrade elevation. The Structural Fill should be placed in maximum 9 inch lifts and compacted to 95 % modified proctor (ASTM D1557).

6. Following the installation of Structural Fill (if necessary) to achieve the design subgrade elevation, a granular base composed of Select Structural Fill should be installed and compacted to 95 % modified proctor. The thickness of the granular base layer should be dictated by the slab design (prepared by others), however GGEA recommends a minimum granular base thickness of 8 inches.
7. Install subsurface utilities.
8. Install the concrete slab as designed. GGEA recommends a modulus of subgrade reaction (k) not to exceed 100 pci for properly prepared subgrade. The installation of a vapor barrier and specification of the concrete finish technique is at the discretion of the architect. Proper joint spacing and reinforcing steel spacing/placement will be critical to the long term performance of slab. The Portland Cement Association (PCA) recommends joint spacing in feet should be two to three times the slab thickness in inches.

Although not required for design, if the granular base is to be used as working surface for an extended period of time prior to concrete placement, the installation of a separation and reinforcement geotextile should be considered between the soil subgrade and granular base. GGEA recommends a woven geotextile such as US Fabrics US 250 (or equivalent). Any granular base that becomes contaminated with soil as a result of repeated construction traffic should be removed and replaced prior to placing concrete. While the geotextile will have no benefit once the concrete is placed, it will reduce the potential for rutting and soil contamination of the granular base if there is a prolonged period of time between granular base installation and concrete placement, especially if the granular base will be subjected to repeated construction traffic.

4.3 EXCAVATION, BACKFILL AND RETAINING WALLS

The soils encountered within the construction depth of this project are composed primarily of loose to compact granular soils and firm to stiff cohesive soils. Excavation through these soils can be accomplished with minimal effort from standard excavation equipment.

Classifications for encountered soil materials within the construction depth of this project consist primarily of sandy silt (ML), silty sand (SM) and lean clay (CL). Structural Fill is defined as any soil material with the exception of USCS classifications of CH, MH, OH, OL, ML and CL-ML. Silt (ML) soils provide a potential for frost heave if subjected to water and freezing temperatures and therefore should not be used as Structural Fill within 3.5 feet of final grade. In the event excavated soils are to be repurposed as Structural Fill, the soils should be blended, stockpiled and tested prior to use as Structural Fill. Geotechnical laboratory testing should be performed for every 5,000 cubic feet of material to ensure the USCS classification is in compliance with Structural Fill specifications.

The soils encountered at this site should be classified by an OSHA competent person in accordance with 29 CFR, Part 1926, OSHA Subpart P, "Excavations and Trenches" prior to and during excavation. From the testing and exploration program, GGEA estimates the soils can be classified as Type C under the OSHA classification guidelines. However, this classification may change depending on other site criteria and moisture conditions at the time of construction. An OSHA competent person should judge the potential need for excavation bracing and excavation geometry in the field.

Utility excavations can be accomplished with minimal effort, however a trench box will be required for excavations that cannot maintain the prescribed OSHA geometry. The trench box shall extend a minimum of 18 inches above the vertical sidewall portion of the excavation. Note that due to the very loose condition of native soils at certain depths, care should be exercised regarding the installation of pipe bedding materials to ensure adequate support is achieved.

In place density testing should be performed at a rate of one test per 50 feet of trench or 2500 square feet of area per lift, at a minimum of one test per day of placement. Specifications regarding Common Fill, Structural Fill, Select Structural Fill and Flowable Fill are included in Appendix F. Structural Fill and Select Structural Fill shall be placed in lifts not to exceed 9 inches in thickness and shall be compacted to 95 % modified proctor. All excavations for foundations and under structurally loaded areas (pavement, sidewalk, slab) shall be backfilled with properly compacted Structural Fill or Select Structural Fill. Common Fill placed in non-structurally loaded areas shall be compacted to 90 % of modified proctor. At a minimum, Select Structural Fill should be used for the upper 12 inches in all structurally loaded areas. Modified proctor testing should be performed for every 5,000 cubic yards of material installed. Foundation backfill shall be installed in a balanced condition with foundations completely backfilled prior to applying load.

Retaining walls should be backfilled with Structural Fill or Select Structural Fill compacted to 95 % of modified proctor (ASTM D1557) density. Clean poorly graded drainage stone should be installed directly behind the wall to allow for hydrostatic pressure relief through weeps or drain tile at the base. The drainage stone should be wrapped in a separation and filtration geotextile such as US 120NW or equivalent. The subgrade at the base of the retaining wall should be prepared in accordance with the recommendations of Section 4.1 of this report. GGEA provides the following estimated design parameters for native soils and compacted Select Structural Fill:

Silty sand (SM)

moist unit weight = 125 pcf

friction angle = 34°

cohesion = 0 psf

Rankine theory

at rest pressure coefficient (K_o) = 0.53

active pressure coefficient (K_a) = 0.36

passive pressure coefficient (K_p) = 2.76

2020 NYS Building Code Table 1610.1 Lateral Soil Load

at rest pressure = 60 psf/ft of depth

active pressure = 45 psf/ft of depth

coefficient of sliding for mass concrete = 0.40

Sandy silt (ML)

moist unit weight = 120 pcf

friction angle = 32°

Rankine theory

at rest pressure coefficient (K_o) = 0.47

active pressure coefficient (K_a) = 0.31

passive pressure coefficient (K_p) = 3.25

2020 NYS Building Code Table 1610.1 Lateral Soil Load

at rest pressure = 100 psf/ft of depth

active pressure = 45 psf/ft of depth

coefficient of sliding for mass concrete = 0.35

lean clay (CL)

moist unit weight = 115 pcf
friction angle = 0° undrained, 28° drained
cohesion = 1,000 psf undrained, 0 psf drained
Rankine theory
 at rest pressure coefficient (K_o) = 0.53
 active pressure coefficient (K_a) = 0.36
 passive pressure coefficient (K_p) = 2.76
2020 NYS Building Code Table 1610.1 Lateral Soil Load
 at rest pressure = 100 psf/ft of depth
 active pressure = 60 psf/ft of depth
coefficient of sliding for mass concrete = 0.30

Select Structural Fill (2" ROC Stone)

moist unit weight = 145 pcf
friction angle = 40°
Rankine theory
 at rest pressure coefficient (K_o) = 0.36
 active pressure coefficient (K_a) = 0.22
 passive pressure coefficient (K_p) = 4.60
2020 NYS Building Code Table 1610.1 Lateral Soil Load
 at rest pressure = 60 psf/ft of depth
 active pressure = 30 psf/ft of depth
coefficient of sliding for mass concrete = 0.55

4.4 PAVEMENT

GGEA provides design and construction recommendations for flexible pavement as follows:

1. Remove existing topsoil and poor quality soil materials to the design subgrade elevation. Any poor quality soil (soft, saturated, organic) should be removed. Existing fill materials may remain pending they are free of deleterious materials and respond well to compaction. The subgrade should be graded to drain.
2. Thoroughly compact the exposed subgrade with a smooth drum vibratory roller. In place density testing of the subgrade is not required.
3. Proof roll the exposed subgrade with a fully loaded 10 wheel dump truck weighing at least 30 tons or a smooth drum roller having an effective force of at least 600 pounds per linear inch of roller width. Any area exhibiting weaving, yielding, rutting or boiling should be reworked and compacted to produce an acceptable response or over excavated and replaced with Structural Fill. The depth of the undercut and type of Structural Fill will depend on the soil material encountered, weather conditions at the time of

construction and the bearing conditions at the base of the undercut. The top surface of the subgrade should be pitched to drain to prevent ponding of stormwater. Proof rolling operations should be observed and directed by a qualified geotechnical professional.

4. Install Structural Fill, if necessary, to achieve the design subgrade elevation. Structural Fill shall be placed in maximum 9 inch lifts and compact to 95 % modified proctor.
5. Install a granular base layer composed of Select Structural Fill compacted to 95 % modified proctor.
6. Install a separation and stabilization geotextile to prevent contamination of the overlying granular base layer with fines from the underlying subgrade soil. GGEA recommends a Class 2 separation geotextile such as US Fabrics US 250 or equivalent. The location of the geotextile within the pavement section will be dependent upon the material used for Structural Fill. If the Structural Fill is granular, the geotextile should be placed between the Structural Fill and native soil. However, if the Structural Fill is cohesive, the geotextile should be placed between the Structural Fill and Select Structural Fill.
7. If the design dictates, install ditches, lateral drains, weeps and storm drainage piping.
8. If catch basins are installed, special attention should be directed to the compaction of stone around the catch basins and the pipes. Failure to properly compact the stone will result in pavement settlement around the catch basins and ponding of water.
9. Install flexible pavement in accordance with the following recommended sections:

Light Duty (primarily car traffic)

10.0 inches granular base
2.5 inches of asphalt concrete binder
1.0 inch of asphalt concrete top

Heavy Duty (mixed truck and car traffic)

12.0 inches granular base
3.5 inches of asphalt concrete binder
1.5 inch of asphalt concrete top

Site contractors should be notified that roadways and parking areas will not support repeated travel by construction loads. Pavement and subgrade failure can be anticipated in areas that receive a high volume of heavy construction traffic. To preclude the overstressing of the pavement system it is recommended that haul roads be located in non-critical areas. As an option, the base course of stone can be overbuilt to a total thickness of 20 inches to serve as a haul route. The additional thickness of stone should be removed prior to paving along with any areas of stone that have been contaminated with soil. Failure to remove fine-grained soils from the stone base may cause pavement distress in the form of heaving resulting from freeze thaw effects.

In the event the binder layer is used as a working surface during construction or there is a prolonged time period between binder and top placement such that daily activities occur over the binder surface, the surface must be power washed, not just swept, and a tack coat should be applied prior to installation of the top course. In addition, any yielding area of pavement binder should be removed and replaced prior to application of the top course.

4.5 EXPANSIVE SOILS

Some cohesive soils undergo volumetric change (shrinkage and swelling) with changes in moisture content and degree of saturation, which are commonly referred to as expansive soils. This condition primarily occurs with fat clay (CH) soil, which is a cohesive soil that exhibits a liquid limit of 50 or greater. The liquid limit is the water content, in percent, of a soil that defines the boundary between the plastic and viscous fluid states. Expansive soils can be found in many areas throughout Western New York and have been associated with foundation problems.

The cohesive soils encountered at this site exhibit a liquid limit ranging from 36 to 47 and a plasticity index ranging from 18 to 24, classifying the soil as lean clay (CL). It is GGEA's opinion this soil exhibits a moderate potential for volumetric change with fluctuations in moisture content. Maintaining consistent moisture content within the soil after construction will aid in limiting the potential volumetric change of soils at and below the foundation bearing grade. GGEA provides the following recommendations to maintain consistent soil moisture content:

1. In warm weather, inspect the soil around the foundation for signs of a gap forming between the soil and the foundation. If found, water the soils twice daily. The soil should be watered evenly one foot away from the foundation and not allowed to run directly into the gap. Provide a barrier against water loss by placing mulch or similar ground cover around the entire foundation perimeter.
2. Trees and landscaping plants should be kept as far from the foundation wall as their mature height. The roots from trees will consume water much faster than the surrounding areas allowing for some areas of clay to dry out and shrink while others will not. This in turn can lead to differential settlement of the structure. Existing roots near to the foundation should be cut and capped by a professional tree service.
3. Water trees and shrubs near to the foundation to preclude them taking excessive moisture out of the surficial soils. Fully grown trees can require as much as 75 gallons of water per day in dry periods.
4. Maintain consistent moisture in the soil by directing roof runoff to splash blocks a few feet away from the foundation. Allow this water to maintain an even level of saturation in the soils overlying the clay deposits.
5. In general, avoid any activity or operations in the vicinity of the building foundation that may promote long-term groundwater fluctuations. The proposed construction and any future adjacent construction should include measures to prevent significant changes in the surrounding subgrade moisture content.

4.6 LIQUEFACTION

Liquefaction is the process where saturated cohesionless (granular) soils, specifically, loose sands and silts, transform from a solid into a liquid as a result of an increase in the pore water pressure caused by repeated disturbance such as experienced during seismic events. Liquefaction results in an immediate loss of shear strength and bearing capacity, causing total and differential settling of the overlying structure.

The granular soils encountered at this site below the proposed construction depth exhibit a high relative density and do not provide a concern for liquefaction.

4.7 SETTLEMENT

Shallow foundations designed and constructed in accordance with the recommendations of this report will provide for total settlement of less than 1.0 inch and differential settlement of less than 0.5 inches.

4.8 SEISMIC SITE CLASS AND DESIGN CATEGORY

In accordance with Section 1613 (Earthquake Loads) of the 2020 NYS Building Code, GGEA has classified the site as **Seismic Site Class D**. The site classification is based on the summation of N values for the upper 100 feet of boring B-2 in accordance with ASCE 7-16 Equation 20.4-2. The design spectral response accelerations have been calculated as 0.176 g for the short period design spectral response acceleration (S_{DS}) and 0.072 g for the one second design spectral response acceleration (S_{D1}). In accordance with tables 1613.2.5(1) and 1613.2.5(2), using Risk Category II, the site is classified as **Seismic Design Category B**. Calculations have been provided in Appendix E.

4.9 GENERAL CONSTRUCTION RECOMMENDATIONS

GGEA provides general construction recommendations as follows:

1. Soil subgrade for pavement and slab on grade areas should be sealed with a smooth drum roller regularly to minimize rutting and weather related deterioration prior to the installation of overlying stone.
2. Regional regulations for frost protection of foundations require a minimum foundation depth of greater than 42 inches below final grade. GGEA recommends a minimum foundation depth of 4.0 feet.
3. Soils and fill materials shall not be stockpiled immediately adjacent to excavation sidewalls. Spoil and fill stockpiles shall be located at distance horizontally from the edge of excavations equivalent to or greater than the excavation depth ($> 1 H : 1 V$ from the bottom of the excavation).
4. If additional undercut is necessary during foundation excavation, the bottom should be graded to a uniform elevation and gradually sloped or stepped back to the design elevation. Undercut "pockets" should be avoided.
5. Conformance to OSHA standards is mandatory during excavation and trench work.
6. Topsoil and organic soils should be removed from all load bearing areas.
7. No fill material or concrete should be placed in water, over saturated subgrade or over frozen subgrade.
8. The foundation bearing grade should not be allowed to freeze either prior to or after placement of concrete. Insulating blankets should be used to cover bearing grades plus a one foot perimeter outside forms and constructed footings until backfill is placed.
9. Grading and contouring efforts should take care to address existing site drainage conditions and mitigate any conflicts with the proposed site development.
10. Continuous footings and associated wall loads should be proportioned to create nearly equal contact pressures throughout, which will serve to minimize differential settlement. Likewise, square spread footings and associated column loads should be proportioned to create nearly equal contact pressures at all locations.
11. Backfill foundations prior to applying load.

12. Upon excavation, if encountered soils or moisture contents are found to be different than those identified on the soil boring logs and represented within this report, the bearing capacity of the soil will need to be reevaluated by a qualified geotechnical professional. Likewise, the footing design may then require adjustment to accommodate for a change in bearing capacity or for soils of varying bearing capacity.

4.10 CONCLUSION

This completes the geotechnical report for the proposed construction of the Payne Park Aquatic Facility in the City of North Tonawanda, New York. This report has been prepared based on the encountered subsurface conditions at the soil boring locations and pertinent data supplied by Brandsetter Carroll. The information presented within this report is intended to serve as the basis for foundation design/site development and should be communicated to the project architect/design professional, foundation contractor and site development contractor. Please contact GGEA if major project changes are made or if encountered subsurface conditions vary from those noted in this report.

Sincerely,



G. Edward Lover, P.G.
Manager of Geotechnical Services
/gel



Mark W. Glynn, P.E.
Consulting Engineer, Principal

Appendix A

Subsurface Exploration Logs

Payne Park Aquatic Facility
Payne Avenue
North Tonawanda, New York

Geotechnical Engineering Report

GGEA 24-1110

August 6, 2024

GEOTECHNICAL REFERENCE STANDARDS AND KEY TO SOIL BORING LOGS

DEPTH IN FT		BLOWS ON SAMPLER				N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS												
SN	REC	0/ 6	6/ 12	12/ 18	18/ 24																
1	12					40		Moist gray (SANDY-SILT) with 15 to 30% gravel, little sand, trace clay, dense, massive soil structure, (ML). clear transition to 2.0 Gray to dark gray shale bedrock, soft, thinly laminated, intensely fractured horizontally along bedding planes, core pieces range from (0.05-0.8'). 4.0 Coring completed at 4.0 feet.	Silty glacial till with little to some gravel, little sand, trace clay to 2.0 feet over shale bedrock to end of coring. ▼ <table><thead><tr><th>Run #</th><th>Depth (ft)</th><th>Length (ft)</th><th>Rec (ft)</th><th>Rec %</th><th>RQD %</th></tr></thead><tbody><tr><td>1</td><td>2.0 to 4.0</td><td>2.0</td><td>2.0</td><td>100</td><td>40</td></tr></tbody></table>	Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %	1	2.0 to 4.0	2.0	2.0	100	40
Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %																
1	2.0 to 4.0	2.0	2.0	100	40																
20		19																			
			21																		
				24																	
	Run #1																				
5																					

Depth: The far left column provides the vertical scale of the boring log in feet below ground surface.

Sample Number (SN): The sample number is used for identification on sample containers and/or laboratory tests. Abbreviations are used for different samples and tests (Table 4.)

Sample Recovery (REC): Shown in the sample number column below the sample number in inches out of 24.

Blows: The number of blows obtained from each of the 6-inch intervals of a 24-inch Standard Penetration Test (ASTM D1586).

N-Value: The Standard Penetration Test N-Value, as specified by ASTM D1586 is defined as the number of blows required by a 140-pound hammer falling 30 inches per blow to drive a 2-inch outside diameter split spoon sampler 24 inches. The N-Value is the sum of the 6/12 and 12/18 value.

Lithology (LITH): A graphic representation of the soil and rock description and classification.

Description and classification:

All recovered soil and rock samples are described and classified in the field during the drilling process. Soil classifications are based on the Unified Soil Classification System ASTM D2487 and ASTM D2488. The relative proportion of soil mixtures with two or more soils is described in accordance with "Suggested Methods of Test for Identification of Soils" by D.M. Burmister, ASTM Special Technical Publication 479, June 1970. Rock descriptions and classifications are frequently referenced from "Rock Core Evaluation Manual Geotechnical Engineering Manual GEM-23" by NYSDOT, 2015. Description and classification are based on visual observation, except where they have been modified to reflect results of laboratory tests as deemed appropriate.

- Soils Field Observations: Moisture (Table 2.), Color, Relative proportion of soil mixtures with two or more soils (Table 5.), Penetration Resistance (Table 3.), Soil Structure, and USCS Classification (Table 1.).
- Rock Field Observations: Color, Rock Type, Hardness (Table 6.), Grain size or Texture, Bedding (Table 7.), Fracturing (Table 8.), Size and Range, and additional observations. The field identification descriptors Rock Hardness, Bedding, and Fracturing are based off the NYSDOT GEM-23.
- The depths of stratum lines shown on the boring logs are based on interpretation and may not represent precise subsurface conditions.

Remarks: This section denotes depth of recovery, stratigraphy of soil and rock, depositional environment, and general documentation of drilling efforts and techniques.

Water Level: Water level readings are made in bore holes at times and under conditions stated on the boring logs. Fluctuations in the water level may occur due to factors other than those present at the time measurements are taken. The symbol "▼" denotes the water level below ground surface at a specified time.

RQD: Denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100mm (4 in.) long are summed and divided by the total length of the core run. (ASTM D6032)

GEOTECHNICAL REFERENCE STANDARDS AND KEY TO SOIL BORING LOGS

Table 1. Unified Soil Classification System

Major Divisions			Symbol	Typical Descriptions
Coarse Grained Soils	Gravel and Gravelly soils	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		More than 50% of coarse fraction retained on No. 4 Sieve.	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils	Clean sand (little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines (Wide Equal Range)
			SP	Poorly-graded sands, gravelly sands, little or no fines, predominately one size or intermediate size
		More than 50% of coarse fraction passing No. 4 Sieve.	SM	Silty sands, sand-silt mixtures
			SC	Clayey-sands, sand-clay mixtures
Fine Grained Soils	Silts and Clays	Liquid limit LESS than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays or low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays or low plasticity
	Silts and Clays	Liquid limit GREATER than 50	MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays or medium to high plasticity, organic silts
Highly Organic Soils			PT	Peat, humus, swamp soils with high organic contents

NOTE: MULTIPLE SYMBOLS ARE USED TO DISTINGUISH DUAL AND BORDERLINE SOILS

Table 2. Relative Soil Moisture

Moisture Content	
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

Table 3. Relative Soil Penetrative Resistance

Penetrative Resistance of Non-Cohesive Soils		Penetrative Resistance of Cohesive Soils	
Term	Blows	Term	Blows
Very Loose	0 - 4	Very Soft	0 - 2
Loose	5 - 10	Soft	3 - 4
Compact	11 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very Dense	>50	Very Stiff	15 - 30
		Hard	> 30

Table 4. Sample Abbreviations

Symbol	Description
ST	Shelby Tube Sample
VS	Vane Shear Test
WR	Weight of rods: A zero blow count with the weight of rods only.
WH	Weight of hammer: A zero blow count with the weight of the rods plus the weight of the hammer.
50/#	Denotes if the number of blows exceeds 50 before 0.5 ft. interval. (ex. 50/4 or 50 blows over 4 inches)
Run	An individual advancement of core equipment

Table 5. Modified Burmister

Proportion of Soil Mixtures	
Trace	0 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

GEOTECHNICAL REFERENCE STANDARDS AND KEY TO SOIL BORING LOGS

Table 6. Relative Rock Hardness

Relative Rock Hardness	Long Description
Very soft rock	Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.
Soft rock	Hand-held specimen crumbles under firm blows with point of geologic pick.
Moderately soft rock	Shallow indentations (0.04 to 0.12 in. (1 to 3 mm)) can be made by firm blows with point of geologic pick. Can be peeled with pocket knife with difficulty.
Moderately hard rock	Cannot be peeled or scraped with knife. Can be distinctly scratched with a steel nail.
Hard rock	Intact hand-held specimen requires more than one hammer blow to break it. Can be faintly scratched by a steel nail.
Very hard rock	Cannot be scratched with a steel nail. Intact specimen breaks only by repeated, heavy blows with geologic hammer.
Extremely hard rock	Intact specimen can only be chipped, not broken, by repeated, heavy blows of a geologic hammer.

Table 7. Rock Bedding

Bedding	Description
Very Thick-Bedding	Greater than 4 ft. (>1.2 m)
Thick-Bedded	1 ft. to 4 ft. (0.3 m to 1.2 m)
Medium-Bedded	4 in. to 12 in. (100 mm to 300mm)
Thin-Bedded	1.2 in. to 4 in. (30 mm to 100 mm)
Very Thin-Bedded	0.5 in. to 1.2 in. (13mm to 30mm)
Thickly Laminated	0.1 in. to 0.5 in. (3 mm to 13 mm)
Thinly Laminated	Less than 0.1 in. (< 3 mm)
None	

Table 8. Degree of Rock Core Fracturing

Degree of Fracturing	Description
Unfractured	No observed fractures.
Very slightly fractured	Core recovered in lengths greater than 3 ft. (1 m).
Slightly to very slightly fractured	Core recovered in lengths from 1 to 3 ft. (0.3 m to 1 m).
Slightly fractured	Core recovered mostly in lengths from 1 to 3 ft. (0.3 to 1 m) with few scattered lengths less than 1 ft. (0.3 m) or greater than 3 ft. (1 m).
Moderately to slightly fractured	Core recovered mostly in lengths averaging 1 ft. (0.3 m).
Moderately fractured	Core recovered mostly in lengths from 0.33 to 1 ft. (0.1 to 0.3 m) with most lengths about 0.67 ft. (0.2 m).
Intensely to moderately fractured	Core recovered in lengths of 0.33 to 0.67 ft. (0.1 to 0.2 m) with most lengths about 0.5 ft. (0.15 m).
Intensely fractured	Core recovered mostly in lengths from 0.1 to 0.33 ft. (0.03 to 0.1 m) with most lengths less than 0.33 ft. (0.1 m) and with fragmented intervals
Very intensely to intensely fractured	Core recovered as short core lengths averaging less than 0.1 ft. (0.03 m).
Very intensely fractured	Core recovered mostly as chips and fragments with a few scattered short core lengths.



EARTH DIMENSIONS, INC.

Geotechnical and Environmental Drilling | Wetland Delineations and Consulting

1091 Jamison Road | Elma, NY 14059

(716) 655-1717 | EDI@earthdimensions.com

EDI Job Code: 3F24 **Hole Number:** B-1-24 **Surface Elevation:** _____
Project Name: 830 Payne Avenue - SBL# 128.09-1-11 **Northing:** _____ **Easting:** _____
Project Location: City of North Tonawanda, Niagara County, NY **Date Started:** 6/24/2024
Client: Glynn Group Engineering & Architecture, PLLC **Date Completed:** 6/24/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
1	1	22	2	5	6	4	11		Dry dark brown (SILTY-SAND) topsoil fill with some silt, trace to little organic matter, very loose, massive soil structure, (SM). 0.4	Sandy topsoil fill with some silt, trace to little organic matter to 0.4 feet over sandy soil fill with little to some silt, little gravel, trace organic matter and brick fragments to 2.2 feet over silty slack water sediment with little to some clay, little sand to 2.7 feet over coarse silty slack water sediment with little to some sand, trace clay to 7.5 feet over clayey slack water sediment with trace sand to 13.0 feet over clayey slack water sediment to 23.0 feet over silty saprolite soil with some shale and gypsum stone fragments, little sand and clay to split spoon refusal.
2	2	20	4	3	4	4	7		Dry to moist brown (SILTY-SAND) fill with 10 to 20% gravel, little to some silt, trace organic matter and brick fragments, loose to compact, massive soil structure, (SM). 2.2 2.7	
3	3	24	5	5	3	6	8		grades downward to Moist faintly mottled olive gray (SAND-SILT-CLAY) with little to some clay, little sand, firm, weakly blocky soil structure, (ML-CL) tending toward, (CL).	
4	4	24	7	6	6	7	12		Moist to wet faintly mottled orangish brown (SANDY-SILT) with little to some fine size sand, trace clay, loose, weakly blocky soil structure to weakly thinly bedded, (ML). 7.5	
5	5	24	4	4	7	9	11		Moist gray to reddish brown (SILTY-CLAY) with trace sand, firm to very stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	
6	6	20	5	4	7	8	11			
7	7	24	2	1	2	1	3		Moist to wet gray to reddish brown (SILTY-CLAY) soft, weakly thinly laminated with very thin coarse silt lenses, (CL). 13.0	
8	8	24	1	1	1	1	2			Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to split spoon refusal at 24.4 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
20										

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140lb. WEIGHT FALLING 30" PER BLOW

Logged By: Kyle Shearing





EARTH DIMENSIONS, INC.

Geotechnical and Environmental Drilling | Wetland Delineations and Consulting

1091 Jamison Road | Elma, NY 14059

(716) 655-1717 | EDI@earthdimensions.com

EDI Job Code: 3F24 **Hole Number** B-2-24 **Surface Elevation:** _____
Project Name: 830 Payne Avenue - SBL# 128.09-1-11 **Northing:** _____ **Easting:** _____
Project Location: City of North Tonawanda, Niagara County, NY **Date Started:** 6/25/2024
Client: Glynn Group Engineering & Architecture, PLLC **Date Completed:** 6/25/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
1	16	1		3	3	3	6		Moist dark brown (SILTY-SAND) topsoil fill with some silt, trace to little organic matter, very loose, massive soil structure, (SM). 0.3	Sandy topsoil fill with some silt, trace to little organic matter to 0.3 feet over sandy soil fill with little to some silt, trace to little gravel, trace organic matter to 1.7 feet over coarse silty soil fill with little to some sand, trace clay and organic matter to 2.5 feet over clayey slack water sediment with trace to little sand to 3.0 feet over coarse silty slack water sediment with little to some sand to 6.0 feet over water sorted and deposited sand with little to some gravel, little silt to 9.5 feet over clayey slack water sediment with trace sand to 13.0 feet over clayey slack water sediment to 19.0 feet over silty glacial drift with little sand and clay, trace gravel and shale stone fragments to 20.5 feet over silty saprolite soil with some shale and gypsum stone fragments, little sand and clay to 24.6 feet over apparent shale bedrock to 25.5 feet over shale bedrock with gypsum deposits to end of coring. Note: Water first encountered at approximately 5.5 feet below ground surface. Note: Lost approximately 400 gallons of water to formation during coring. Note: Water level at 14.6 feet below ground surface at coring completion with core tooling removed from bore hole. Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to auger refusal at 25.5 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 30.5 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
2	18	2		1	2	3	3		Moist brown (SILTY-SAND) fill with 5 to 15% gravel, little to some silt, trace organic matter, loose, massive soil structure, (SM). 1.7	
3	20	6		5	4	6	9		Moist dark gray (SANDY-SILT) fill with little to some sand, trace clay and organic matter, loose, massive soil structure, (SM). 2.5	
4	20	6		10	13	14	23		Moist dark gray (SAND-SILT-CLAY) with some clay, trace to little sand, very soft, weakly blocky soil structure to thinly laminated, (CL). 3.0	
5	24	4		4	6	11	10		grades downward to 6.0	
6	24	3		4	7	10	11		Moist to wet faintly mottled gray to orangish brown (SANDY-SILT) with little to some mostly fine size sand, loose to compact, weakly thinly bedded, (ML). 9.5	
7	24	3		2	2	1	4		Wet grayish brown gravelly (SILTY-SAND) with 15 to 30% mostly small rounded to subrounded gravel, little silt, compact, stratified, (SM). 13.0	
8	24	1		1/12		2	<1		Moist reddish brown to gray (SILTY-CLAY) with trace sand, stiff to very stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL). 18.0	
20									Moist to wet reddish brown to gray (SILTY-CLAY) very soft to soft, weakly thinly laminated with very thin coarse silt lenses, (CL). 19.0	
									grades downward to See next sheet	

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Kyle Shearing



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EDI Job Code: 3F24 **Hole Number** B-2-24 **Surface Elevation:** _____
Project Name: 830 Payne Avenue - SBL# 128.09-1-11 **Northing:** _____ **Easting:** _____
Project Location: City of North Tonawanda, Niagara County, NY **Date Started:** 6/25/2024
Client: Glynn Group Engineering & Architecture, PLLC **Date Completed:** 6/25/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
	9	20	23	27	45	50/3	72		Moist to wet gray (SAND-SILT-CLAY) with 5 to 10% gravel and shale stone fragments, little sand and clay, very soft to soft, massive soil structure, (ML-CL). ----- grades downward to ----- Dry bluish gray very gravelly (SAND-SILT-CLAY) saprolite soil with 30 to 50% shale and gypsum stone fragments, little sand and clay, very dense, massive soil structure, (GM),(GC). Dry bluish gray shale stone fragments, soft.	20.5 24.6 25.5 Run Depth Length REC REC RQD # of # (ft) (ft) (ft) % % pieces ----- 1 25.5 to 5.0 5.0 100 52 120 30.5
	Run	#1							Bluish gray to gray shale bedrock, soft, with occasional thin white gypsum deposits, very soft, large gypsum deposit from 26.9 to 27.6 feet, thinly to thickly laminated, intensely fractured from 25.5 to 26.9 feet, moderately to intensely fractured horizontally along bedding planes below 26.9 to 30.5 feet with high angle fractures from 27.6 to 27.7, 27.9 to 28.1, and 30.3 to 30.5 feet, core breaks appear fresh, core lengths range from (0.01-0.8').	ED I Bedrock Hardness Classification ----- Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
									Coring completed at 30.5 feet.	
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Kyle Shearing



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EDI Job Code: 3F24

Hole Number B-3-24

Surface Elevation: _____

Project Name: 830 Payne Avenue - SBL# 128.09-1-11

Northings: _____ Eastings: _____

Project Location: City of North Tonawanda, Niagara County, NY

Date Started: 6/25/2024

Client: Glynn Group Engineering & Architecture, PLLC

Date Completed: 6/25/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
	1	16	2	4	5	5	9		Dry to moist dark brown (SILTY-SAND) topsoil fill with some silt, trace to little organic matter, very loose, massive soil structure, (SM). 0.4	Sandy topsoil fill with some silt, trace to little organic matter to 0.4 feet over sandy soil fill with little to some silt, trace brick fragments to 2.5 feet over clayey slack water sediment with trace to little sand, trace organic matter to 3.5 feet over coarse silty slack water sediment with some sand, trace organic matter to 6.5 feet over clayey slack water sediment with trace sand to 13.0 feet over clayey slack water sediment to 17.5 feet over silty saprolite soil with some shale and gypsum stone fragments, little sand and clay to split spoon refusal.
	2	20	7	4	5	8	9		Dry to moist brown to dark brown (SILTY-SAND) fill with 10 to 20% gravel, little to some silt, trace brick fragments, loose to compact, massive soil structure, (SM). 2.5	
									grades downward to 3.5	
5	3	16	6	7	6	9	13		Moist faintly mottled gray to orangish brown (SAND-SILT-CLAY) with some clay, trace to little sand, trace organic matter, firm, weakly blocky soil structure to thinly laminated, (CL).	
									grades downward to 6.5	
	4	20	7	5	8	10	13		Moist to wet orangish brown (SANDY-SILT) with some mostly fine size sand, trace organic matter, compact, thinly bedded, (ML).	
									grades downward to	
10	5	20	5	6	9	11	15		Moist gray to reddish brown (SILTY-CLAY) with trace sand, stiff to very stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	
	6	24	5	6	7	8	13			Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to split spoon refusal at 19.9 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
									grades downward to 13.0	
	7	24	4	2	2	1	4		Moist to wet gray to reddish brown (SILTY-CLAY) soft, weakly thinly laminated with very thin coarse silt lenses, (CL).	
15									grades downward to 17.5	
	8	18	6	11	22	50/5	33		Dry to moist gray very gravelly (SAND-SILT-CLAY) saprolite soil with 30 to 50% shale and gypsum stone fragments, little sand and clay, hard, massive soil structure, (GM),(GC). 19.9	Saprolite - soil derived from bedrock weathered in place
20										Note: No water at completion.

Split spoon refusal at 19.9 feet.

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140lb. WEIGHT FALLING 30" PER BLOW

Logged By: Kyle Shearing



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EDI Job Code: 3F24

Hole Number B-4-24

Surface Elevation: _____

Project Name: 830 Payne Avenue - SBL# 128.09-1-11

Northing: _____ Easting: _____

Project Location: City of North Tonawanda, Niagara County, NY

Date Started: 6/24/2024

Client: Glynn Group Engineering & Architecture, PLLC

Date Completed: 6/24/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
	1	22	5	4	3	3	7		Dry dark brown (SILTY-SAND) topsoil fill with some silt, trace to little organic matter, loose, massive soil structure, (SM). 0.5	Sandy topsoil fill with some silt, trace to little organic matter to 0.5 feet over coarse silty soil fill with little to some sand, trace to little gravel to 1.5 feet over coarse silty soil fill with little to some sand, trace to little gravel, trace clay and organic matter to 2.5 feet over silty slack water sediment with little sand, trace to little clay, trace organic matter to 3.5 feet over coarse silty slack water sediment with little to some sand to 6.0 feet over clayey slack water sediment with trace sand to 11.0 feet over clayey slack water sediment with an occasional thin sand lense to 13.0 feet over silty saprolite soil with some shale stone fragments, little to some sand, trace to little clay to 28.0 feet over shale and gypsum stone fragments to auger refusal.
	2	24	5	3	4	5	7		Dry brown (SANDY-SILT) fill with 5 to 15% gravel, little to some sand, loose, massive soil structure, (ML). 1.5	
									Moist dark brown to brown (SANDY-SILT) fill with 5 to 15% gravel, little to some sand, trace clay and organic matter, loose, massive soil structure, (ML). 2.5	
	3	20	6	4	4	6	8		grades downward to 3.5	
	4	24	5	6	9	12	15		Moist faintly mottled brownish gray (SAND-SILT-CLAY) with little sand, trace to little clay, trace organic matter, firm, weakly blocky soil structure, (ML-CL). 6.0	
									grades downward to	
	5	24	5	5	10	12	15		Moist to wet faintly mottled brownish gray to orangish brown (SANDY-SILT) with little to some mostly fine size sand, compact, weakly thinly bedded, (ML). 11.0	
									grades downward to	
	6	24	5	5	6	6	11		Moist faintly mottled reddish brown to gray (SILTY-CLAY) with trace sand, stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL). 13.0	
									grades downward to	
	7	24	3	2	2	1	4		Moist reddish brown to gray (SILTY-CLAY) stiff, thinly laminated with very thin coarse silt lenses and an occasional thin wet sand lense, (CL) with an occasional thin (SM) interbed. 16.0	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet and 5.0-foot interval sampling to auger refusal at 28.7 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
									grades downward to	
									Moist to wet reddish brown (SILTY-CLAY) with trace sand, soft, weakly thinly laminated with very thin coarse silt lenses, (CL). 16.0	
									grades downward to	
	8	6	12	42	19	44	61		Wet very gravelly (SAND-SILT-CLAY) with 40 to 60% gravel and flat sided stone fragments, occasional cobble, little to some sand, trace to little clay, hard, massive soil structure, (GM),(GC).	

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140lb. WEIGHT FALLING 30" PER BLOW

Logged By: Kyle Shearing



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EDI Job Code: 3F24

Hole Number B-4-24

Surface Elevation: _____

Project Name: 830 Payne Avenue - SBL# 128.09-1-11

Northing: _____ Easting: _____

Project Location: City of North Tonawanda, Niagara County, NY

Date Started: 6/24/2024

Client: Glynn Group Engineering & Architecture, PLLC

Date Completed: 6/24/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
									Wet very gravelly (SAND-SILT-CLAY) with 40 to 60% gravel and flat sided stone fragments, occasional cobble, little to some sand, trace to little clay, hard, massive soil structure, (GM),(GC).	Saprolite - soil derived from bedrock weathered in place
	9		10						grades downward to 23.5	
25		16		22	50/4				Moist to wet bluish gray to olive gray very gravelly (SAND-SILT-CLAY) saprolite soil with 40 to 60% mostly shale stone fragments, little to some sand, trace to little clay, hard, massive soil structure, (GM),(GC).	Note: Water level at 24.2 feet below ground surface at completion.
									grades downward to 28.0	Note: Water first encountered at 16.0 feet below ground surface.
	10	4	50/5						Wet bluish gray shale stone fragments, soft, and white gypsum stone fragments, very soft.	
30									Advanced augers to refusal at 28.7 feet.	
40										

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140lb. WEIGHT FALLING 30" PER BLOW

Logged By: Kyle Shearing



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EDI Job Code: 3F24

Hole Number B-5-24

Surface Elevation: _____

Project Name: 830 Payne Avenue - SBL# 128.09-1-11

Northing: _____ Easting: _____

Project Location: City of North Tonawanda, Niagara County, NY

Date Started: 6/26/2024

Client: Glynn Group Engineering & Architecture, PLLC

Date Completed: 6/26/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
1	1	20	2	5	8	4	13		Dry to moist (SILTY-SAND) topsoil fill with some silt, trace to little organic matter, very loose, massive soil structure, (SM). 0.5	Sandy topsoil fill with some silt, trace to little organic matter to 0.5 feet over sandy soil fill with little to some silt, trace to little gravel to 2.3 feet over silty topsoil with little to some clay, trace sand and organic matter to 2.5 feet over silty slack water sediment with little to some clay, trace to little sand to 3.6 feet over coarse silty slack water sediment with little to some sand to 5.3 feet over water sorted and deposited sand with little to some gravel, little silt to 6.2 feet over clayey slack water sediment with trace sand to 10.3 feet over coarse silty glacial till with little to some sand and gravel, trace clay to 16.0 feet over silty glacial till with little to some gravel, little sand, trace to little clay with an occasional cobble to 33.2 feet over silty saprolite soil with some shale and gypsum stone fragments, little sand and clay to auger refusal.
2	2	20	7	3	3	5	6		Dry to moist brown (SILTY-SAND) fill with 5 to 15% gravel, little to some silt, compact, massive soil structure, (SM). 2.3 2.5 grades downward to	
3	3	18	6	5	8	12	13		Moist dark gray (CLAYEY-SILT) topsoil with little to some clay, trace sand and organic matter, stiff, weakly granular soil structure to massive soil structure, (ML-CL) tending toward (CL). 3.6	
4	4	22	6	6	8	12	14		grades downward to Moist faintly mottled gray (SAND-SILT-CLAY) with little to some clay, trace to little sand, stiff, weakly blocky soil structure to thinly laminated, (ML-CL) tending toward (CL). 5.3 6.2	
5	5	20	4	5	8	10	13		grades downward to Moist faintly mottled orangish brown (SANDY-SILT) with little to some mostly fine size sand, compact, weakly thinly bedded, (ML). 10.3	
6	6	22	6	8	12	12	20		grades downward to Moist to wet grayish brown gravelly (SILTY-SAND) with 10 to 25% gravel, little silt, compact, stratified, (SM). 16.0	
7	7	12	15	17	22	29	39		Moist reddish brown to gray (SILTY-CLAY) with trace sand, stiff, thinly laminated with very thin coarse silt lenses, (CL). grades downward to Moist grayish brown gravelly (SANDY-SILT) with 10 to 25% gravel, little to some sand, trace clay, compact, massive soil structure, (ML).	
8	8	10	20	17	17	50	34		grades downward to Moist grayish brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, occasional cobble, little sand, trace to little clay, hard, massive soil structure, (ML-CL).	

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140lb. WEIGHT FALLING 30" PER BLOW

Logged By: Kyle Shearing, Jack Masman



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EDI Job Code: 3F24

Hole Number B-5-24

Surface Elevation: _____

Project Name: 830 Payne Avenue - SBL# 128.09-1-11

Northing: _____ Easting: _____

Project Location: City of North Tonawanda, Niagara County, NY

Date Started: 6/26/2024

Client: Glynn Group Engineering & Architecture, PLLC

Date Completed: 6/26/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
									Moist grayish brown gravelly (SAND-SILT-CLAY) with 15 to 30% gravel, occasional cobble, little sand, trace to little clay, hard, massive soil structure, (ML-CL).	Note: Water level at 23.5 feet below ground surface at completion. Note: Water first encountered at 5.3 feet below ground surface.
	9		19							
		4		50/5						
25										
	10		16							
		24		31						
30					38			69		
									Moist gray very gravelly (SAND-SILT-CLAY) saprolite soil with 30 to 50% shale and gypsum stone fragments, little sand and clay, hard, massive soil structure, (ML-CL) tending toward (GM),(GC). Advanced augers to refusal at 35.8 feet.	Saprolite - soil derived from bedrock weathered in place
	11		15							
		22		21						
					27					
35						31		48		
40										

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140lb. WEIGHT FALLING 30" PER BLOW

Logged By: Kyle Shearing, Jack Masman





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EDI Job Code: 3F24

Hole Number B-7-24

Surface Elevation: _____

Project Name: 830 Payne Avenue - SBL# 128.09-1-11

Northing: _____ Easting: _____

Project Location: City of North Tonawanda, Niagara County, NY

Date Started: 6/25/2024

Client: Glynn Group Engineering & Architecture, PLLC

Date Completed: 6/25/2024

Depth (ft)	SN	Rec (in)	Blows on Sampler				N	LITH	Description and Classification	Water Table and Remarks
			0/6	6/12	12/18	18/24				
0.5	1	24	6	9	5	4	14		Dry dark brown (SILTY-SAND) topsoil fill with some silt, trace to little organic matter, compact, massive soil structure, (SM).	Sandy topsoil fill with some silt, trace to little organic matter to 0.5 feet over sandy soil fill with little to some silt, trace to little gravel, trace brick fragments to 2.5 feet over coarse silty slack water sediment with little to some sand, trace organic matter to 6.5 feet over water sorted and deposited sand with little silt and gravel to 7.4 feet over clayey slack water sediment with trace sand to end of boring.
2.5	2	18	8	6	6	7	12		Dry to moist brown to dark brown (SILTY-SAND) fill with 5 to 15% gravel, little to some silt, trace brick fragments, loose to compact, massive soil structure, (SM).	
5	3	20	8	5	6	8	11		Moist, moist to wet below 5.0 feet, faintly mottled gray to orangish brown (SANDY-SILT) with little to some mostly fine size sand, trace organic matter, compact, weakly thinly bedded, (ML).	
6.5	4	20	9	9	4	7	13		grades downward to Moist to wet brown (SILTY-SAND) with 10 to 20% mostly subrounded to rounded fine size gravel, little silt, compact, stratified, (SM).	
7.4									grades downward to	
10.0	5	24	9	6	8	13	14		Moist gray to reddish brown (SILTY-CLAY) with trace sand, stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	Note: No water at completion.
									Boring completed at 10.0 feet.	
15										
20										

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140lb. WEIGHT FALLING 30" PER BLOW

Logged By: Kyle Shearing

Appendix B

Project Location Plan

Payne Park Aquatic Facility
Payne Avenue
North Tonawanda, New York

Geotechnical Engineering Report

GGEA 24-1110

August 6, 2024



PROJECT LOCATION
830 PAYNE AVENUE



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MATERIALS TESTING • CONSULTING

GLYNN GROUP ENGINEERING
& ARCHITECTURE, PLLC

415 S. TRANSIT STREET LOCKPORT, NEW YORK 14094
www.glynn-group.com
VOICE (716) 625 - 6933 / FAX (716) 625 - 6983

PROJECT: PAYNE PARK AQUATIC FACILITY			
SUBJECT: PROJECT LOCATION PLAN			
CLIENT: BRANDSETTER CARROLL INC.			
PROJ. NO.: 24-1110	SCALE: 1" = 300'	DATE: 05.31.24	BY: GEL

SHEET NO.:
S1

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Appendix C

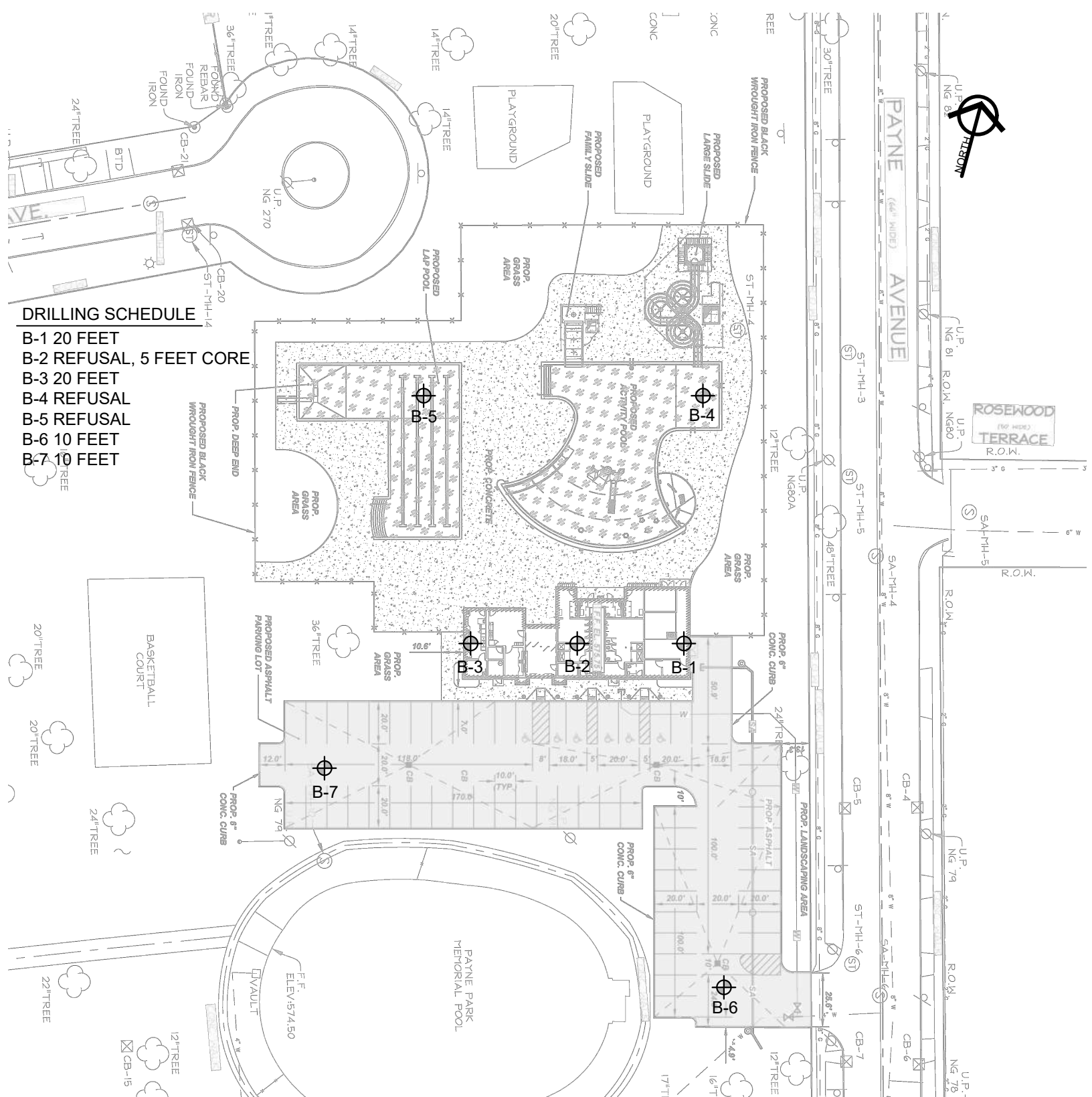
Subsurface Exploration Plan

Payne Park Aquatic Facility
Payne Avenue
North Tonawanda, New York

Geotechnical Engineering Report

GGEA 24-1110

August 6, 2024



DRILLING SCHEDULE

- B-1 20 FEET
- B-2 REFUSAL, 5 FEET CORE
- B-3 20 FEET
- B-4 REFUSAL
- B-5 REFUSAL
- B-6 10 FEET
- B-7 10 FEET

 CIVIL • GEOTECHNICAL STRUCTURAL • ARCHITECTURE MATERIALS TESTING • CONSULTING GLYNN GROUP ENGINEERING & ARCHITECTURE, PLLC 415 S. TRANSIT STREET LOCKPORT, NEW YORK 14094 www.glynn-group.com VOICE (716) 625 - 6933 / FAX (716) 625 - 6983	PROJECT:			PAYNE PARK AQUATIC FACILITY		SHEET NO.:

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Appendix D

Laboratory Analysis

Payne Park Aquatic Facility
Payne Avenue
North Tonawanda, New York

Geotechnical Engineering Report

GGEA 24-1110

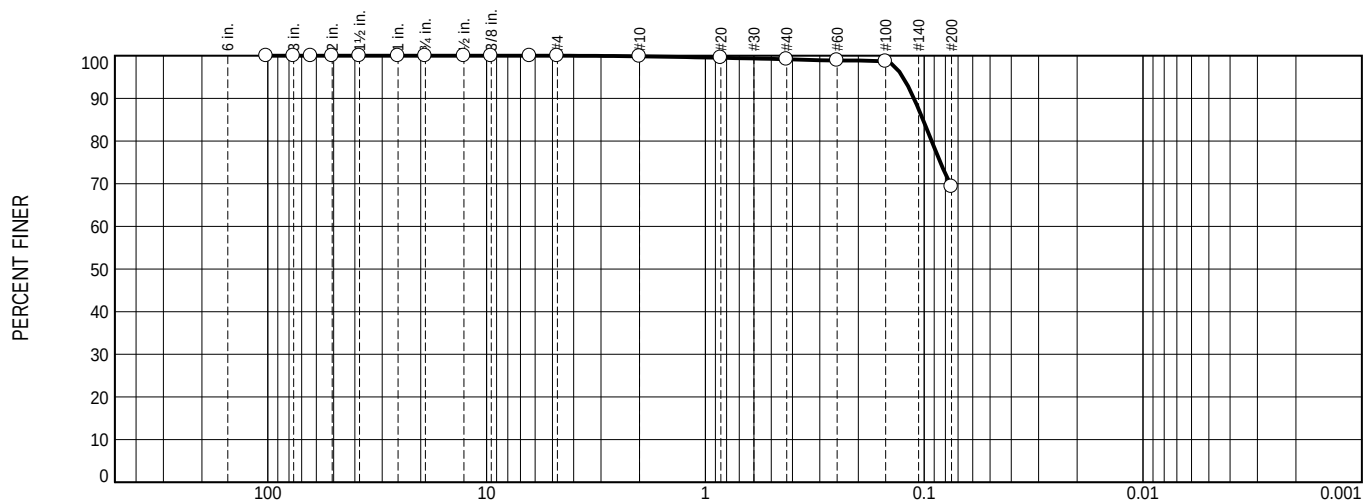
August 6, 2024

Project: Payne Park Aquatic Facility
Client: Brandsetter Carroll Inc.

Project No.: 24-1110

Location: B-1 (S3)
Sample Number: 24-01 Depth: 4.0 - 6.0 ft.

Sample Date: 7.18.24



% +3"	% Gravel	% Sand	% Fines	
			Silt	Clay
0.0	0.0	30.7	69.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4	100.0		
3	100.0		
2.5	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	99.9		
#20	99.5		
#40	99.2		
#60	98.9		
#100	98.7		
#200	69.3		

* (no specification provided)

Material Description			
sandy silt			
<u>Atterberg Limits</u>			
PL= NP	LL= NV	PI= NP	
<u>Coefficients</u>			
D ₈₅ = 0.1012	D ₆₀ =	D ₅₀ =	
D ₃₀ =	D ₁₅ =	D ₁₀ =	
C _u =	C _c =		
<u>Classification</u>			
USCS= ML	AASHTO=	A-4(0)	
<u>Remarks</u>			
Natural Moisture Content = 3.5 %			

Figure

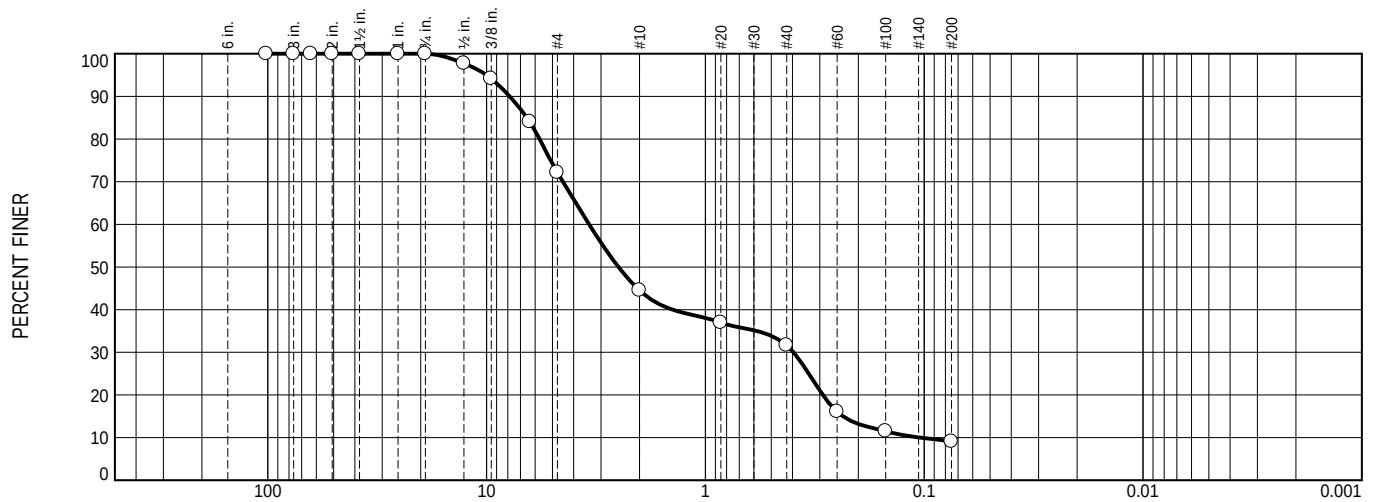
Tested By: JMP Checked By: GEL

Project: Payne Park Aquatic Facility
Client: Brandsetter Carroll Inc.

Project No.: 24-1110

Location: B-2 (S4)
Sample Number: 24-02 Depth: 6.0 - 8.0 ft.

Sample Date: 7.18.24



GRAIN SIZE - mm.

% +3"	% Gravel	% Sand	% Fines	
			Silt	Clay
0.0	27.8	63.1	9.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4	100.0		
3	100.0		
2.5	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	97.7		
.375	94.2		
.25	84.0		
#4	72.2		
#10	44.5		
#20	37.0		
#40	31.6		
#60	16.0		
#100	11.5		
#200	9.1		

* (no specification provided)

Material Description			
poorly graded sand with silt and gravel			
<u>Atterberg Limits</u>			
PL= NP	LL= NV	PI= NP	
<u>Coefficients</u>			
D ₈₅ = 6.5422	D ₆₀ = 3.3993	D ₅₀ = 2.4962	
D ₃₀ = 0.3955	D ₁₅ = 0.2351	D ₁₀ = 0.1039	
C _u = 32.71	C _c = 0.44		
<u>Classification</u>			
USCS= SP-SM	AASHTO= A-1-b		
<u>Remarks</u>			
Natural Moisture Content = 8.9 %			

Figure

Tested By: JMP Checked By: GEL

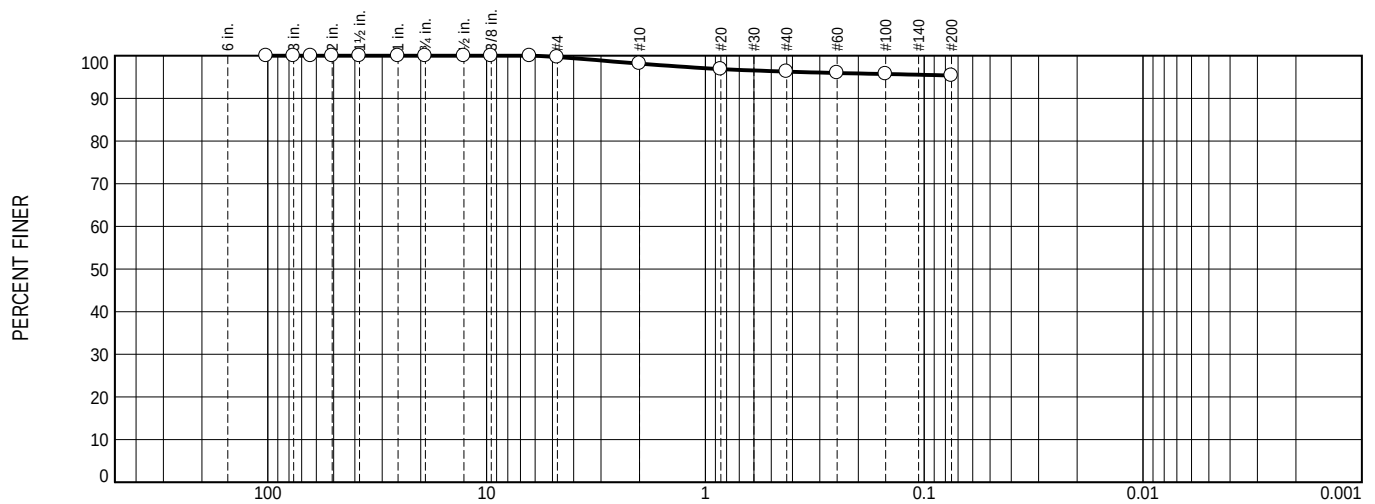
Project: Payne Park Aquatic Facility
Client: Brandsetter Carroll Inc.

Project No.: 24-1110

Location: B-3 (S5,S6)
Sample Number: 24-03

Depth: 8.0 - 13.0 ft.

Sample Date: 7.18.24



GRAIN SIZE - mm.			
% +3"	% Gravel	% Sand	% Fines
0.0	0.3	4.3	Silt Clay
			95.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4	100.0		
3	100.0		
2.5	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	99.7		
#10	98.2		
#20	96.9		
#40	96.3		
#60	96.0		
#100	95.7		
#200	95.4		

* (no specification provided)

Material Description		
lean clay		
<u>Atterberg Limits</u>		
PL= 23	LL= 47	PI= 24
<u>Coefficients</u>		
D ₈₅ =	D ₆₀ =	D ₅₀ =
D ₃₀ =	D ₁₅ =	D ₁₀ =
C _u =	C _c =	
<u>Classification</u>		
USCS= CL	AASHTO=	A-7-6(25)
<u>Remarks</u>		
Natural Moisture Content = 25.9		

Figure

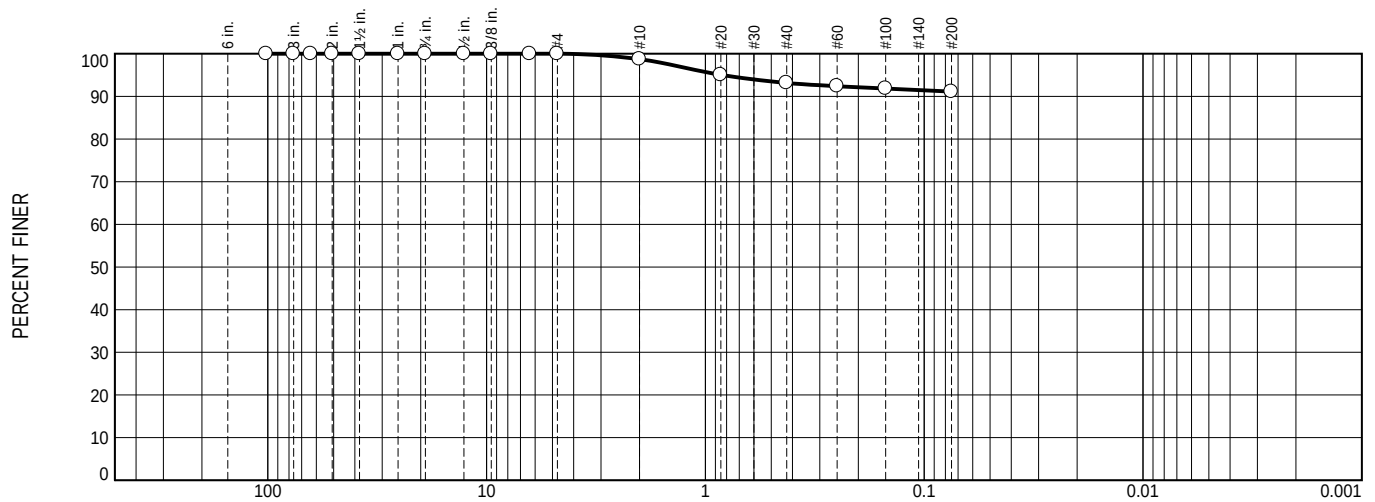
Tested By: JMP Checked By: GEL

Project: Payne Park Aquatic Facility
Client: Brandsetter Carroll Inc.

Project No.: 24-1110

Location: B-2 (S7)
Sample Number: 24-04 Depth: 13.0 - 15.0 ft.

Sample Date: 7.18.24



GRAIN SIZE - mm.			
% +3"	% Gravel	% Sand	% Fines
0.0	0.0	8.9	91.1
			Silt Clay

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4	100.0		
3	100.0		
2.5	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	98.7		
#20	95.1		
#40	93.2		
#60	92.4		
#100	91.9		
#200	91.1		

* (no specification provided)

Material Description		
lean clay		
<u>Atterberg Limits</u>		
PL= 18	LL= 36	PI= 18
<u>Coefficients</u>		
D ₈₅ =	D ₆₀ =	D ₅₀ =
D ₃₀ =	D ₁₅ =	D ₁₀ =
C _u =	C _c =	
<u>Classification</u>		
USCS= CL	AASHTO=	A-6(16)
<u>Remarks</u>		
Natural Moisture Content = 36.4 %		

Figure

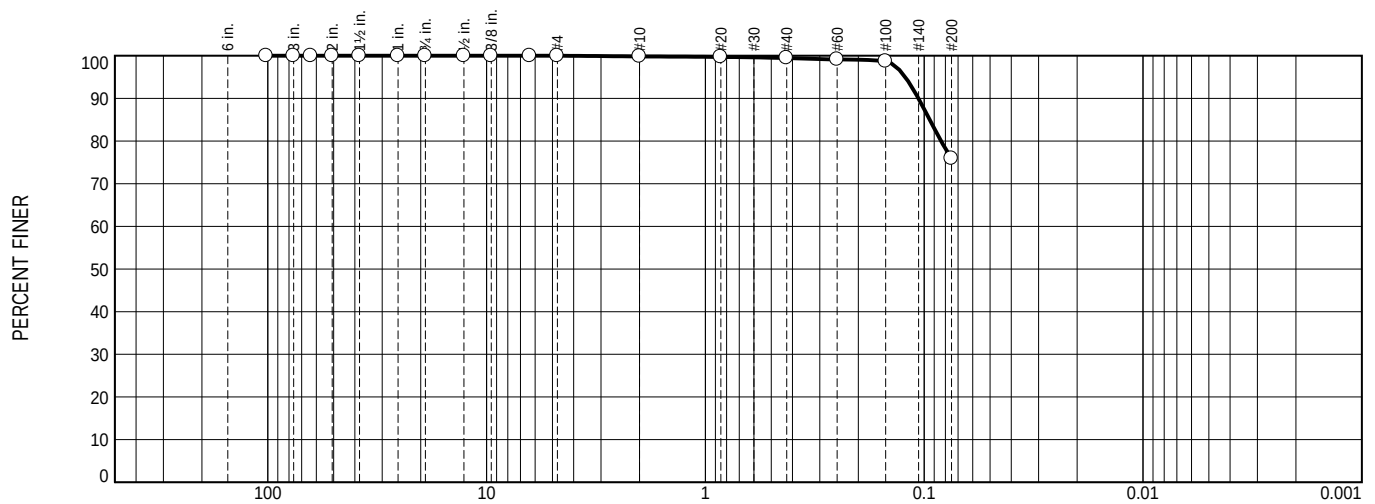
Tested By: JPM Checked By: GEL

Project: Payne Park Aquatic Facility
Client: Brandsetter Carroll Inc.

Project No.: 24-1110

Location: B-6 (S2)
Sample Number: 24-05 Depth: 2.0 - 4.0 ft.

Sample Date: 7.18.24



GRAIN SIZE - mm.			
% +3"	% Gravel	% Sand	% Fines
0.0	0.0	24.1	Silt 75.9
			Clay

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4	100.0		
3	100.0		
2.5	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	99.8		
#20	99.7		
#40	99.5		
#60	99.1		
#100	98.7		
#200	75.9		

* (no specification provided)

<u>Material Description</u>			
silt with sand			
<u>Atterberg Limits</u>			
PL=	NP	LL=	NV
		PI=	NP
<u>Coefficients</u>			
D ₈₅ =	0.0943	D ₆₀ =	D ₅₀ =
D ₃₀ =		D ₁₅ =	D ₁₀ =
C _u =		C _c =	
<u>Classification</u>			
USCS=	ML	AASHTO=	A-4(0)
<u>Remarks</u>			
Natural Moisture Content = 16.5			

Figure

Tested By: JMP Checked By: GEL

Appendix E

Seismic Site Class and Design Category

Payne Park Aquatic Facility
Payne Avenue
North Tonawanda, New York

Geotechnical Engineering Report

GGEA 24-1110

August 6, 2024

Project : Payne Park Aquatic Center

Client: Brandsetter Carroll

GGEA # : 24-1110

Date: 08.05.24

Depth (di)	N Value (Ni)
6	5
7	11
5	4
2	1
4.6	72
75.4	100

B-2

ASCE 7-16
Equation 20.4-2

$$N = \frac{100}{\sum \frac{d_i}{N_i}} = \boxed{16.9}$$

ASCE 7-16

Table 20.3-1

15 < N < 50

SITE CLASS = **D**

2020 NYS Code Section 1613

F_a = **1.6** Site coefficient Table 1613.2.3(1)

F_v = **2.4** Site coefficient Table 1613.2.3(2)

S_s = **0.165** Mapped accelerations short periods Figure 1613.2.1(1)

S₁ = **0.045** Mapped accelerations 1 sec period Figure 1613.2.1(2)

S_{MS} = **0.264** Maximum spectral response short periods equation 16-36

S_{M1} = **0.108** Maximum spectral response 1 sec periods equation 16-37

S_{DS} = **0.176** Design spectral response short periods equation 16-38

S_{D1} = **0.072** Design spectral response 1 sec periods equation 16-39

Risk Category = **II** Table 1604.5

Seismic Design Category = **B** Table 1613.2.5(1)

Table 1613.2.5(2)

Appendix F

Fill Specifications

Payne Park Aquatic Facility
Payne Avenue
North Tonawanda, New York

Geotechnical Engineering Report

GGEA 24-1110

August 6, 2024

Common Fill

All soil and/or crushed rock material with the exception
of those with USCS classifications of
CH, MH, OH, and OL.

Place material in 12 inch lifts (loose) and compact to 90 % of modified proctor (ASTM D-1557) maximum
dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or
a reversible vibratory plate tamper (for smaller applications) such as a
Bomag BPR 35/60 or similar (weight > 400 lbs).

Structural Fill

All soil and/or crushed rock material with the exception
of those with USCS classifications of
CH, MH, OH, OL, ML and CL-ML.

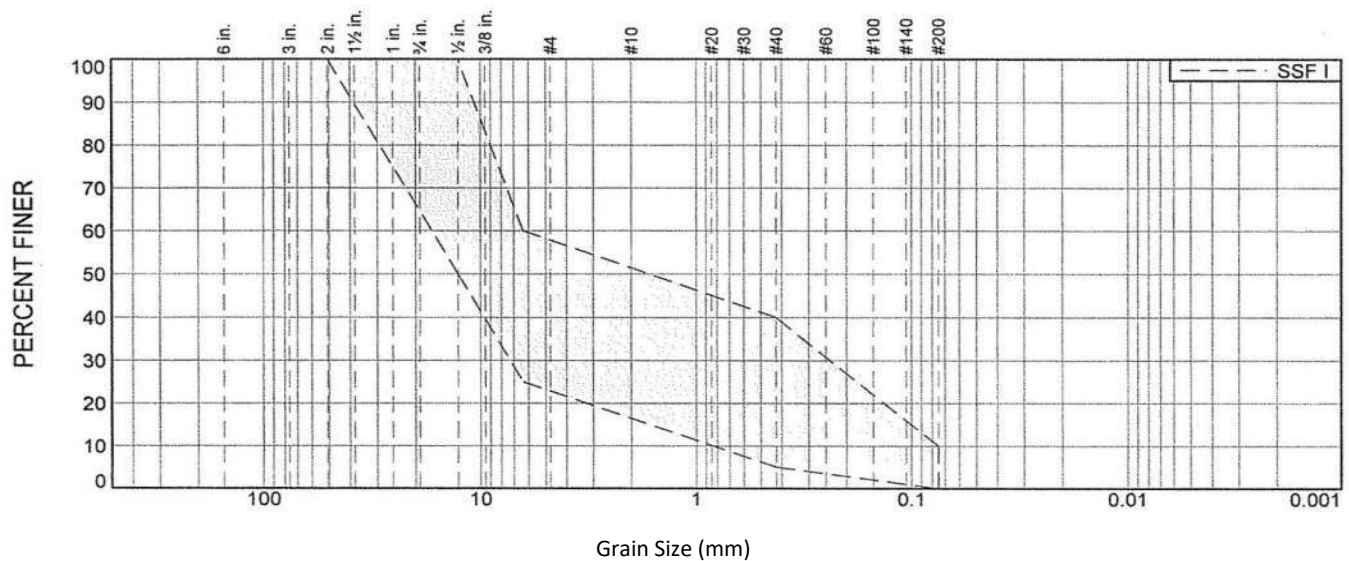
Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum
dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or
a reversible vibratory plate tamper (for smaller applications) such as a
Bomag BPR 35/60 or similar (weight > 400 lbs).

Select Structural Fill

NYSDOT Item No. 304.12 Subbase Course, Type 2

Sieve Size	Required % Passing
2 inch	100
1/4 inch	25 - 60
No. 40	5 - 40
No. 200	0 - 10



In addition to the above specification, material shall also meet the well graded qualifications of ASTM D-2487, such that USCS classification = GW, GW-GM, SW or SW-SM.

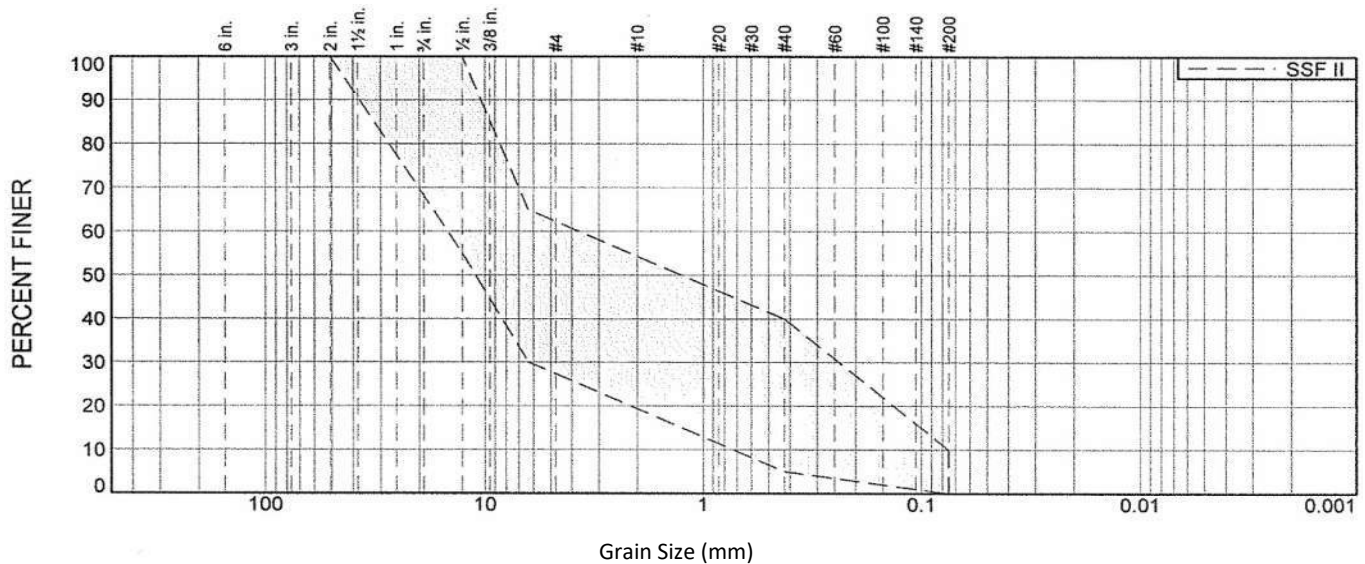
Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

Select Structural Fill

NYSDOT Item No. 304.14 Subbase Course, Type 4

Sieve Size	Required % Passing
2 inch	100
1/4 inch	30 - 65
No. 40	5 - 40
No. 200	0 - 10



In addition to the above specification, material shall also meet the well graded qualifications of ASTM D-2487, such that USCS classification = GW, GW-GM, SW or SW-SM.

Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

Flowable Fill

Controlled Low Strength Material (CLSM).

Typically a fly ash or cement based pozzolanic fill manufactured by local concrete plants.

Minimum 28 day compressive strength = 100 psi.

May include fine aggregate.

The material should be placed in separate lifts not to exceed 30 inches in depth and each lift should be allowed to fully cure (monitor for shrinkage and/or desiccation) prior to placing subsequent lifts or applying load.

CLSM should not be used within 42 inches of final grade due to potential freeze/thaw susceptibility and should not be used if the excavation contains standing water or is subject to groundwater infiltration.

Article 15A

EQUAL EMPLOYMENT OPPORTUNITY POLICY STATEMENT

It is the policy of the _____ (Legal Name of Your Organization) to provide equal employment opportunity to all people without regard to race, color, sex, religion, age, national origin, disability, sexual preference, or Vietnam Era Veteran status. As head of the organization, I am personally committed to assuring that our organization will act affirmatively to develop avenues of entry and mobility for minorities, women, individuals with disabilities, and Vietnam Era Veterans through the following activities:

- Development of programmatic approaches to the elimination of all unjust exclusionary employment practices, policies and consequences;
- Development of educational and training programs for all employees, with emphasis on our goals for upgrading minorities, women, individuals with disabilities and Vietnam Era Veterans;
- Development of personnel practices, policies and career ladders to assist and encourage upward mobility of employees restricted to lower levels;
- Development of mechanisms for swift and judicious resolution of complaints of discrimination consistent with our policy, and other applicable statutes; and
- Provision of reasonable accommodations to enable qualified individuals with disabilities to enjoy equal employment opportunities and equal terms, conditions and privileges of employment.

To effectuate this policy, we have designed a plan which conforms with all relevant Federal and State non-discrimination laws and regulations including but not limited to: The Civil Rights Act of 1964, as amended, the Rehabilitation Act of 1973, as amended, the Americans with Disabilities Act, the Vietnam Era Veteran's Readjustment Act of 1974, and the New York State Human Rights Law. The plan applies to all job classifications and titles in this organization's jurisdiction. It governs all our employment policies, practices and actions including, but not limited to: recruitment, hiring, discipline, rate of pay or other compensation, advancement, reclassification, reallocation, promotion, demotion, discharge and employee benefits. I will see that the Affirmative Action Office is provided with all available resources necessary for the execution of its program responsibilities. Moreover, all managers, supervisors, and employees must make consistently diligent efforts to implement this policy in day-to-day program and employment decisions. Affirmative Action considerations will be an integral part of all organizational activities performed in the furtherance of our mission and in meeting our responsibilities to the State's citizens.

Signature of Agency Head _____

Printed Name of Agency Head _____

New York State Office of Parks, Recreation and Historic Preservation

Contractor's Solicitation Log

Project No: _____ Region: _____ Date Submitted: _____ Page _____ of _____

Contractor/Firm Name & Address: _____ County: _____
 _____ Contact Person: _____
 _____ E-Mail: _____
 _____ Telephone No: _____

	Firm Name Address, City, State, Zip Contact Person	Program	Telephone No Fax No E-Mail Address	Date of Contact Follow-up Date	Deadline Response Date	Method(s) of Contact	M / WBE Response Code	Bidder Action Code
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

M/WBE Response Codes:

11 - Submitted Written Quote
 12 - Submitted Verbal Quote
 13 - Negotiating With Prime
 14 - Developing Quote

21 - Not Certified for Item(s)

22 - Location Unacceptable
 23 - No Price Agreement
 24 - No Time For Bid
 25 - Schedule Unacceptable

Bidder Action Codes:

31 - Selected
 32 - Unavailable
 33 - No Longer in Business
 34 - Undeliverable

35 - Unreachable
 36 - Unresponsive
 37 - Not Selected

Method of Contact:

41 - Mail
 42 - E-Mail
 43 - Phone
 44 - FAX

45 - Face to Face

Program:

MBE
 WBE
 DBE
 Other

DOCUMENT 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: PAYNE PARK AQUATIC FACILITY
- C. Project Location:
1. 830 Payne Avenue, North Tonawanda, NY 14120
- D. Owner: City of North Tonawanda 216 Payne Ave, North Tonawanda, New York 14120
- E. Architect: Nancy Nozik, Brandstetter Carroll, Inc., 1220 W. Sixth St., Suite 300, Cleveland, Ohio 44113.
- F. Architect Project Number: 23065

1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Brandstetter Carroll, Inc. and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, and unit costs, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

PAYNE PARK AQUATIC FACILITY

_____ Dollars (\$_____).

ALLOWANCES \$200,000.00 Dollars

GRAND TOTAL

_____ Dollars (\$_____).

1. The above amount may be modified by amounts indicated by the Bidder on the attached Document 004322 "Unit Prices Form". B.

2. Detailed Breakdown:

Demolition	_____
Concrete	_____
Masonry	_____
Metals	_____
Wood, Plastics, Composites	_____
Thermal & Moisture Protection	_____
Openings	_____
Finishes	_____
Specialties	_____
Equipment	_____
Furnishings	_____
Special Construction: Swimming Pool	_____
Plumbing	_____
HVAC	_____
Electrical	_____
Earthwork	_____
Site Improvements	_____
General Conditions	_____
Allowances	\$200,000.00

1.3 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within **10** days after a written Notice of Award, if offered within **60** days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting ten percent (10%) of the Base Bid amount above:

1. _____ Dollars (\$_____).

- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 SUBCONTRACTORS AND SUPPLIERS

- A. The following companies shall execute subcontracts for the portions of the Work indicated:

1. Earthwork: _____.
2. Aquatics: _____.
3. Concrete Work: _____.
4. Masonry Work: _____.
5. Roofing Work: _____.
6. Plumbing Work: _____.
7. HVAC Work: _____.
8. Electrical Work: _____.

1.5 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by the Owner. The project must be substantially complete within 365 calendar days.

1.6 ACKNOWLEDGMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:
1. Addendum No. 1, dated _____.
 2. Addendum No. 2, dated _____.
 3. Addendum No. 3, dated _____.
 4. Addendum No. 4, dated _____.

1.7 BID SUPPLEMENTS

- A. The following supplements are a part of this Bid Form and are attached hereto.

1. Non-Collusive Bidding Certification
2. Form of Bid Bond

1.8 CONTRACTOR'S LICENSE

- A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in North Tonawanda, NY, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.9 SUBMISSION OF BID

- A. Respectfully submitted this ____ day of _____, 2025.
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).
- F. Witnessed By: _____ (Handwritten signature).
- G. Attest: _____ (Handwritten signature).
- H. By: _____ (Type or print name).
- I. Title: _____ (Corporate Secretary or Assistant Secretary).
- J. Street Address: _____.
- K. City, State, Zip: _____.
- L. Phone: _____.
- M. License No.: _____.
- N. Federal ID No.: _____ (Affix Corporate Seal Here).

END OF DOCUMENT 004113

DOCUMENT 004321 – ALLOWANCE FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Payne Park Aquatic Facility
- C. Project Location: 830 Payne Avenue, North Tonawanda, NY 14120.
- D. Owner: City of North Tonawanda.
- E. Architect: Brandstetter Carroll, Inc.
- F. Architect Project Number 23065.

1.2 BID FORM SUPPLEMENT

- A. This form is required to be attached to the Bid Form.
- B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 012100 "Allowances."

1.3 SUBMISSION OF BID SUPPLEMENT

- A. Respectfully submitted this ____ day of _____, 2025.
- B. Submitted By: _____ (Insert name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004321

DOCUMENT 004322 - UNIT PRICES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Payne Park Aquatic Facility
- C. Project Location: 830 Payne Avenue, North Tonawanda, NY 14120.
- D. Owner: City of North Tonawanda.
- E. Architect: Brandstetter Carroll, Inc.
- F. Architect Project Number 23065.

1.2 BID FORM SUPPLEMENT

- A. This form is required to be attached to the Bid Form.
- B. The undersigned Bidder proposes the amounts below for the purpose of Change Orders, both additive and deductive. Unit Price costs shall include preparation of substrate(s), furnish of all materials, and provide all labor per unit cost as listed below.
- C. Measurement and Payment: See Section 012100 "Allowances" and individual Specification Sections for work that requires establishment of unit prices. Units of measurement are provided below and shall be field verified by the Owner's Testing Agency.
- D.

1.3 UNIT PRICES

- A. Unit-Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.
 - 1. _____ Dollars (\$_____) per cubic yard.
- B. Unit-Price No. 2: Rock or unforeseen concrete foundation excavation and replacement with satisfactory soil material.
 - 1. _____ Dollars (\$_____) per cubic yard.
- C. Unit-Price No. 3: On-site Fill – Moved, placed, and compacted.
 - 1. _____ Dollars (\$_____) per cubic yard.

D. Unit-Price No. 4: Imported Fill – Placed and compacted.

1. _____ Dollars (\$_____) per cubic yard.

E. Unit-Price No. 5: Engineered Fill (#304 stone) – Placed and compacted.

1. _____ Dollars (\$_____) per cubic yard.

F. Unit-Price No. 6: Engineered Fill (#57 stone) – Placed and compacted.

1. _____ Dollars (\$_____) per cubic yard.

G. Unit-Price No. 7: Engineered Fill (#1 & #2 stone) – Placed and compacted.

1. _____ Dollars (\$_____) per cubic yard.

H. Unit-Price No. 8: “Tensar” type soil reinforcement geogrid - installed.

1. _____ Dollars (\$_____) per 4.36 ft x 250 ft roll.

I. Unit-Price No. 9: 4 inch Concrete Slab, including base, as detailed.

1. _____ Dollars (\$_____) per 10 sq ft..

J. Unit-Price No. 10: 6 inch Concrete Slab, including base, as detailed.

1. _____ Dollars (\$_____) per 10 sq ft.

K. Unit-Price No. 11: Asphalt Paving, including base, as detailed.

1. _____ Dollars (\$_____) per 100 square foot.

L. Unit-Price No. 12: Seed, including soil preparation as detailed.

1. _____ Dollars (\$_____) per 100 square foot.

M. Unit-Price No. 13: Sod, including soil preparation as required.

1. _____ Dollars (\$_____) per 100 square foot.

1.4 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, 2025.

- B. Submitted By: _____ (Insert name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004322

DOCUMENT 004323 - ALTERNATES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Payne Park Aquatic Facility
- C. Project Location: 830 Payne Avenue, North Tonawanda, NY 14120
- D. Owner: City of North Tonawanda.
- E. Architect: Brandstetter Carroll, Inc.
- F. Architect Project Number: 23065.

1.2 BID FORM SUPPLEMENT (Alternates)

- A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

- A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.
- B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."
- C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."
- D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.
- E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within **60** days of the Notice of Award unless otherwise indicated in the Contract Documents.
- F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

- A. Alternate No. 01: Demolition
 - 1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.

2. _____ Dollars (\$_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

B. Alternate No. 02: Artificial Turf

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars (\$_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

C. Alternate No. 03: Kitchen Equipment

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars (\$_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

D. Alternate No. 04: Ornamental Fence

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars (\$_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT (Alternates)

- A. Respectfully submitted this ____ day of _____, 2025
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004323

NON-COLLUSIVE BIDDING CERTIFICATION REQUIRED BY
SECTION 139-D OF THE STATE FINANCE LAW

SECTION 139-D, Statement of Non-Collusion in bids to the State:

BY SUBMISSION OF THIS BID, BIDDER AND EACH PERSON SIGNING ON BEHALF OF BIDDER CERTIFIES, AND IN THE CASE OF JOINT BID, EACH PARTY THERETO CERTIFIES AS TO ITS OWN ORGANIZATION, UNDER PENALTY OF PERJURY, THAT TO THE BEST OF HIS/HER KNOWLEDGE AND BELIEF:

[1] The prices of this bid have been arrived at independently, without collusion, consultation, communication, or agreement, for the purposes of restricting competition, as to any matter relating to such prices with any other Bidder or with any competitor;

[2] Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to opening, directly or indirectly, to any other Bidder or to any competitor; and

[3] No attempt has been made or will be made by the Bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

A BID SHALL NOT BE CONSIDERED FOR AWARD NOR SHALL ANY AWARD BE MADE WHERE [1], [2], [3] ABOVE HAVE NOT BEEN COMPLIED WITH; PROVIDED HOWEVER, THAT IF IN ANY CASE THE BIDDER(S) CANNOT MAKE THE FOREGOING CERTIFICATION, THE BIDDER SHALL SO STATE AND SHALL FURNISH BELOW A SIGNED STATEMENT WHICH SETS FORTH IN DETAIL THE REASONS THEREFORE:

[AFFIX ADDENDUM TO THIS PAGE IF SPACE IS REQUIRED FOR
STATEMENT.]

Subscribed to under penalty of perjury under the laws of the State of New York, this _____ day of _____, 20____ as the act and deed of said corporation of partnership.

IF BIDDER(S) (ARE) A PARTNERSHIP, COMPLETE THE FOLLOWING:

NAMES OF PARTNERS OR PRINCIPALS

LEGAL RESIDENCE

IF BIDDER(S) (ARE) A CORPORATION, COMPLETE THE FOLLOWING:

NAME

LEGAL RESIDENCE

President:

Secretary:

Treasurer:

President:

Secretary:

Treasurer:

Exhibit 1 Non-Collusive Bidding Certification-3

Identifying Data

Potential Contractor_____

Address_____

Street

City, Town, etc.

Telephone_____

Title_____

If applicable, Responsible Corporate Officer

Name_____

Title_____

Signature_____

Joint or combined bids by companies or firms must be certified on behalf of each participant.

Legal name of person, firm or corporation

Legal name of person, firm or corporation

By_____

Name

Name

Title

Title

Address_____

Street

Address_____

Street

City

State

City

State

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENT, THAT WE, THE UNDERSIGN,

_____, As the Principal and
(Insert Name of Bidder)

_____, As Surety, are
(Insert Name of Surety)

Hereby held and firmly bound unto the City of North Tonawanda, New York,

In the Sum of : _____ Dollars (\$ _____)
As Liquidated damages for payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The Conditions of the above obligation is such that whereas the Principal has submitted to the City of North Tonawanda, New York, a certain Bid, attached hereto and hereby made part hereof to enter into a contract in writing, for the

_____ Contract No. _____

NOW THEREFORE

- (A) If said Bid shall be rejected, or, in the alternate
- (B) If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the form of Contract attached hereto (properly completed in accordance with said bid) and shall furnish a Bond for the faithful performance of said Contract, 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 amount of this obligation as herein stated.

The surety, for value received, hereby stipulates and agrees that the obligation of said surety and its Bond shall be in no way impaired or affected by any extension of the time within which the principal may accept such Bid, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Parties hereto have duly executed this

Bond on this _____ Day of

_____, 20_____.

(SEAL)

(Name of Principal)

By_____

(SEAL)

(Name of Surety)

By_____

Sealed and Delivered
in the presence of :

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of _____)

County of _____) ss

On this _____ Day of _____, 20____,

Before me personally came and appeared _____

_____ to me known, who, being by me duly sworn, did

depose and say that he resides at _____

_____ : that he is the _____

Of _____ The Corporation described in and of which executed the foregoing instrument; that he knows the seal of said Corporation; that one of the impression of such seal; that it was so affixed by order of the Directors of said Corporation, and that he signed his name thereto by like order.

(SEAL)

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

State of _____)

County of _____) ss

On this _____ Day of _____, 20____,

Before me personally came and appeared _____

_____ to me known and known to me to be one of the

Members of the firm of _____

Described in and who executed the foregoing instrument and he acknowledged to me that he executed the same as and for the act and for the act and deed of said firm.

(SEAL)

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

State of _____)

County of _____) ss

On this _____ Day of _____, 20____,

Before me personally came and appeared _____

_____ to me known and known to me to be the person
Described in and who executed the foregoing instrument and acknowledged that he executed the
same.

(SEAL)

SUPPLEMENTARY CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction", AIA Document A201, 2017 Edition. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 -- GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.3 THE WORK. ADD: The term "work" is used throughout in a restricted or generic sense.

ADD: 1.1.9 ALTERNATES Alternates are defined as alternate products, materials, equipment, installations or systems for the work, which may, at Owner's option and under terms established by the Bidding and Contract Documents, be selected and recorded in the Owner-Contractor Agreement to either supplement or displace corresponding basic requirements of Contract Documents. Alternates may or may not substantially change scope and general character of the work; and must not be confused with "allowances", "unit prices", "change orders", "substitutions", and other similar provisions.

ADD: 1.1.10 APPROVE The term "approved" where used in conjunction with the Architect's action on the Contractor's submittals, applications and requests is limited to the responsibilities and duties of the Architect stated in the General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract Document requirements, unless otherwise provided in the Contract Documents.

ADD: 1.1.11 FURNISH The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

ADD: 1.1.12 INDICATED Refers to graphic representations, notes or schedules in specifications and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled" and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.

ADD: 1.1.13 INSTALL The term "install" is used to describe operations at Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.

ADD: 1.1.14 PROVIDE The term "provide" means "to furnish and install, complete and ready for intended use."

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

ADD: 1.2.4 Drawings are diagrammatic and are a graphic representation of Contract requirements, produced according to best available standards to an optimum scale. Dimensions of work as indicated on Drawings are not guaranteed to be as built dimensions. No measurements shall be scaled from Drawings and used as definite dimensions for layout or fitting work in place.

ARTICLE 3 - CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

ADD 3.2.5 The Contractor and his Subcontractors will keep the Architect and his Consultants apprised on a weekly basis by prompt written notice whenever the Contractor or his Subcontractors observe or otherwise become aware of any defects in the Project.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 Add after "procedures" in the second sentence: ", progress".

3.4 LABOR AND MATERIALS

ADD: 3.4.4 After the Contract has been executed, if circumstances warrant, the Owner and the Architect will consider a formal request for substitution of products in place of those specified. In making requests for substitutions, the Contractor (1) represents that the Contractor has personally investigated the proposed substitute product and determined that it is equivalent or superior in all respects to that specified including, but not limited to, physical dimensions, structural characteristics, code acceptance, capacity, performance, durability and all other characteristics which differ in any way from the materials specified; (2) represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified; (3) certifies that the cost data presented is complete and includes all related costs under this Contract except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and (4) will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be completed in all respect. Architect's acceptance of the equivalent or substitute item does not nullify these responsibilities of the Contractor in any respect. The Architect and/or Owner reserve the right to reject any and all requests for substitutions.

ADD: 3.4.5 The materials used on the Work shall conform to the requirements of the Contract, Drawings and Specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed). In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statement to the Architect as to the origin, composition, and manufacturer of all materials to be used in the Work. Such statements shall be furnished promptly after execution of the Contract but in all cases, prior to delivery of such materials.

3.5 WARRANTY

ADD: 3.5.1 The Contractor's minimum warranty period is 12 months from the date of Substantial Completion. Refer to General Conditions, General Requirements and individual sections of Divisions 2 through 32 for the work and materials required to be specifically or individually warranted, and for the specific requirements and terms of those warranties.

ADD: 3.5.2 Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equivalently acceptable, the Contractor has the option of using any product and manufacturer combination listed. When only one product and manufacturer is specified, this is the basis of the Contract, without substitution or exception. When Contractor proposes to use "approved equivalent" materials/product, the Architect's decision on its acceptability shall be final.

3.6 TAXES

3.6: REPLACE the entire paragraph with the following: This Project is exempt from State of New York Sales Tax. The owner shall provide identification to the Contractor.

3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

ADD 3.7.6: All applicable State laws, municipal ordinances and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

3.8 ALLOWANCES

ADD: 3.8.2.4 On allowances which are to be expended by Subcontractor rather than directly by the Contractor, the Subcontractor's overhead, profit, handling and other costs should be included in the Contract Sum and the allowance shall cover only the net cost to the Subcontractor.

3.9 SUPERINTENDENT

3.9.1: ADD Upon execution of the contract, Contractor shall designate his Project Manager and Job Superintendent. Job Superintendent shall be stationed on the job full-time during the entire course of construction. Superintendents shall not be employed on any other project during the course of this Contract.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.10.2: CHANGE "approval" to "review" in all instances.

3.18 INDEMNIFICATION

3.18.1: DELETE in its entirety and substitute: The Contractor shall keep and hold the Owner and the Architect herein and their officers, directors, agent, servants and employees harmless from any and all liabilities, losses, suits, claims, judgments, fines, penalties, demands or expenses, including all reasonable costs for investigation and defense thereof (including but not limited to attorneys' fees, court costs and expert fees), claimed by anyone by reason of injury or damage to persons or property sustained in or about the project site, as a proximate result of the acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by either of them or anyone for whose acts or omissions either of them may be liable, or arising out of the operations of the Contractor upon and about the excepting such liability as may result from the sole negligence of the Owner or the Architect, their officers, directors, servants, agents and employees; provided, however, that upon the filing of any claim with the Owner or the Architect for damages arising out of incidents for which the Contractor herein agrees to hold Owner and Architect harmless, then and in that event the Owner or Architect shall notify the Contractor of such claim and the Contractor shall have the right to settle, compromise or defend the same. Contractor shall further use legal counsel reasonably acceptable to the Owner or Architect in carrying out Contractor's obligations hereunder. Any final judgment rendered against the Owner or Architect for any cause for which Contractor is liable hereunder shall be conclusive against Contractor as to liability and amount, where the time for appeal therefrom has expired. The Indemnify provisions set forth herein shall survive the expiration or early termination of this Agreement.

ARTICLE 4 - ARCHITECT

4.2 Administration of the Contract

4.2.7, Line 1: DELETE "and approve".

4.2.7: CHANGE "approval" to "review" in first instance in last sentence.

ARTICLE 7 - CHANGES IN THE WORK

7.2 AND 7.3 CHANGE ORDERS AND CONSTRUCTION CHANGE DIRECTIVES

ADD 7.2.1.4 AND 7.3.6.1: ADD Sub Paragraph (Same limits apply to change orders.)

All overhead and profit shall not exceed the amounts noted herein.

	<u>Overhead</u>	<u>Profit</u>	<u>Commission</u>
a. Contractor on work performed by other than its own forces	-	-	5%
b. To first tier subcontractor on work performed by its subcontractor	-	-	5%
c. To Contractor and/or the subcontractor for that portion of the work performed with their respective forces.	10%	5%	-

ARTICLE 8 - TIME

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1: ADD: If Change Orders are granted for time extensions, it is understood and agreed that they are done so upon the agreement of the Owner and Contractor that no claim will be asserted for any alleged increasing costs, either direct, indirect, or impact costs, including, but not limited to, extended overhead, or any wage, material or other escalations associated with such time extension, and such costs are hereby expressly waived.

ADD 8.3.1.1: All time delays encountered during the construction process caused by adverse weather conditions shall be determined utilizing the following methodology.

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

**MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK**

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(11)	(8)	(6)	(6)	(5)	(5)	(4)	(4)	(5)	(6)	(6)	(6)

Upon acknowledgment of the Notice to Proceed and continuing throughout the contract, the Contractor will record on the daily report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse occurred in previous month), be calculated chronologically for the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in the previous paragraph, above, the Architect will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the appropriate contract clause.

ADD 8.4 LIQUIDATED DAMAGES

8.4.1 The operational capacity of the Owner is effected by the Project and the work shall be completed as soon as possible.

8.4.2 The Owner will suffer financial damage if the work is not substantially complete on the date set forth in the Contract Documents. Time being of the essence, the Contractor (and his Surety) shall pay to the Owner the following sums:

8.4.2.1 \$500.00 per consecutive calendar day beyond the completion date.

8.4.2.2 Substantial Completion will be the date that AIA Document G704 is executed by the Architect, Owner and Contractor.

8.4.3. Minor uncompleted items in the base work, as well as "Punch list" items shall be completed within thirty days after the date of substantial completion. If work is not totally finished and all items on the "Punch list" completed within thirty days, the liquidated damage charge shall be applied at the rate as shown in Paragraph 8.4.2, on a daily basis, until such time as the Architect certifies that all work is complete.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.3 APPLICATIONS FOR PAYMENT

ADD: 9.3.1.3 First payment amounting to (5%) of application will be made to Contractor without supporting data. Subsequent Applications for Payment must be accompanied by the following forms, in duplicate:

- .1 Latest edition of AIA Document G706A, Contractor's Affidavit of Release of Liens, with accompanying lien waivers from Contractor, Subcontractors, Sub-subcontractors and Suppliers from previous calendar month. Lien waivers must show amount paid.
- .2 Latest edition of AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims, indicating that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the application is being submitted and the owner of this property might in any way be responsible have been paid or otherwise satisfied.
- .3 Revised project schedule to reflect status of Project at current date.
- .4 An Affidavit of Compliance of payment of prevailing wages for the previous period.

.5 Copies of certified payrolls.

ADD: 9.3.1.4 The form of Application for Payment shall be the latest edition of AIA Document G702, Application and Certificate for Payment, supported by either the latest edition of AIA Document G703 Continuation Sheet or other support document form preferred by the Contractor. Applications must be submitted in triplicate and supported by such other documentation as the Owner may require.

ADD: 9.3.1.5 From the total of the amount determined to be payable on a partial payment, five percent (5%) of such total amount will be deducted and retained by the Owner. This amount will be retained until the final payment is made. The balance of the amount payable, less all previous payments, shall be paid to the Contractor.

9.6 PROGRESS PAYMENTS

ADD 9.6.1.1 No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in Supplementary Conditions Article 9.10.

9.8 SUBSTANTIAL COMPLETION

9.8.1: ADD The Certificate of Substantial Completion will not be issued until those submissions listed under Project Closeout, in the General Requirements have been submitted.

9.9 PARTIAL OCCUPANCY OR USE

9.9.3: ADD The Contractor shall not be relieved of his obligations to maintain the portion of the premises accepted but shall remain obligated to correct any "punch list" items then uncorrected. He shall also continue to be responsible for all latent defects covered by the Contract Documents and he shall continue to carry insurance to protect both the Owner, others and his firm for workmen engaged to correct "punch list" or defective items.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.2: ADD Final Application for Payment shall be accompanied by the same forms as previous applications except they should be marked "Final". In addition, latest edition of AIA Document G707, Consent of Surety Company to Final Payment, should be submitted. The Owner also reserves the right to require additional documentation.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1: ADD No attempt has been made here to outline a safety program for this project. Contractor has sole and complete responsibility for conditions at the site including safety of persons and property continuously during entire extent of work and not limited to normal work hours. Each subcontractor shall cooperate with Contractor and take every precaution reasonably required by law or ordinance to protect the safety of persons and property. The duty of the Architect to conduct construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on or near the construction site.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.2: ADD The Contractor agrees that all work hereunder shall be performed in compliance with the requirement of the Occupational Safety and Health Act of 1970; that the Contractor is fully responsible for the safety and health of all persons engaged in said work; and acknowledges that the Owner and Architect, with respect to such persons, shall not be construed as, nor be held liable for any obligation as, an employer within the meaning of the Act. Attention is also called to the Manual of Accident Prevention for Construction as published by Associated General Contractors of America, Inc., to the extent that such provisions are not in contravention of applicable law.

ADD 10.2.9 The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated.

- .1 For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).
- .2 The Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stock piles, and his parked construction equipment that may be hazardous to the operation of traffic, emergency fire-rescue or maintenance vehicles.
- .3 The Contractor shall furnish and erect all barricades, warning signs, and marking for hazards prior to commencing work which requires such erection and shall maintain the barricades, warning signs, and markings for hazards until dismantled at the appropriate time.

REMOVE 10.3.3 paragraph.

11.1 CONTRACTOR'S INSURANCE AND BONDS

11.3.7 WAIVERS OF SUBROGATION

DELETE this section.

ADD 11.6 ENDORSEMENTS AND FAILURE TO MAINTAIN INSURANCE

- 11.6.1 The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits of any policies.
- 11.6.2 The Contractor agrees to indemnify and hold the Owner and Architect harmless from any and all claims, demands, actions, and causes of action whatsoever, and any expense incurred by the Owner and Architect in the defense thereof, arising out of or in any way connected with the failure of the Contractor to maintain any insurance required of him in the General Conditions, including, but not limited to the proper scope, amount, form and endorsements, during the life of the contract, or thereafter. To this end, the Contractor shall keep all insurance companies advised of any changes in the Work to assure continuous and adequate coverage.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

ADD 12.2.6: Neither the final Certificate for Payment nor any provision of the Contract Documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor or Subcontractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

ADD ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

ADD 13.1.1: All construction contracts shall comply with: Copeland Anti-Kick Back Act (18 U.S.C. 874) as supplemented in Department of Labor Regulations (29 CFR, Part 3). This Act provides that the contractor is prohibited from inducing, by and means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled.

ADD 13.1.2: Equal Employment Opportunity Construction Contract Compliance. State assisted construction projects are subject to the January 27, 1972 Equal Employment Opportunity Executive Order of the Governor of Ohio. Regulation set forth by the Ohio Department of Administrative Services will apply to each construction contract awarded.

ADD 13.1.2.1 In the hiring of employees for the performance of work under the contract or any subcontract, no contractor, subcontractor, or any person acting on a contractor's or subcontractor's behalf, by reason of race, color, religion, sex, sexual orientation, age disability, military status (as defined in R.C. 4112.01), national origin, or ancestry, including R.C. Chap. 4112, shall discriminate against any citizen of the state in the employment of labor or workers who are qualified and available to perform the work to which the employment relates.

ADD 13.1.2.2 That no contractor, subcontractor, or any person on a contractor's or subcontractor's behalf, in any manner, shall discriminate against or intimidate any employee hired for the performance of the work under the contract on account of race, color, religion, sex, sexual orientation, age, disability, military status (as defined in R.C. 4112.01), national origin or ancestry, including R.C. Chap. 4112.

ADD 13.1.3: The Owner, the state auditor, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the contractor for the purpose of making audit, examination, excerpts and transcriptions.

ADD 13.1.4: The contractor must comply with the Clean Air Act of 1970.

ARTICLE 15 – CLAIMS AND DISPUTES

15.4 Arbitration is to be the selected method.

ARTICLE 16 - WARRANTY REQUIREMENTS

16.1 REFERENCES Refer to General Conditions, General Requirements and individual sections for the determination of work which is required to be specifically or individually warranted, and for the specific requirements and terms of those warranties.

16.1.4 CLAIMS AND DISPUTES

16.1.4 Claims for Additional Cost.

- .1 No additional compensation beyond the Contract amount will be paid because of additional costs caused by winter operations, regardless of changes in the Project Schedule. All such costs shall be included in the Contract amount.
- .2 If for any reason the Contractor deems that additional compensation is due him for work or materials not clearly provided for in the Contract, Drawings or Specifications or previously authorized as extra work, he shall notify the Architect in writing of his intention to claim such additional compensation before he begins the work on which he bases the claim. If such notification is not given or the Architect is not afforded proper opportunity by the Contractor for keeping strict amount of actual cost as required, then the Contractor hereby agrees to waive any claims for such additional compensation.

16.2 CONTRACTOR'S PROCUREMENT OBLIGATIONS Contractor shall not purchase, subcontract for, or allow others to purchase or subcontract for materials or units of work for Project where a warranty, certification or similar commitment is required, until it has been determined that entities required to countersign such commitments are willing to do so. Contractor is responsible for all warranties being in conformance with requirements.

16.3 SUBMISSION OF WARRANTIES Warranties are to be submitted prior to or at time of Substantial Completion of the Project.

16.4 OWNER'S RECOURSE Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies. Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

- .1 The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents. The Owner further reserves the right to refuse to accept work for the Project where a warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

16.5 DISCLAIMERS AND LIMITATIONS Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporate the products, nor does it relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Contractor.

16.6 REPLACEMENT COST Upon determination that work covered by a warranty has failed, the Contractor shall replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.

- 16.7 RELATED DAMAGES AND LOSSES When correcting warranted work that has failed, the Contractor shall remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.
- 16.8 REINSTATEMENT OF WARRANTY When work covered by a warranty has failed and been corrected by replacement or rebuilding, the Contractor shall reinstate the warranty by written endorsement. The reinstated warranty shall be equivalent to the original warranty with an equitable adjustment for depreciation.

END OF SUPPLEMENTARY CONDITIONS

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)

« »
« »
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

« »
« »
« »

The Architect:
(Name, legal status, address and other information)

« »
« »
« »
« »

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.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

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8	MISCELLANEOUS PROVISIONS
9	ENUMERATION OF CONTRACT DOCUMENTS

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.

☐ 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.

[« »] By the following date: « »

§ 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

§ 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)

<< >>
<< >>
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<< >>
<< >>
<< >>

§ 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 a building information modeling exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with a building information modeling exhibit, 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 Building information modeling exhibit, dated as indicated below:
(Insert the date of the building information modeling exhibit 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)

DRAFT AIA® Document A201® – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

<< >>
<< >>

THE OWNER:

(Name, legal status and address)

<< >><< >>
<< >>

THE ARCHITECT:

(Name, legal status and address)

<< >><< >>
<< >>

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14	TERMINATION OR SUSPENSION OF THE CONTRACT
15	CLAIMS AND DISPUTES

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.

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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 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 and certify termination of the Agreement under Section 14.2.2.

§ 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.

§ 1.2.2 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.

§ 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 will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment 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 this 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 material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them 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 material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect’s consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

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 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner’s ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 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.

§ 2.2.3 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.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 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.

§ 2.4 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 written 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 deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor 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. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

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.

§ 3.1.3 The Contractor shall not be relieved of 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.

§ 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.

§ 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 2.2.3, 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 make 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 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.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 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.

§ 3.4 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 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 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.

§ 3.5 WARRANTY

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.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 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 21 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 an equitable adjustment 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 in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed 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 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 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 attendance at the Project site during performance 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.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 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.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

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

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be 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 the way by which 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 requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing 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 written 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. 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 cause such services or certifications to be provided by a properly 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, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, 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. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 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, and 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 and patching shall be restored to the condition existing prior to the cutting, fitting and 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 such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

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

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect 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 such 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 the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such 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, 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, 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 by the negligent acts 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 of indemnity that would otherwise exist as to a party or person described in this Section 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 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.

§ 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 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the 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, except as provided in Section 3.3.1.

§ 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 report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) 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 FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 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 13.5.2 and 13.5.3, whether or not such 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, material and equipment 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, unless otherwise specifically stated by the Architect, 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.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize 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 duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 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.

§ 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 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 practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names 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. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 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. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

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

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, 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, which the Contractor, by these 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.

§ 5.4 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 in writing; 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 such 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 Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 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 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 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, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor 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 report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report 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, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 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.

§ 6.3 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, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 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 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 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.

§ 7.3.6 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.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and 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 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 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

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 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 an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order 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 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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.

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 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 material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 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, material suppliers, or other persons or entities making a claim by reason of having 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 issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part 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 comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. 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. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. 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 material 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 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.

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

§ 9.5.3 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 material or equipment suppliers 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 Architect will reflect such payment on the next Certificate 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.

§ 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 material and equipment 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 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, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment 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 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 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' 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 costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 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 Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. 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, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the 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 by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 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, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall 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.

§ 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 such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such 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.

§ 9.9 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 as required under Section 11.3.1.5 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.

§ 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 written 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 and, 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 terms and conditions of 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.

§ 9.10.2 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 and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial 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 and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If such lien 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 such lien, 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 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 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; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material 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.

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.

§ 10.2 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 or the Contractor's Subcontractors or Sub-subcontractors; 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 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 owners and users of adjacent sites and utilities.

§ 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, except damage or loss 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, written notice of such 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.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be

extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 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 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 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 indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance 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 indemnify 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 LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed 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:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the

Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 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, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after 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.

§ 12.2.2 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 an 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 written 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 2.4.

§ 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.

§ 12.2.3 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.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors 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 except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 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 such 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 such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 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.

§ 13.4.2 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 there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 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 (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 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 13.5.1, 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 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 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.

§ 13.5.4 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.

§ 13.5.5 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.

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

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may 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.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time 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 13.7.

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 or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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 Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor 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' written 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 for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .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.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, 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' written 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.

§ 14.3 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 as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. 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 such termination 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 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 for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

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, 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.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written 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 must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

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. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 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.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 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.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, 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 arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no 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 such 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 an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, 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 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 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 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration

permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

DRAFT

SECTION 011000 – SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under separate contracts.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.
8. Miscellaneous provisions.

1.2 PROJECT INFORMATION

A. Project Identification: Payne Park Aquatic Facility

1. Project Location: 830 Payne Avenue, North Tonawanda, NY 14120

B. Owner: City of North Tonawanda, North Tonawanda, NY 14120

1. Owner's Representative:
 - a. Chelsea L. Spahr, PE – City Engineer, 216 Payne Avenue, North Tonawanda, NY 14120

C. Architect: Brandstetter Carroll, Inc., 1220 West 6th Street, Suite 300, Cleveland, OH 44113 216.241.4480.

1. Architect's Representatives:
Ms. Nancy Nozik, Project Manager nnozik@bciaep.com, 216-241-4480.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The project includes the construction of a new aquatic facility including a new seasonal Pool House, outdoor swimming pool, pool deck, pool slide, water features, pool accessories, fencing, sidewalks, parking lot, utilities, and landscaping.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.4 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with 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 separate contracts.
- B. Subsequent Work: Owner will award 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. Data cabling, AV systems, telephone and sound systems
 - 2. Security cameras and access control
 - 3. Furniture (tables, chairs, desks)

C. GENERAL CONSIDERATION FOR ALL CONTRACTS

- 1. All Contractors shall be responsible for coordinating their work with other Trades and Contractors. This does not relieve the other Contractors of their responsibility to coordinate their own work and to work with the other trades in timely and professional manner.
- 2. Testing and Inspection services will be engaged, and paid for, by the Owner. Each contractor shall be responsible for coordinating all testing and inspections with the Testing Agency, and the local authorities having jurisdiction.
- 3. Each Contractor shall be responsible for coordinating the work of all subcontractors, vendors, suppliers, field representatives, etc. This shall be done for each and every CONTRACT.
- 4. Each Contractor shall coordinate their work with any and all outside vendors/Contractors engaged by the Owner.

1.5 ACCESS TO SITE

- A. General: 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. 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.
 - 1. Limits: Confine construction operations to limits of construction as shown in drawings.
 - 2. Driveways, Walkways and Entrances: Keep existing adjacent driveways and portions of parking areas, outside of the Project site's Contract limits, clear and available to the public at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize disrupting traffic on Payne Ave during construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

- c. Coordinate construction activities with and submit documentation required by City, and County Transportation (Road) & Utility Engineers.

1.6 COORDINATION WITH OCCUPANTS AND NEIGHBORING RESIDENTS

- A. Full Occupancy: Neighboring residences will occupy adjacent building(s) and park areas during entire construction period. Cooperate with Owners during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with their day-today operations. Maintain existing exits unless otherwise indicated.
 1. Maintain access to existing walkways, driveways, and other adjacent occupied or used facilities. Do not close or obstruct walkways, or other occupied or used facilities without written permission from the business Owner and City and approval of authorities having jurisdiction.
 2. Notify adjacent owners not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work on the site to normal business working hours of 7 a.m. to 7 p.m., Monday through Friday, unless otherwise indicated.
- C. Existing Utility Interruptions: Do not interrupt utilities serving adjacent occupied facilities occupied unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Notify Owner not less than two days in advance of proposed utility interruptions.

2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Controlled Substances: No smoking, E-cigarettes, or other tobacco or non-tobacco related activities on site.
- F. Protection of Adjacent Structure:
1. No work is authorized on or within the existing pool building.
 2. There will be no alterations, demolition, utility tie-ins, or modification to the existing structure.
 3. All project work will occur outside of the footprint of the existing pool building.
 4. The existing pool structure is to be fully protected from potential damage during construction activity.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012000 – DRAWINGS AND PROJECT MANUAL

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section applies to all the Work contained in the Contract Documents and applies to all Contractors.
- B. It is the intent of the Contract Documents to include all the labor, materials and Work for a complete, functional and operational installation for the Project and facility, in compliance with all applicable rules, regulations, codes, laws and ordinances.
- C. All Contractors are responsible for all the Work necessary to meet these requirements and it is understood that the Project requirements are indicated throughout these Contract Documents and are not limited to a certain subset of them.
- D. Each Contractor shall be responsible for ascertaining their own scope of Work and coordinating that Scope of Work with all other Contractors for this Project, are required by the Contract Documents.

1.2 CONFLICT OR INCONSISTENCY

- A. In the event of a conflict or inconsistency in the Contract Documents, all of the following shall apply:
 - 1. The Drawings and Project Manual are complimentary, what is required by one shall be as binding as if required by all.
 - 2. The most stringent requirement shall apply in the event of a conflict or inconsistency.
 - 3. In the interpretation of the Contract Documents, a more detailed drawing or statement of the Work shall take precedence over more general information in the Contract Documents, but not to negate the requirement that the most stringent requirement shall apply in the event of a conflict or inconsistency.
 - 4. The Contractor shall notify the Architect, in writing, of any conflicts or inconsistency discovered in the Contract Documents.
 - 5. The Architect shall interpret and decide such matters, pursuant to Paragraphs 4.2.11 and 4.2.12 of the General Conditions (AIA Document A201 – 2007) and as modified in Supplementary Conditions.

1.3 DOCUMENTS ISSUED

- A. Owner will provide one hard copy set consisting of drawings and project manual. Owner will provide electronic pdf files of limited number of drawings. (See Section 013300 Submittal Procedures for requirements) and project manual. The Owner may designate the Architect to distribute documents.

- B. Permit Documents: Architect will forward appropriate quantity of construction permit documents sets to reviewing agency. Upon issuance of the permit(s) the contractor shall maintain set(s) of AHJ approved documents on site as required by local authorities. (Minimum one set).
 - a. The Owner shall pre-pay plan review processing fees, if any. The Contractor(s) shall pay permit fees and costs.
 - b. City permit fees will be waived.
- C. Construction Sets: Only revised Construction Documents will be issued to the Contractor. Contractor is solely responsible for printing electronic pdf files, coordinating, distributing and maintaining a current on-site Permit Documents set(s) of all revised Construction Documents and Delegated Design Drawings.
- D. Architect and Owner are not responsible for quality of drawings not printed by contractor at full sheet sizes.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 012000

SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Contingency allowances.

1.2 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.3 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.4 INFORMATIONAL 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. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, insurance, equipment rental, and similar costs.
- C. Change orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.7 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lowerpriced materials or systems of the same scope and nature as originally indicated.

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.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Lump-Sum Allowance: Include the sum of \$50,000.00 for signage at the pool house and pool safety signage.
 - 1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.
- B. Allowance No. 2: Contingency Allowance: Include a contingency allowance of \$150,000.00 for use according to Owner's written instructions.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.2 DEFINITIONS

- A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See Section 012100 "Allowances" and individual Specification Sections for work that requires establishment of unit prices. Units of measurement are provided in Specification Section 004322 and shall be field verified by the Owner's Testing Agency.
- 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 acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Specification Section 004322 "Unit Prices Form". This form is required to be attached to the Bid Form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

3.1 END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 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.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 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. Execute accepted alternates under the same conditions as other work of the Contract.
- C. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 01: DEMOLITION

1. Base Bid: Do NOT include any demolition activities.
2. Alternate: Provide all demolition as indicated on the drawings and specifications.

B. Alternate No. 02: ARTIFICIAL TURF

1. Base Bid: All grass areas inside the pool fence to be seed.
2. Alternate: Provide artificial turf in lieu of seed at all grass areas inside the pool fence.

C. Alternate No. 03: KITCHEN EQUIPMENT

1. Base Bid: All kitchen equipment to be provided by Owner.
2. Alternate: Provide all kitchen equipment as indicated on drawing A-101 and 004232 "ALTERNATES FORM".

D. Alternate No. 04: ORNAMENTAL FENCE

1. Base Bid: Vinyl coated chain link fence per Specification 323113 "Chain Link Fences and Gates".
2. Alternate: Provide ornamental fence and gates per Specification Section 323119 "Ornamental Metal Fence System".

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

- A. 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. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

- h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. 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 date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. 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.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 14 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
- 4. Architect to review all substitution requests under consideration with Owner. Architect to obtain Owner approval.

1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 7 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution will not adversely affect Contractor's construction schedule.
 - c. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - d. Requested substitution is compatible with other portions of the Work.
 - e. Requested substitution has been coordinated with other portions of the Work.
 - f. Requested substitution provides specified warranty.
 - g. 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.
- B. Substitutions for Convenience: Not allowed.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
- a. 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 for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. 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.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

**SUBSTITUTION
REQUEST**
(After the Bidding/Negotiating Phase)

Project Payne Park Aquatic Facility Substitution Request Number: _____
From: _____
To: Brandstetter Carroll, Inc. Date: _____
Attn: _____ A/E Project Number: 23065
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 ☐ 1-4 years old ☐ 5-10 years 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**
(After the Bidding/Negotiating Phase - 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 RECOMMENDATION

- ☐ Approve Substitution – Make submittals in accordance with Specification Section 013300 Submittal Procedures.
- ☐ Approve Substitution as noted – Make submittals in accordance with Specification Section 013300 Submittal Procedures.
- ☐ Reject Substitution – Use specified materials.
- ☐ Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

OWNER'S REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 013300 Submittal Procedures. Prepare Change Order.
- ☐ Substitution approved as noted – Make submittals in accordance with Specification Section 013300 Submittal Procedures. Prepare Change Order.
- ☐ Substitution rejected - Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications. The Owner shall approve all modifications throughout the construction process.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for required Coordination Drawings to be developed and provided by the Contractor.
 - 2. Section 012500 "Substitution Procedures" for required documentation to be submitted by the Contractor.
 - 3. See Section 004322 "Unit Prices" for the cost per unit of measurement to be used in applicable Change Orders, both additive and deductive.
 - 4. Section 012100 "Allowances" for required administrative and procedural requirements governing allowances.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue Architect Supplemental Instructions (ASI) describing and minor clarifications concerning the Work. ASIs shall not involve adjustment to the Contract Sum or the Contract Time.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue Bulletin containing 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. Bulletins issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. After receipt of Bulletin, 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.

- b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include all costs of labor and supervision delivery charges, equipment rental, and amounts of trade discounts 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 CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail." or forms acceptable to Architect.
- B. Contractor-Initiated Work Change 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, 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. Work Change Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail or form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section Allowances for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Owner's Contingency Allowance: See Section 012100 "Allowances" for administrative and procedural requirements governing allowances.
- C. Unit-Price Adjustment: See Section 004322 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Bulletin, Architect will issue a Change Order for signatures of Owner and Contractor on City approved forms.

1.6 REVISION OF CONSTRUCTION DOCUMENTS

- A. Bulletins: Architect may issue a Bulletin that instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Bulletins contain a description of changes in the Work and if required, revised Construction Documents.
- B. Architect Supplemental Instructions (ASI): Architect may issue an ASI that provides the Contractor with minor clarification of the Work. ASI will not be cause of changes in the Contract Sum or the Contract Time.
- C. Documentation: Maintain detailed records on a time and material basis of work required by the Bulletins.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
 - 2. All Change Orders based on Unit Costs shall be substantiated by Owner's Testing Agency documentation of quantities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date but no later than seven 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 line-item breakdowns of all labor and material of each principal subcontract amount in excess of five percent (5%) of the Contract Sum.
 - 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 divided and titled by Specification Sections and consistent with a format similar to the AIA Document G703 which is acceptable to the owner.
 - 3. Provide labor & material breakdowns of all principal subcontract amounts in sufficient detail to access if requested payment matches the Completed Work. Coordinate with Project Manual table of contents.
 - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. 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.
6. Materials stored off site shall be accompanied by the following documentation for each material :
 - a. Photos of all materials displaying Project name.
 - b. Itemized list of all materials.
 - c. Certificate of Insurance with the Owner as additionally insured.
7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Unit Prices: Provide a separate line item in the schedule of values for each unit price for each material, multiplied by measured quantity. Use information indicated in Section 004322 "Unit Prices" to determine quantities.
9. Contingency: Contingency allowances shall be shown as separate line items in the schedule of values listing all labor & materials that were approved by the Owner. Line items Contingency allowances shall incorporate all requirements and information as indicated in Section 012100 "Allowances"
10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor.
- C. Payment Application Times: Submit Application for Payment to Architect by the time determined at the Preconstruction meeting for each month. The period covered by each Application for Payment is one month.

- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. 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 notarization and signatures.
 - 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 of Change Orders issued before last day of previous construction period covered by the current application.
- F. Transmittal: Submit signed and notarized original copies of each Application for Payment to the Architect. Digital copies are acceptable. A pencil copy should be emailed to the Architect for review 7 days prior to the final submittal. The pencil copy shall include waivers of lien, documentation for materials stored off site, and similar attachments required. Contractor provide final signed copy of pay application and schedule of values on after progress meeting.
 - 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 entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 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. 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.
 - 2. Schedule of values.
 - 3. Certificates of insurance and insurance policies.
 - 4. Contractor's construction schedule (preliminary if not final).
 - 5. Schedule of unit prices.
 - 6. Submittal schedule (preliminary if not final).
 - 7. List of Contractor's staff assignments.
 - 8. List of Contractor's principal consultants.
 - 9. Copies of building and site permits.
 - 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - 11. Initial progress report.
 - 12. 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 Certificates of Partial 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.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. A similar form to the AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims." Acceptable to owner.
 5. A similar form to the AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens." Acceptable to Owner.
 6. A similar form to the AIA Document G707-1994, "Consent of Surety to Final Payment." Acceptable to owner.
 7. Evidence that claims have been settled.
 8. 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.
 9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination drawings.
 - 2. Requests for Information (RFIs).
 - 3. Project Web site.
 - 4. Project meetings.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for required Coordination Drawings to be developed and provided by the Contractor.
 - 2. Section 012500 "Substitution Procedures" for required documentation to be submitted by the Contractor.
 - 3. Section 012600 "Contract Modification Procedures" for required documentation to be submitted by the Contractor for any changes to the Contract Sum or Contract Time.

1.2 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 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. Use CSI Form 1.5A. Include the following information in tabular form:
 - 1. Name, address, and telephone number 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.

1.4 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.
- B. 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.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors 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.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown 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.
- B. See Section 013300 "Submittal Procedures" for requirements of Coordination Drawings to be developed, and submitted by the Contractor.

1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor 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 solution(s) 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.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven business (working) days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. or on non-business days will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. 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 of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time and or the Contract Sum and may be eligible for Contractor to submit Change Proposal according to 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 seven days of receipt of the RFI response.

- b. See Section 012600 "Contract Modification Procedures" for required documentation to be submitted by the Contractor for any changes to the Contract Sum or Contract Time.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B. or Use software log and post on Project Web site. Include the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect
 - 4. RFI that were dropped and not submitted.
 - 5. RFI number, description, and title.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
- 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 days if Contractor disagrees with response.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 - 1. Attendees: Obtain approval of meeting times and frequency with Owner and Architect. Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting and contractor shall post on Project Website.
- 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 fifteen 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. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.

- g. Procedures for Owner provided testing and inspection services.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of record documents.
 - l. Use of the premises.
 - m. Work restrictions.
 - n. Working hours.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Procedures for moisture and mold control.
 - r. Procedures for disruptions and shutdowns.
 - s. Construction waste management.
 - t. Parking location(s) and availability.
 - u. Location(s) of temporary office, work, and site staging & storage areas.
 - v. Equipment deliveries and priorities.
 - w. First aid.
 - x. Security.
 - y. Site SWPP, dust control and street maintenance procedures.
 - 3. Minutes: Contractor shall be responsible for conducting meeting will record and distribute meeting minutes.
- C. Progress Meetings: Conduct progress meetings at regular intervals determined at Preconstruction Meeting with Architect and Owner.
- 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) Coordination requirements.
 - 2) Sequence of operations between trades.
 - 3) Status of submittals.
 - 4) Status of deliveries.
 - 5) Off-site fabrication.

- 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of Change Order requests.
 - 15) Pending changes.
 - 16) Pending claims and disputes.
 - 17) Documentation of information for payment requests.
3. Minutes: Contractor shall be responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information and post on Project Website.
 - a. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Construction schedule updating.

1.2 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. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. PDF electronic file.
 - 2. Four paper copies attached to pay applications.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. Revised Construction Schedule: Submit with Applications for Payment.

1.4 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the Work from entities involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that is capable of managing construction schedules.
 1. Use Procore for current Windows operating system.
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 1. Contract completion date to not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each 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 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. Pool Equipment
 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 15 days for startup and testing.
 5. Owner Training: Include no fewer than 15 days for training.

6. 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.
 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- D. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule with each Pay Application before.
1. Revise schedule immediately after each meeting or other activity where revisions have been made. Issue updated schedule concurrently with each Pay Application.
 2. As the Work progresses, indicate final completion percentage for each activity.
- E. Recovery Schedule: When periodic update indicates the Work is 14 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.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. 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.
- B. Activities: Treat each story 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 30 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. Long Lead Time Items that will affect schedule performance and timeframes for installation.
 3. Owner Testing Agency: Include collection of samples, perform testing and distributing reports indicated in schedule.
 4. Submittal Review Time: Include review and resubmittal times indicated in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.

6. 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.
 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- D. Recovery Schedule: When periodic update indicates the Work is 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.
- E. Computer Scheduling Software: Prepare schedules using current version of Use Procore and its current Windows operating system.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 10 days of date established for the Notice of Award. Outline significant construction activities for the first 120 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 10 days after date established for the Notice of Award.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.

- c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and Balancing.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare revised a Schedule showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week 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. As the Work progresses, indicate final completion percentage for each activity.
- B. 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.
 - 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.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
 - 4. Final completion construction photographs.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image.
 - a. Description of location, vantage point, and direction.
 - b. Unique sequential identifier keyed to accompanying key plan.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. File Names: Name media files with date and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground utilities.
 - 2. Underslab services.
 - 3. Piping.
 - 4. Electrical conduit.
 - 5. Waterproofing and weather-resistant barriers.
- D. Periodic Construction Photographs: Take 10-20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: Take 20-30 photographs after date of Substantial Completion for submission as Project Record Documents. Architect may inform photographer of desired vantage points.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

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 requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals. B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Section 017900 "Demonstration and Training" for demonstration of equipment and training of Owner's personnel.
 - 5. Section 013100 "Project Management and Coordination" for required Coordination Drawings to be developed and provided by the Contractor.

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: Initial written and graphic information and physical samples that may or may not require Architect's review and return. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "Informational Submittals."
- C. Delegated-Design Services: Professional design services required by the Contract Documents, shall be provided by a design professional licensed in the State of New York. Professional Delegated-Design services are solely responsible for the provision of all certifications, calculations and drawings required to document compliance with specific performance and design criteria defined in the Construction Documents and by the AHJ.
- D. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

- E. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.
- F. Architect's Digital Data Files: Electronic digital data files of a limited number Contract Drawings will be provided after data licensing agreement(s) are fully executed between Architect & Engineers. See the end of this Section for Electronic File Agreement.
- G. BIM: Building Information Modeling.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review by Architect, Engineer and Owner, 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. Supply submittal schedule concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required early because of long lead time for manufacture or fabrication.
 - 2. Format: Arrange the following information in a tabular format:
 - a. Scheduled dates for all submittals.
 - b. Specification Section number and title.
 - c. Submittal category: Action; Informational.
 - d. Name of subcontractor.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of certain of the Contract Drawings (see list below) for use in preparing Coordination and Shop Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital data files of drawings authored by Architect's consultants are not available from the Architect, but may be available from the consultant. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual prior to the release of any digital data.
 - c. Digital Drawing Software Program: The Contract Drawings have been created in Revit edition 2023. Contractor is responsible for converting Revit files into AutoCAD.
 - d. Contractor shall submit an Electronic File Agreement, included in this Specification Section, prior to the release of any digital data.

- e. The following digital data files are limited to:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
 - 3) Building elevations.
- 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. Partial and incomplete Submittals will be rejected and returned.
 - 3. Coordinate transmittal of different types of submittals for related parts of the Work 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 required 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.
 - 1. Initial Review: Allow 14 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. Resubmittal Review: Allow 14 days for review of each resubmittal.
 - 3. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 business days for initial review of each submittal.
- D. Paper Submittals: Place a permanent label or title block on each of the three complete paper copies of each submittal item for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 3 by 8 inches on label or beside title block to record Contractor's review and approval markings.
 - 3. Title block shall include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.

- h. Submittal Specification Section number, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a dash and then a sequential number (e.g., 061000-001). Resubmittals shall include an "R" suffix after another dash and then a sequential one digit number (e.g., 061000-001-R1).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- 4. Additional Paper Copies: Unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - 5. Transmittal for Paper Submittals: Provide three complete paper copies and assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
- 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements listed in each 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.
 - a. File name shall use Specification Section number followed by a dash and then a sequential number (e.g., 061000-001). Resubmittals shall include an "R" suffix after another dash and then a sequential one digit number (e.g., 061000-001-R1).
 - 3. Provide means for insertion to permanently record Contractor's review and approval to record markings.
 - 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of person that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Specification Section number and title.
 - h. Related physical samples submitted directly.
 - i. Transmittal number, numbered consecutively.
 - j. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Identifications: Clearly identify which product(s) are being submitted for review and which options need to be selected by Architect, Engineer or Owner. All submittals that do not identify required review items will be rejected and returned without review.
- G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.
- H. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with review notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 1. Post electronic submittals as PDF electronic files directly to electronic data share platform specifically established, by the Contractor, for Project.
 - a. Architect will return annotated file with Architect's Shop Drawing Submittal Review transmittal indicating review action. Annotate and retain one copy of file as an electronic Project record document file.
 2. Certificates and Certifications Submittals: Provide a statement that includes the signature(s) 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.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated as required.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. Mark each copy of each submittal to show which products and options are applicable.
 2. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.

- b. Manufacturer's product specifications.
 - c. Statement of compliance with specified referenced standards.
 - d. Testing by recognized testing agency.
 - e. Application of testing agency labels and seals.
 - f. Notation of Contractor's coordination requirements.
 - 3. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - e. Weights and methods of attachment.
 - 4. Submit Product Data before or concurrent with Samples.
 - 5. Submit Product Data, Shop Drawings, Product Data, Certificates, Warranties, Schematic Diagrams in the following format:
 - a. PDF electronic file.
- C. 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. Use the identical labels, numbers, letters used in the contract documents for individual components, i.e. doors and windows numbers and letters. Include the following information, as applicable:
- a. Identification of products.
 - b. Schedules (door, window, room finish, etc.).
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements with other trades.
 - e. Notation of dimensions established by field verified measurements.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified as Delegated Design.
2. Sheet Sizes for Submittals: Submittal shall be formatted and submitted in the following manner:
- a. Submit written Product Data, Certificates, Warranties, Schematic Diagrams, etc. on 8½ by 11 inches format.
 - b. Paper copies of drawings larger than 8½" x 11" must be submitted at original scale.
 - c. Submit full-size drawings of templates and patterns.
 - d. Shop Drawings shall be no larger than 24 by 36 inches.
- D. Samples: Submit actual Samples of finishes for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Project name.
 - b. Contractor's name.
 - c. Generic description of Sample.
 - d. Product name and name of manufacturer.
 - e. Sample source.
 - f. Number and title of applicable Specification Section.
3. Provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for qualitycontrol 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.
5. Samples for Initial Selection: Submit manufacturer's color chart samples consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, gloss, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will retain submittal and return transmittal with options selected.
6. Samples for Verification: Submit actual 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 sets of Samples. Architect will retain one sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record sample to be furnished to the Owner, see Section 017700 Closeout Procedures.
 - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

- E. Due to the required coordination of all interior finishes with the Owner, the Contractor shall provide all required color/finish/texture samples to the Architect prior to the Architect's selection of any item or finish.
- F. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- G. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- H. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- I. 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.
- J. 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.
- K. 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.
- L. 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.
- M. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- N. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- O. 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.
- P. 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:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.

7. Limitations of use.

- Q. Product Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally to facilitate fully functional integration of building systems including but not limited to Pool equipment and piping, Mechanical (ductwork), Plumbing, Electrical, and Technology (data / sound / video / security) Systems.

1. Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on any one single source. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 - c. Use all applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to illustrate, identify and resolve all dimensional and clearance conflicts between various systems and components.
 - d. Coordinate the addition of trade-specific information to coordination drawings by all contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - e. Indicate functional and spatial relationships of components of architectural, structural, mechanical, and electrical, pool systems.
 - f. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - g. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - h. Indicate required installation sequences.
 - i. Specifically note dimensions that are in conflict with submitted equipment and minimum clearance requirements. Dimensional conflicts caused by Contractor's lack of coordination and difficult installations will not be considered changes to the Contract.

- B. Coordination Drawing Organization: Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in this Section. Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-alarm, and electrical Work. Show locations of visible ceiling

- mounted devices relative to interior partitions and exterior walls. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Ancillary (attic) Space: Indicate for support of ceiling and wall systems, mechanical and electrical pool equipment, and related Work. Locate mechanical, plumbing, fire-alarm, pool, and electrical Work subframing within ancillary space to accommodate layout of light fixtures and other components indicated on Drawings.
 3. Mechanical Rooms: Provide plans and elevations of mechanical, plumbing, fire-alarm, and electrical equipment. Include required clearances for accessing & servicing equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Fire Rated Assemblies: Indicate Penetrations through partitions and walls and Perimeter fire rated seals at wall roof deck required for all trades. Show the required clearances to reset dampers.
 6. Slab Edge and Embedded Items: Indicate slab edge locations, sizes of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles,
 7. Concrete Slabs: Show slab depressions for floor finishes curbs and housekeeping pads, and similar items.
 8. Mechanical, Plumbing, and Pool Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, connections to equipment, 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 dampers, and enclosures of ductwork.
 9. 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 lighting (including battery pack, if applicable) smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from face of exterior walls or partitions.
 10. Architect will review Contractor's Coordination Drawings to verify design intent. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
 11. Review: Architect will review Contractor's Coordination Drawings to confirm that the Work is being coordinated but not for the details of the coordination, which are Contractor's responsibility.
 12. Contractor shall provide the required structural loads of all building systems (HVAC / Electrical, Pool equipment and piping), interior finishes as shown on the Coordination Drawings to the professional Delegated-Design Engineering services providing roof framing design & engineering.

- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format:
 - a. Same digital data software program (Revit), version (edition 2023), and operating system as original Drawings.
2. File Submittal Format: Submit or post coordination drawing files using format (Revit edition 2023), same as file preparation format
3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
 - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal.

2.3 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 in the Contract Documents.
 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request listing requested additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional licensed in New York, 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.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for and 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. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, coordinated with and approved for compliance with the Contract Documents. All

submittals that do contain Contractor's approval stamp will be rejected and returned without review.

3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 - 1. "Reviewed Without Exception" - The work covered by the submittal may proceed provided it complies with the requirements of the contract documents. Final payment depends on that compliance.
 - 2. "Reviewed With Exception" – Requires compliance with Architects or Engineers notations or correction to attain "Reviewed Without Exception" status. Resubmission not required.
 - 3. "Revise And Resubmit" – Do not use or allow others to use. Revise and Resubmit.
 - 4. "For Record Only" – Submittal returned without action.
- B. Informational Submittals: Architect will review each submittal may or may return Informational Submittals as determined by the Architect based on each Specification Section's requirements.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300



**BRANDSTETTER
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ARCHITECTS + ENGINEERS + PLANNERS

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DALLAS
469.941.4926

DENTON
940.387.8182

NORMAN
405.360.0810

Electronic File Agreement

Date_____

Mr. / Mrs. _____

Company Name_____

Address_____

City, State Zip_____

RE: Payne Park Aquatic Facility

Dear Mr/Mrs : _____

At your request, we will provide electronic files for your convenience and use related to the above-mentioned project subject to the following terms and conditions:

Our electronic files are prepared in AutoCAD or Revit. We make no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

Data contained on these electronic files are part of our instruments of service and shall not be used by you or anyone else receiving these data through or from you for any purpose other than as a convenience for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to us. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against us, our officers, directors, employees, agents or subconsultants that may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold us harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from your use of these electronic files.

These electronic files are not construction documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. We make no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by us and the electronic files, the signed or sealed hard-copy construction documents shall govern. You are responsible for determining if any conflict exists.

By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including, and without limitation, the need to check,



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308 East 8th St
CINCINNATI
OH 45202
513.651.4224

1220 West 6th St
Suite 300
CLEVELAND
OH 44113
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confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

Because information presented on the electronic files can be modified, unintentionally or otherwise, we reserve the right to remove all indicia of ownership and/or involvement from each electronic display.

We will furnish you electronic files of the following drawing sheets:

Floor plan.

Reflected ceiling plan.

Building elevations.

Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by us, and we make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall we be liable for any loss of profit or any consequential damages as a result of your use or reuse of these electronic files.

Respectfully,
Brandstetter Carroll Inc.

Name _____

Title _____

Initials/

cc: File, Brandstetter Carroll

Contractor's Signature of Acceptance & Date

(Contractor's Printed Name and Title)

(Contractor's Printed Company Name)

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality control.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Mockup requirements.
- F. Testing and inspection services.
- G. Manufacturers' field services.

1.2 QUALITY CONTROL

- A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- C. Perform Work using persons qualified to produce required and specified quality.
- D. Products, materials, and equipment may be subject to inspection by OWNER at place of manufacture or fabrication. Such inspections shall not relieve CONTRACTOR of complying with requirements of Contract Documents.
- E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from OWNER before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current as of date for receiving Bids except where specific date is established by code.
- C. Obtain copies of standards and maintain on Site when required by product Specification Sections.
- D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from OWNER before proceeding.
- E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of OWNER shall be altered from Contract Documents by mention or inference in reference documents.

1.5 LABELING

- A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.
- C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this Section and identified in individual product Specification Sections.
- B. Assemble and erect specified or indicated items with specified or indicated attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mockups shall be comparison standard for remaining Work.
- D. Where mockup has been accepted by OWNER and is specified in product Specification Sections to be removed, remove mockup and clear area when directed to do so by OWNER.

1.7 TESTING AND INSPECTION SERVICES

- A. CONTRACTOR will employ and pay for specified services of an independent firm to perform testing and inspection.
- B. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by OWNER.
 - 1. Laboratory: Authorized to operate at Project location in State of New York.
 - 2. Laboratory Staff: Maintain full-time Professional ENGINEER or specialist on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by OWNER.
- D. Reports shall be submitted by independent firm to OWNER, CONTRACTOR, and authorities having jurisdiction, indicating observations and results of tests and compliance or noncompliance with Contract Documents.
 - 1. Submit final report indicating correction of Work previously reported as noncompliant.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify OWNER and independent firm 48 hours before expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional Samples and tests required for CONTRACTOR'S use.
- F. Employment of testing agency or laboratory shall not relieve CONTRACTOR of obligation to perform Work according to requirements of Contract Documents.
- G. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from OWNER. Payment for retesting or re-inspection will be charged to CONTRACTOR by deducting testing charges from Contract Sum/Price.
- H. Agency Responsibilities:
 - 1. Test Samples of mixes submitted by CONTRACTOR.
 - 2. Provide qualified personnel at Site. Cooperate with OWNER and CONTRACTOR in performance of services.
 - 3. Perform indicated sampling and testing of products according to specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify OWNER and CONTRACTOR of observed irregularities or nonconformance of Work or products.
 - 6. Perform additional tests required by OWNER.
 - 7. Attend preconstruction meetings and progress meetings.

- I. Agency Reports: After each test, promptly submit one copy of report to OWNER, CONTRACTOR, and authorities having jurisdiction. When requested by OWNER, provide interpretation of test results. Include the following:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and Specification Section.
 - 6. Location in Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
 - 10. Conformance with Contract Documents.
- J. Limits on Testing Authority:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency or laboratory may not approve or accept any portion of the Work.
 - 3. Agency or laboratory may not assume duties of CONTRACTOR.
 - 4. Agency or laboratory has no authority to stop the Work.

1.8 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting, and balancing of equipment and commissioning as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to OWNER 30 days in advance of required observations. Observer is subject to approval of OWNER.
- C. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 013300 - Submittal Procedures, "Manufacturer's Field Reports" Article.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 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.

1.2 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.
- 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.

1.3 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.

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. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.

34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; www.ec-central.org.
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).

78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.
119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.
121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.

122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NECA - National Electrical Contractors Association; www.necanet.org.
137. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
138. NEMA - National Electrical Manufacturers Association; www.nema.org.
139. NETA - InterNational Electrical Testing Association; www.netaworld.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.
141. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.

168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrasssod.org.
189. TRI - Tile Roofing Institute; www.tilerroofing.org.
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; www.ul.com.
192. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
201. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
202. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
203. WPA - 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.

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.

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; <http://dodssp.daps.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.
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; <http://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; 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. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; 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.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.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.
1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and 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. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
 7. TFS - Texas Forest Service; Forest Resource Development and Sustainable Forestry; <http://txforests-service.tamu.edu>.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

- A. Installation, removal, 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. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use. Provide connections and extensions of services as required for construction operations. Owner shall pay for Water and Sewer (sanitary & sanitary) Service connection fees required by Work.
- C. Electric Power Service: Electric power from Utility Company is available for use. Provide temporary connections and extensions of services as required for construction operations. Contractor shall pay for Utility Company installation fees for temporary & permanent electrical services.

1.3 INFORMATIONAL SUBMITTALS

- A. Pre-excavation Photographs or Video: 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.
- B. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles (fonts), graphic elements, and message content. Include all applications and documentation required by Owner for temporary lane closures or the redirection of traffic.
- 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. 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 requirements for replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water and describe plans for dealing with water runoff 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.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction and Utility providers to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in New York Accessibility Standards.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to 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.
- B. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in this Section and Section 311000 "Site Clearing," are in place.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

- A. Common-Use Field Office: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Office shall be 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. Furniture required for Project-site documents including plan tables, plan racks, conference tables and chairs.

2. Meeting area of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall.
3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
4. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. 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. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."
- C. 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.

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.

- 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.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the project Stormwater Pollution Prevention Plans (SWPPP) along with any amendments, and in accordance with the New York Department of Environmental Conservation and Municipal AHJs. The SWPPP shall consist of all construction plans and reports required by the New York Department of Environmental Conservation and Municipal AHJs. The contractor is solely responsible for initiating and maintaining all required SWPPP applications, onsite inspection reports, corrective actions, and changes in stormwater conveyance and control.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established per requirements of the SWPPP requirements of New York Department of Environmental Conservation and Municipal AHJs. Provide documentation upon request from AHJ or Owner's Representative.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.4 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.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system or private system on-site as directed by authorities having jurisdiction if required.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash 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.

- E. 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. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. Electric Power Service: Provide temporary electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment land-based telephone line(s) for each field office.

3.5 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
 - 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.
 - 2. Utilize designated area within existing building for temporary field offices.
 - 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. 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.
- D. Parking: Use designated areas of Project site for construction personnel parking determined during construction.
- E. Storage and Staging: Use designated areas of Project site for storage and staging needs.

- 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 Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as required by Owner.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touch up signs so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- 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.

3.6 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.
 - 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.
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of New York Department of Environmental Conservation and Municipal AHJs. Construction General Permit and authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
- D. 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.

- E. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. 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 entire Project site or portion determined sufficient to accommodate construction operations, as indicated on Drawings.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- H. 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.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. 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.
- L. 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.

3.7 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- 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.

3.8 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. 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

SECTION 015723 - TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Temporary stormwater pollution controls.

1.2 ACTION SUBMITTALS

- A. Stormwater Pollution Prevention Plan (SWPPP): submit completed New York State Department of Environmental Conservation (NYSDEC) SPDES SWPPP application and documentation required in Section 18- 39(b)(4) of the Watershed within 15 days of date established for commencement of the Work. See <https://www1.nyc.gov/site/dep/environment/regulations.page>
- B. Inspection report format as required by Municipal and NYSDEC prior to the start of Construction.

PART 2 - PRODUCTS

2.1 TEMPORARY STORMWATER POLLUTION CONTROLS

- A. The Contractor is solely responsible for the provision of all temporary stormwater pollution controls and reporting as required by the SWPPP.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the SWPPP.
- B. Locate stormwater pollution controls in accordance with the SWPPP.
- C. Conduct construction as required to comply with the SWPPP and minimize possible contamination or pollution or other undesirable effects.
1. Inspect, repair, and maintain SWPPP controls during construction.
 - a. Inspect all SWPPP controls not less than every seven days, and after each occurrence of a storm event, as outlined in the SWPPP.

- D. Maintain SWPPP inspection reports and documentation during all phases of Construction. Submit all records to the Owner / Architect upon request.
- E. Remove SWPPP controls at completion of construction and restore and stabilize areas disturbed during construction.

END OF SECTION 015723

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 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.

1.2 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.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Will not be accepted or considered.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in other sections Show compliance with requirements. See Section 012500 "Substitution Procedures" for administrative and procedural requirements for all substitutions.

1.4 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.

1.5 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. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 6. Protect stored products from damage and liquids from freezing.

1.6 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.
 - 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. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: See Section 013300 "Submittal Procedures" for requirements.

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 not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Contractor Proposed Substitutions: It is the sole responsibility of the Contractor to provide the required documentation to prove equivalency to the originally specified material or equipment. All required documentation shall be submitted with the Proposed Submittal Request. See Section 012500 "Submittal Procedures". The Architect is the sole evaluator of material or equipment equivalency. The Architect's determination is final.

B. Product Selection Procedures:

1. 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.
2. 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.
3. Products:
 - a. Restricted List: 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 unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed.
4. Manufacturers:

- a. Restricted List: 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.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, that complies with requirements.
- 5. 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 by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.
- 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.
- 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 full product line that includes both standard and premium items. Contractor to indicate which items are premium and standard and what is included in bid.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 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's portion of the Work.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for coordination of Owner-performed work, and limits on use of Project site.
 - 2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 - 3. Section 013300 "Submittal Procedures" for definitions submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 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.

1.3 CLOSEOUT SUBMITTALS

- A. Final Property Survey: Submit a digital copy showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. 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, or when encountering the need for cutting and patching of elements whose structural function is not known, 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. 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.
 - 3. 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.
 - 4. 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.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. 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.
 - 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. Use materials that are not considered hazardous.

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, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, 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. 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 local utility providers and 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 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, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

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 and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following 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 lay out 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.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. 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.
- C. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

3.5 INSTALLATION

- A. 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.
- 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 satisfactory results as judged by Architect. 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 of type expected for Project.
- 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: Select tools or equipment that minimize production of excessive noise levels.
- 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 with manufacturer.
 - 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, as judged by Architect. 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. 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. 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 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: 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.
- F. 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, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate 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.

- G. 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 COORDINATION OF OWNER'S PORTION OF THE WORK

- A. Site Access: Provide access to Project site for Owner's construction personnel.
 - 1. Provide temporary facilities required for Owner-furnished, Contractor-installed products.
 - 2. Refer to Section 011000 "Summary" for other requirements for Owner-furnished, Contractor-installed products
- 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.

3.8 PROGRESS CLEANING

- A. Clean Project site and work areas daily. 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.
 - 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.
- 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: 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 017419 "Construction Waste Management and Disposal."
- 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.

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 AND REPAIR 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. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. 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.
- D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.
- G. Construction & Demolition Debris Handling and Recovery Facilities (CDDHRF): A construction & demolition debris handling and recovery facility that receives uncontaminated construction and demolition debris generated/excavated from construction.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Practice efficient waste management in the use of materials in the course of work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including but not limited to the following:
1. Demolition Waste:
 - a. Asphalt Paving
 - b. Concrete
 2. Construction Waste:
 - a. Masonry and CMU

- b. Lumber
- c. Steel and Metals
- d. Wood Sheet Materials
- e. Wood Trims
- f. Roofing
- g. Gypsum Board
- h. Piping
- i. Electrical Conduits
- j. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle the following uncontaminated packaging materials.
 - 1) Paper
 - 2) Cardboard
 - 3) Boxes
 - 4) Plastic Sheet and Film
 - 5) Polystyrene Packaging
 - 6) Wood Crates and Pallets
 - 7) Plastic Pails

1.4 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609, AHJ and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use form acceptable to Owner and Architect for construction waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form acceptable to Owner and Architect for construction waste. Include the following:
1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include the hauling and tipping fees and cost of collection containers for each type of waste.
 3. Total cost of disposal (with no waste management)
 4. Revenue from salvaged materials
 5. Revenue from recycled materials
 6. Savings in hauling and tipping fees by donating materials
 7. Savings in hauling and tipping fees that are avoided.
 8. Handling and Transportation Costs. Include cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with operation, termination, and removal requirements in Temporary Facilities and Control specification.
 2. Identify the closest CDDHRF facility and verify acceptable types of waste materials.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with other sections for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

- A. Asphalt Paving: Break up and transport paving to asphalt recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
- C. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- D. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- E. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of 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 waste materials.
- C. Disposal of Spoils: Remove unused soil spoils to designated areas on Owner's property. Specific locations and amounts will be determined
- D. Disposal: Remove waste materials from Owner's property and legally dispose of them at CDDHRF licensed facilities.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 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.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.
- D. Permits: Final Issued Construction Permits for Building & Site.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 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 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, final completion construction photographic documentation, damage or settlement surveys, property surveys, 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 where applicable.
 - 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 Architect's signature for receipt of submittals.
 5. Submit test/adjust/balance 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 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 and utility services 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 documentation specified in other sections.
 6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 8. Complete final cleaning requirements, including touchup painting.
 9. Touch up 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 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. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: 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.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance. 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. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 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. Use CSI Form 14.1A or other acceptable form per Architect.
1. Organize list of spaces in sequential order, starting with exterior areas (roof, exterior finishes, etc) first and proceeding to the interior of the Project.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, pool / HVAC / electrical equipment, and building systems.
 3. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated copy.
 - b. PDF electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 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 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.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. 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.

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 landscaped 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 neither planted nor paved to a smooth, even-textured surface.
- 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, trenches, equipment vaults, manholes, attics, and similar spaces.
- h. Sweep concrete floors broom clean in unoccupied spaces.
- i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- j. Remove labels that are not permanent.
- k. Wipe surfaces of pool, mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- o. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in other sections. Prepare a written report.

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. 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 burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective light and exit fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed 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 operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file: Assemble each manual into a composite electronically indexed in directories that match the titles and numbering in the Project Manual's Table of Contents. Include identification in each digital data file.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 - 2. One paper copy. Include a complete operation and maintenance index with divisions that match the titles and numbering in the Project Manual's Table of Contents. Each division's title page and directory shall be in clear plastic sleeves. Architect will return it after its final review.
- C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 10 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 10 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: 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 documents, in the order listed:
 1. Title page.
 2. Table of contents that matches the titles and numbering in the Project Manual's Table of Contents.
 3. Manual contents.
- C. 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.
 7. Name and contact information for Owner.
 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 9. Cross-reference to related systems in other operation and maintenance manuals.
- D. 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.
- E. 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.
- F. 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: Enable bookmarking of 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.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. 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.
4. 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.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. 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:

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.

- C. 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.
- D. 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.

2.3 OPERATION MANUALS

- A. 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 is 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.
- B. Descriptions: Include the following:
 - 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.
- C. 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.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

- A. 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.
- B. 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.
- C. 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.
- D. 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.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. 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 warranty and bond information, as described below.

- B. 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, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 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.
- D. 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.
- E. 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.
- F. 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.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- 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. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, 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.
- E. 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 operation and maintenance manuals.
- F. Comply with other sections for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 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.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record project Drawings.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set of marked-up record (“as built”) Drawings for Owner and Architect review.
 - b. Final Submittal:
 - 1) Submit one paper-copy set of marked-up record (“as built”) Drawings incorporating Owner and Architect review comments.
 - 2) Submit PDF electronic files of one set scanned record Drawings.
 - 3) Print each Drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data and Shop Drawings: Submit one paper copy and annotated PDF electronic files of each submittal filed in directories that match the titles and numbering in the Project Manual's Table of Contents.
- D. Submission Record Drawings: Final submission all Final Record Drawings, Specifications and Product Data are required prior to inspection for Certificate of Substantial Completion.

PART 2 - PRODUCTS

2.1 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. Record data as soon as possible after obtaining it.
 - c. Record and check the markup before enclosing concealed installations.
 - 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 4. Note Bulletin Number, ASI Number, and Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Maintain an organized record set of prints, available for inspection by Owner, Architect and AHJ at the site at all times.
 - 2. Format: Maintain an organized record set of annotated PDF electronic file with comment function enabled.
 - 3. Digital Format of Record Shop Drawings: Organize digital Shop Drawings into separate electronic files that correspond to each sheet of the Contract Drawings.
 - 4. Digital Format of Record Product Data, and Specifications: File in directories that match the titles and numbering in the Project Manual's Table of Contents. Include identification in each digital data file.
 - 5. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 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.
 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. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic files in directories that match the titles and numbering in the Project Manual's Table of Contents.

2.3 RECORD PRODUCT DATA

- A. 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.
- B. Format: Submit record Product Data as annotated PDF electronic files in directories that match the titles and numbering in the Project Manual's Table of Contents.

2.4 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 record miscellaneous record as annotated PDF electronic files in directories that match the titles and numbering in the Project Manual's Table of Contents.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- 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. Maintenance of Record Documents and Samples: Store record documents and Samples 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.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of commissioned systems, subsystems, and equipment.
 - 2. Requirements of Contractor provided demonstration, training, operation and maintenance of commissioned systems, subsystems, and equipment.
- B. The Owner Training Plan contained in this Section details the level of training required for commissioned systems. The Owner Training Plan also contains the minimum attendees.

1.2 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 utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. The following information will be submitted to the General Contractor for distribution to the Owner eight (8) weeks after Contract Award.
 - 1. Name and contact information of Contractor responsible for training
 - 2. Name and contact information of firm(s) providing the training
 - 3. Initial training date(s) of Owner's training schedule

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Recordings: Submit two copies within seven days of end of each training module. Format will be in .wmv or .mov files.
- B. Demonstration and Training Transcripts: Submit two copies within seven days of end of each training module. Transcript will be type-written including applicable content related to the training session conducted. Each transcript will include all training session attendees, subject matter covered, including any questions and answers addressed during the session.
- C. At completion of training, submit complete training manual(s) for Owner's use.

1.4 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, or other qualified representative, experienced in operation and maintenance procedures and training. Instructor shall be an individual familiar with the Project, systems design, systems installation, systems operation, and systems maintenance. The representative performing training will have at least five (5) years of experience in conducting Owner training sessions. The Trainer will have been associated with the manufacturer for at least one (1) year.
- C. The Owner will not accept training from individuals or firms unfamiliar with the project. Training sessions will be rescheduled at no additional expense to the Owner.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.
- C. Training sessions will be scheduled for completion only after system is functional as demonstrated by successful completion of Functional Testing. Training will be scheduled with the attendees, listed below, at least two (2) weeks in advance.
 - 1. Owner's representative
 - 2. Brandstetter Carroll Inc. – Architect

PART 2 - PRODUCTS

2.1 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 the Owner Training Plan attached to this Specification Section.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.

- c. Operating standards.
 - d. Regulatory requirements including but limited to AHJ inspections and recertifications.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
- 2. Documentation: Provide the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
- 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:

- a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module.
- B. The individuals being trained shall receive:
 - 1. Written training agendas
 - 2. Written training materials reviewed in a classroom setting.
 - 3. On-site explanation and demonstration of the equipment operation.
 - 4. Explanation of common equipment operations such as: sequencing, programming, shut-down, emergency operation, start-up, etc.
- C. Training agendas will be submitted to the Architect/Engineer/AHJ (if required) two (2) weeks prior to the training date for review and comment.
- D. Training Agenda is:
 - 1. Submitted to the Owner and Architect for review and acceptance.
 - 2. Revise and resubmit Training Agenda until acceptable.
 - 3. Provides an overall schedule showing all training sessions.
 - 4. Includes at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.

- c. Name of firm and person conducting training; including qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as projector, projection screen, etc. to be provided by Contractor.
5. The trainer returns this information to the Owner and the General Contractor. Once approved by the Owner, the training session can be scheduled. The trainer provides a copy of the agenda to each trainee.
- E. Training manual to conduct the training session. Specifically the manual will:
1. Contain applicable portions of the O&M Manuals
 2. Contain copies of all hand-outs, slides, overheads, video presentations, etc. that are not included in O&M Manuals
 3. Provide two (2) copies for attendees
 4. Provide one (1) copy to be included in operations and maintenance data to the Owner
- F. Training Record. For each piece of equipment, trainers shall document, in the Training Record, the following information:
1. Trainee
 2. Total training hours required
 3. Training hours completed
 4. Training date
 5. Topics covered
 6. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in the original training session.
 7. Training Session Recording
 8. Training Session Transcript

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, 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.
- 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, through General Contractor, with at least two weeks' 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 an oral performance-based test.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Record demonstration and training sessions. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Narration: Describe scenes on video recording by audio narration by microphone while or dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.
- C. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.
- D. Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect. Recordings shall have a resolution of not less than 3200 to 2400 pixels. Recordings will be made with a stationary (i.e. tripod mounted) camera, proper lighting, and proper sound capabilities (i.e. microphone).

END OF SECTION 017900

SECTION 033000 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade (ground).
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. 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 concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures,

curing procedures, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 2. Laboratory test reports for concrete mix design with the following data:
 - a. Method used to determine the proposed mix design per ACI 301, Article 4.2.3.
 - b. Gradation and quantity of fine and coarse aggregates.
 - c. Proportions of all ingredients including all admixtures added either at the time of batching or at the job site.
 - d. Water/cement ratio and water/cementitious ratio.
 - e. Slump - ASTM C143.
 - f. Certification and test results of the total water-soluble chloride ion content of the design mix - FHWA RD-77 or AASHTO T 260-84.
 - g. Air content of freshly mixed concrete by the pressure method, ASTM C231, or the volumetric method, ASTM C173.
 - h. Unit weight of concrete - ASTM C138.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

- E. Samples: For waterstops, vapor retarder.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, testing agency.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.

4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semi-rigid joint filler.
13. Joint-filler strips.
14. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Field quality-control reports.

E. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Special Inspector Qualifications: A qualified person employed or retained by an approved agency that has the recommended experience and certifications as summarized in Appendix C of the current International Code Council (ICC) Special Inspection Manual.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.10 FIELD CONDITIONS

- A. 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.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. 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 steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.

3. ACI 315, "Details and Detailing of Concrete Reinforcement"

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent-treated and edge sealed.
 - c. Structural 1, B-B or better; mill-oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill-oiled and edge sealed.
 3. Overlaid Finnish birch plywood.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable, or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Bar Mats: ASTM A 184, fabricated from ASTM A 615, Grade 60, deformed bars, assembled with clips.

- C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615, 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. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. For slabs on ground, use supports with sand plates or horizontal runners where base material will not support chair legs.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150, Type I/II.
 - 2. Fly Ash: ASTM C 618, Class F or C.
 - 3. Slag Cement: ASTM C 989, Grade 100 or 120.
 - 4. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494, Type A.
 - 2. Retarding Admixture: ASTM C 494, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

F. Water: ASTM C 94 and potable.

2.6 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CETCO, a Minerals Technologies company; Waterstop-RX-101 Waterstop-RX-101T Waterstop-RX-102.
 - b. Sika Greenstreak; Swellstop.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A 10 mils. Include manufacturer's recommended adhesive or pressure-sensitive tape.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Raven Industries, Inc; Vapor Block 10.
 - b. Stego Industries, LLC; Stego Wrap Vapor Barrier (10-Mil).
 - c. W.R. Meadows, Inc; Perminator 10 mil.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corp. - Construction Chemicals; Confilm.
 - b. ChemMasters, Inc; Spray-Film.
 - c. Dayton Superior; AquaFilm J74RTU.
 - d. Euclid Chemical Company (The); an RPM company; Eucobar.
 - e. Sika Corporation; SikaFilm.
 - f. SpecChem, LLC; Spec Film.
 - g. W.R. Meadows, Inc; EVAPRE.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corp. - Construction Chemicals; MasterKure CC 180 WB (Pre-2014: Kure N Seal VOC).
 - b. ChemMasters, Inc; Safe-Cure Clear DR.
 - c. Dayton Superior; Clear Cure VOC J7WB.
 - d. Euclid Chemical Company (The); an RPM company; Kurez DR VOX.
 - e. SpecChem, LLC; SpecRez.
 - f. W.R. Meadows, Inc; 1100-CLEAR SERIES.
- F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
 - a. ChemMasters, Inc; Polyseal WB.
 - b. Dayton Superior; Cure & Seal 1315 J22WB.
 - c. Euclid Chemical Company (The); an RPM company; Super Diamond Clear VOX.
 - d. SpecChem, LLC; Cure & Seal WB 25.
 - e. W.R. Meadows, Inc; Vocomp-30.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork, or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.10 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 C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 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 5000 psi at 28 days when tested according to ASTM C 109.
- 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 C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 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 according to ASTM C 109.

2.11 CONCRETE MIXTURES, GENERAL

- 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, according to ACI 301.
1. Use a qualified independent 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 cement in concrete as follows:
1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Slag Cement: 50 percent.
 4. Combined Fly Ash or Pozzolan and Slag Cement: 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, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 8. Do not use Fly Ash or Pozzolans, Slag Cement, or Silica Fume in concrete to receive a polished finish.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
- E. Do not air entrain interior trowel-finished concrete slabs-on-grade and suspended slabs, including light-weight concrete. Do not allow entrapped air content to exceed 3 percent.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 3. Slump Limit: 4 inches plus or minus 1 inch.
- B. Slabs and Walls: Proportion normal-weight concrete mix as follows:
1. Minimum Compressive Strength: 5000 psi air entrained.
 2. Minimum Cementitious Materials Content: 610 lb./cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.40.
 4. Slump Limit: 4 inches. 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for ¾-inch nominal maximum aggregate size.

2.13 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Earth cuts may be used as forms for footing vertical surfaces, if sides are sharp and true, and not exposed in finished structure.
- C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- D. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class C, 1/2 inch for rough-formed finished surfaces.
- E. Construct forms tight enough to prevent loss of concrete mortar.
- F. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
 - 1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.
- N. Do not allow excess form-coating material to accumulate in forms or contact in-place concrete surfaces against which fresh concrete will be placed.

3.2 EMBEDDED ITEM INSTALLATION

- 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. No aluminum conduit shall be installed in concrete.
 - 4. No sleeves, holes, or inserts shall be placed in or within 2'-0" of columns or beams without approval of the structural engineer.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete is to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.
- C. Granular Course: For slabs on ground receiving moisture-sensitive floor covering place slab directly on vapor retarder. Place vapor retarder on granular fill or fine-graded granular material, moisten and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.
- D. Thickness of granular fill (including fine-graded) shall be 6 inch minimum unless noted otherwise in geotechnical report.

3.5 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. 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.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. 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. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction 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 contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths long as practicable. Where more than one length is required, lace or clip sections together.

3.7 WATERSTOP INSTALLATION

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. No concrete shall be placed except when Architect's representative (or independent testing laboratory) is present unless this requirement is specifically waived by the Architect. Give adequate notice to the Architect, the testing laboratory, and all contractors affected before placing concrete.
- C. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified. Concrete delivery tickets shall show:
1. Batch number
 2. Mix by number with cement content in pounds and maximum size aggregate
 3. Admixtures

4. Air content
 5. Slump
 6. Time of loading
 7. Temperature of concrete for mass concrete elements
- D. Discharge concrete within 1-1/2 hours after water has been added to the cement unless a longer time has been authorized by the Architect/Engineer. During hot weather or other conditions contributing to a quick stiffening of the concrete, the Architect/Engineer may require discharge in less than 1-1/2 hours. If loss of slump occurs, HRWR may be re-dosed at the site as long as a "flash set" has not occurred. Re-dosage procedures must be discussed and approved by the Engineer and the manufacturer at the Pre-Concrete Conference.
- E. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- F. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- G. 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. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. 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.
- H. 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.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- I. Place interior slabs on grade that will later receive floor coverings only after floor level or roof above has been placed. Also, protect the slab from any moisture infiltration until building is complete.

- J. Pumping Concrete: Grout used to prime a pump shall not be placed in the forms in any concrete exposed to view in the final structure.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to view or to be covered with a coating or covering material applied directly to concrete.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. For polished slabs: Specified overall values of flatness, SOF(F) 45; and of levelness, SOF(L) 35; with minimum local values of flatness, MLF(F) 30; and of levelness, MLF(L) 24.
 - b. For all other slabs: Specified overall values of flatness, SOF(F) 35; and of levelness, SOF(L) 25; with minimum local values of flatness, MLF(F) 24; and of levelness, MLF(L) 17.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish when indicated to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
1. Uniformly spread 25 lb./100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
 2. After broadcasting and tamping, apply float finish.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.
- H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
1. Uniformly apply dry-shake floor hardener at a rate of 100 lb./100 sq. ft. unless greater amount is recommended by manufacturer.
 2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
 3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. 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 steel-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 and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 5,000 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.
 - 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.12 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 ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed 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 manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

- a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
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. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. 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.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to 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 28 days' old.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- 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. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- 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, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. 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. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include 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, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. 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.
- 3.16 FIELD QUALITY CONTROL
- A. Special Inspections and field quality control testing: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
1. Refer to drawings for testing and special inspection requirements.
 2. Prepare and submit reports within 7 days of completing tests and inspections. Distribute reports to Architect, Engineer, Owner (or owner's representative), and Contractor. Clearly indicate non-compliance on reports.
- B. Non-Compliant Work:
1. The contractor shall remove and replace all non-compliant work, or, at the contractor's expense, perform additional testing to verify compliance. Contractor shall submit results of additional testing to Architect, Engineer, and Owner (or owner's representative) for review and approval.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. 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.

END OF SECTION 033000

Mix Design Submittal Form

A copy of this form shall be completed for each type of concrete listed in the specification. Mix designs not submitted on this form will not be reviewed.

Part 1

CONCRETE SUPPLIER INFORMATION

Contact Person: _____

Telephone Number: _____

Company Name: _____

Address: _____

Main Plant Location: _____

Miles from Project Site: _____

PROJECT INFORMATION

Project Name: _____

Address: _____

General Contractor: _____

Concrete Type: _____

Specification Section Reference: _____

Intended Use: _____

Part 2

DETERMINE REQUIRED COMPRESSIVE STRENGTH (select one method)

☐ If field test data is available:

If a group of at least 15 consecutive compressive strength tests meeting the requirements of ACI 301-10 4.2.3.2 are available, calculate the standard deviation and required average compressive strength from ACI 301-10 Table 4.2.3.3.a

Number of Tests: _____

Standard Deviation: _____

K Factor: _____

f_{cr} : _____

Recorded Field Test Data		
Test	Date	f_c
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

☐ If field test data is not available:

If no field compressive strength tests are available, select required average compressive strength from ACI 301-10 Table 4.2.3.3.b

f_{cr} : _____

Part 3

DOCUMENTATION OF AVERAGE COMPRESSIVE STRENGTH

Two methods of determining expected compressive strength are acceptable including Field Test Data Method and Trial Mix Method. Select one method and provide the data required as described.

Field Test Data Method:

Provide design Materials, Types, Specific Gravity, Weight and Volume for the concrete being tested. Utilize the following table. Mix #2 is not required when ten or more consecutive strength tests for one mixture are available. See ACI 301-10 4.2.3.4.a for additional information and requirements.

Materials	Type/Source		Specific Gravity		Weight (lbs.)		Absolute Volume (cu. ft.)	
	#1	#2	#1	#2	#1	#2	#1	#2
Mix								
Cement								
Fly Ash								
Microsilica								
Coarse Aggregate								
Fine Aggregate								
Water								
Air								
Other								
TOTAL							27.0 cu. ft.	

Mix #1, Water/Cement Ratio: _____

Mix #2, Water/Cement Ratio: _____

- ☐ If at least 10 strength tests represent one mixture, calculate average compressive strength and verify it is greater than required compressive strength.

Average Compressive Strength (f'_c): _____

Required Compressive Strength (f'_{cr}): _____

- ☐ If at least 10 strength tests represent two mixtures, calculate average compressive strength for each mixture and plot as a function of water/cement ratio. Using the required compressive strength from Part 2, determine the corresponding water/cement ratio.

Required Compressive Strength (f'_c): _____

Water/Cement Ratio From Plot: _____

Attach copy of average compressive strength vs. water cement ratio.

Establish mixture proportions based upon the required water cementitious ratio. Use the table below to show the actual mixture used on the project. (If one trial mix was used the mixture will match Mix #1)

Field Test Data					
Mix #1	Date	f'_c	Mix #2*	Date	f'_c
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
11			11		
12			12		
13			13		
14			14		
15			15		
16			16		
17			17		
18			18		
19			19		
20			20		
21			21		
22			22		
23			23		
24			24		
25			25		
26			26		
27			27		
28			28		
29			29		
30			30		
Average	-		Average	-	

Materials	Type/Source	Specific Gravity	Weight (lbs.)	Absolute Volume (cu. ft.)
Cement				
Fly Ash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

Trial Mixture Method:

Provide three design mixtures including: Materials, Types, Specific Gravity, Weight and Volume for the concrete being tested. See ACI 301-10 for additional information and requirements.

Materials	Type/Source			Specific Gravity			Weight (lbs.)			Absolute Volume (cu. ft.)		
	#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3
Trial Mixture												
Cement												
Fly Ash												
Microsilica												
Coarse Aggregate												
Fine Aggregate												
Water												
Air												
Other												
Total										27.0 cu. ft.		

Mix #1, Water/Cement Ratio: _____

Mix #2, Water/Cement Ratio: _____

Mix #3, Water/Cement Ratio: _____

Provide compressive test results from above mixtures.

Trial Mix Test Data								
Mix #1	Date	f _c	Mix #2	Date	f _c	Mix #3	Date	f _c
1			1			1		
2			2			2		
3			3			3		
Average	-		Average	-		Average	-	

Plot average compressive strength versus water cement ratio and determine the proper water-cementitious material ratio to meet the required compressive strength from Part 2.

Required Compressive Strength (f_{cr}): _____

Water/Cementitious Materials Ratio: _____

Establish the mixture proportions based upon the required water cementitious ratio. Use the table below to summarize mixture proportions used on the project.

Materials	Type/Source	Specific Gravity	Weight (lbs.)	Absolute Volume (cu. ft.)
Cement				
Fly Ash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

Additional Requirements/Information:

Please provide the following attachments: (Initial if attached)

Coarse Aggregate Gradation Report	_____
Fine Aggregate Gradation Report	_____
Concrete Compressive Strength Data	_____
Admixture Compatibility Certification Letter	_____
Trial Mixture strength vs. water/cement ratio plots	_____

SECTION 036000 - GROUTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Portland cement grout.
 - 2. Rapid curing epoxy grout.
 - 3. Non-shrink cementitious grout.

1.2 SUBMITTALS

- A. Product Data: Grout.
- B. Manufacturer's Installation Instructions: Mixing, handling, surface preparation and placing epoxy type and non-shrink type grouts.
- C. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

- A. Perform Work according to New York State Department of Transportation Standards.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Do not perform grouting if temperatures exceed 85 degrees F.
- B. Maintain minimum temperature of 50 degrees F before, during, and after grouting, until grout has set.

PART 2 - PRODUCTS

2.1 PORTLAND CEMENT GROUT MATERIALS

- A. Portland Cement: AASHTO M240.
- B. Water:
 - 1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts in quantities capable of causing:
 - a. Corrosion of steel.
 - b. Volume change increasing shrinkage cracking.
 - c. Efflorescence.
 - d. Excess air entraining.
- C. Fine Aggregate:
 - 1. Washed natural sand.
 - 2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
 - 3. Free from injurious amounts of organic impurities as determined by ASTM C40.

- D. Mix:
1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes.

2.2 RAPID CURING EPOXY GROUT

- A. Manufacturers:
1. L&M Construction Chemical.
 2. Sika Corporation.
 3. W.R. Meadows, Inc.
 4. Substitutions: Permitted.
- B. Rapid-Curing Epoxy Grout: High strength, three-component epoxy grout formulated with thermosetting resins and inert fillers. Rapid-curing, high adhesion, and resistant to ordinary chemicals, acids and alkalis.

Property	Test	Result
Compressive Strength	ASTM C579	12,000 psi at 7 days
Tensile Strength	ASTM C307	2,000 psi minimum
Coefficient of Expansion	ASTM C531	0.000030 in per degree F
Shrinkage	ASTM C827	none

2.3 NON-SHRINK CEMENTITIOUS GROUT

- A. Manufacturers:
1. CGM, Inc.
 2. Euclid Chemical Company.
 3. L&M Construction Chemical.
 4. QUIKRETE.
 5. Sika Corporation
 6. Substitutions: Permitted.
- B. Non-shrink Cementitious Grout: Pre-mixed ready for use formulation requiring only addition of water; non-corrosive, non-metallic, non-gas-forming, no chlorides.
- C. Properties: Certified to maintain initial placement volume or expand after set and meet following minimum properties when tested according to CRD-C621, for Type D non-shrink grout:

Property	Test	Time	Result
Setting Time	ASTM C191	Initial	2 hours (approx.)
		Final	3 hours (approx.)
Expansion			0.10% - 0.4% Maximum
Compressive Strength	CRD-C621	1 day	4,000 psi
		7 days	7,000 psi
		28 days	10,000 psi to 10,800 psi

2.4 CURING

- A. Prevent rapid loss of water from grout during first 48 hours by using approved membrane curing compound or with by using wet burlap method.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces until sound, clean concrete surface achieved.
- B. Rough concrete lightly, but not enough to interfere with placement of grout.
- C. Remove foreign materials from metal surfaces in contact with grout.
- D. Align, level, and maintain final positioning of components to be grouted.
- E. Saturate concrete surfaces with clean water; remove excess water, leaving none standing.

3.2 INSTALLATION - FORMWORK

- A. Construct leakproof forms anchored and shored to withstand grout pressures.
- B. Install formwork with clearances to permit proper placement of grout.

3.3 MIXING

- A. Portland Cement Grout:
 - 1. Use proportions of two parts sand to one part cement, measured by volume.
 - 2. Prepare grout with water to obtain consistency to permit placing and packing.
 - 3. Mixing Water and Grout: Pre-mix using approximately 2/3 of water; after partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing 2 to 3 minutes.
 - 4. Mix only quantities of grout capable of being placed within 30 minutes after mixing.
 - 5. Do not add additional water after grout has been mixed.
 - 6. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 in 28 days.
- B. Mix and prepare rapid curing epoxy grout according to manufacturer's instructions.
 - 1. Capable of developing minimum compressive strength of 2400 in 48 hours and 7000 psi in 28 days.
- C. Mix and prepare non-shrink cementitious grout according to manufacturer's instructions.
 - 1. Capable of developing minimum compressive strength of 2400 in 48 hours and 7000 in 28 days.
- D. Mix grout components in proximity to Work area and transport mixture quickly and in manner not permitting segregation of materials.

3.4 PLACING GROUT

- A. Do not use pneumatic-pressure or dry-packing methods; do not vibrate placed grout.
- B. Thoroughly compact final installation and eliminate air pockets.

3.5 CURING

- A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. After grout has attained its initial set, keep damp for minimum of three days.

3.6 FIELD QUALITY CONTROL

- A. Perform field inspection and testing according to ACI 318.
- B. Submit proposed mix design of each class of grout to inspection and testing firm for review prior to commencement of Work.
- C. Tests of grout components may be performed to ensure conformance with specified requirements.

END OF SECTION 036000

SECTION 042000 - UNIT MASONRY

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.
- B. This section supplements Structural Specifications on Structural Drawings.
- C. Specification Section 047200 Cast Stone: Delegated Design Drawings showing anchoring and attachment details and requirements.

1.2 SUMMARY

Section Includes:

- 1. Concrete masonry units.
- 2. Embedded flashing.
- 3. Miscellaneous masonry accessories.
- 4. Clay face brick.
- 5. Mortar and grout.
- 6. Ties and anchors.
- 7. Cavity drainage materials

B. Products Installed but not specified under this Section:

- 1. Steel lintels in unit masonry.
- 2. Steel shelf angles for supporting unit masonry.
- 3. Galvanized angles at exterior wall openings.

C. Related Requirements:

- 1. See the "Steel Lintel Schedule" on the Structural Drawings for sizing and installing lintels, shelf angles and masonry anchors for connecting to structural steel framing.
- 2. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
- 3. Specification Section 047200 Cast Stone for trim and wall panel requirements.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS

- A. Product Data and or Drawings: For each type of product.
 - 1. Reinforcing Steel: Detail Drawings showing bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
 - 2. Integral water repellent used in CMUs as required in Masonry Specifications on Structural Drawings
 - 3. **Cold-Weather and Hot-Weather Procedures:** Detailed description of methods, materials, and equipment to be used to comply with requirements for both grout and mortar determined by the TMS 602/ACI 530.1/ASCE6 and as required in Masonry Specifications on Structural Drawings
 - 4. Clay face brick, in the form of straps of five or more bricks.
 - 5. Colored mortar samples.
 - 6. Fabricated Flashing: **Detailed drawings** showing how all through wall flashings provided water and air tight assemblies including but not limited to flashings at corners, end-dams at lintels, sill and jamb flashings applications.
 - 7. Miscellaneous masonry accessories. Product color samples of visible accessories (weep cells), detail drawings detailing masonry steel connections and reinforcing.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients in compliance with proportion specifications of ASTM C270 and as required in Masonry Specifications on Structural Drawings
 - 1. Include test reports for **mortar mixes** required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 - 2. Include test reports, according to ASTM C 1019, for **grout mixes** required to comply with compressive strength requirement.
- C. 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 according to TMS 602/ACI 530.1/ASCE 6. See additional requirements listed in the Masonry Specifications on Structural Drawings

1.5 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.

1.6 FIELD CONDITIONS

- A. 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.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.
- B. 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.
- C. 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 louvers, windows, overhead coiling doors 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.
- D. 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 602/ACI 530.1/ASCE 6.
 - 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.
 - 2. See additional requirements listed in the Masonry Specifications on Structural Drawings
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. See additional requirements listed in the Masonry Specifications on Structural Drawings

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, flashing requirements and to set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as detailed on Drawings.
 - 2. Clean exposed faces of mockups with masonry cleaner as indicated.
 - 3. Protect accepted mockups from the elements with weather-resistant membrane.
 - 4. 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.
 - a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 5. Retain mockups until building envelope is completed and approved. Demolish and dispose of mockup offsite thereafter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 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.

2.2 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.
- B. Defective Units: Structural masonry unit standards 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.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.3 MASONRY UNITS

- A. 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, bond beams, and other special conditions.
 - 2. Provide bullnose units for outside corners of interior walls unless otherwise indicated.
- B. Integral Water Repellent: All exterior concrete masonry units above and below grade shall be manufactured with integral water repellent.
 - 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) ACM Chemistries.
 - 2) BASF Corporation; Construction Systems.
 - 3) Euclid Chemical Company (The); an RPM company.
 - 4) GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - 5) Block Plus W-10; Addiment Inc.
 - 6) Dry-Block; W.R. Grace & Co., Construction Product Division.
 - 7) Rheopel; Master Builders.
 - 2. See additional requirements listed in the Masonry Specifications on Structural Drawings
- C. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
 - 2. Density Classification: Normal weight unless otherwise indicated.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
- D. Face Brick: ASTM C216 and as follows:
 - 1. Grade and Compressive Strength: Provide units with grade and minimum average net-area compressive strength indicated below.
 - a. Grade SW.
 - b. Not less than the net area compressive strength of 5500 psi required to produce clay masonry construction of compressive strength indicated in conjunction with Type N mortar.

2. Type FBS.
3. Size: Brick manufactured to the following actual dimensions within the tolerances specified in ASTM C-216:
 - a. Modular: 3-5/8 inches thick by 2-1/4 high by 7-5/8 inches long.
 - b. Color: **Face Brick: Belden - Burgundy Blend.**

2.4 MORTAR AND GROUT MATERIALS

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds. Only **packaged preblended portland cement and hydrated lime is acceptable.**
- B. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.
 1. Do not use calcium chloride in mortar or grout.
 2. Add cold-weather admixture (when required) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Euclid Chemical Company (The); an RPM company.
 - b. Solomon Colors, Inc.
 4. Basis of Design: Solomon SGS 10H Light Buff
- C. 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.
- D. 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. For masonry below grade or in contact with earth, use Type S.
 2. For reinforced masonry, use Type N.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 1. Mix to match Architect's sample.
 2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:

- a. Decorative CMUs.
 - b. CMUs.
 - c. Concrete face brick.
 - d. Clay face brick.
 - F. 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 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi.
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.
 - G. Portland Cement: ASTM C 150/C 150M, Type I, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
 - H. Hydrated Lime: ASTM C 207, Type S.
 - I. Aggregate for Mortar: ASTM C 144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
 - J. Aggregate for Grout: ASTM C 404.
 - K. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
 - L. Water: Potable.
- 3.2 REINFORCEMENT
- A. 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. Unit. See Masonry Specification Section on Structural Drawings for reinforcing requirements.
 - B. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
 1. Interior Walls: Hot-dip galvanized carbon steel.
 2. Exterior Walls: Hot-dip galvanized carbon or Stainless steel.

3. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.
- D. Masonry-Joint Reinforcement for Multiwythe Masonry:
1. Ladder type with one side rod at each face shell of hollow masonry units more than 4 inches wide, plus one side rod at each wythe of masonry 4 inches wide or less.
 2. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. The eye extension of the veneer ties shall be sized to locate the full opening of the eye no less than two inches beyond the face of the CMU backup wythe when installed.

3.3 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer 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 A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
 3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 4. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
 5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M. Hot-dip galvanized after fabrication.
 6. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.
- 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 or stainless-steel wire.
 2. Tie Section: Triangular-shaped wire tie made from hot-dip galvanized steel or stainless-steel wire.
 3. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch. Fabricate wire ties from 0.187-inch diameter, hot-dip galvanized-steel wire unless otherwise indicated.

- D. Anchors for Connecting to Cast Stone Wall Panels & Trim: Coordinate Delegated Cast Stone design drawings and details to ensure anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
- E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated or bent to configuration indicated.
 - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- F. Interior Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

3.4 MASONRY LINTELS

- A. Concrete Lintels: Precast or formed-in-place concrete lintels shall be in compliance with requirements contained in Lintel Schedule on the Structural Drawings.
 - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels shall be in compliance with requirements contained in Lintel Schedule on the Structural Drawings and made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

3.5 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual", Section 076200 "Sheet Metal Flashing and Trim" and as follows:
 - 1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, 0.016 inch thick.
 - 2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
 - 3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
 - 4. Fabricate through-wall flashing with drip edge flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed. Extend vertical leg of this base flashing between the split wythe and terminate as shown on the drawings but less than 6 inches.
 - 5. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
 - 6. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Advanced Building Products Inc.

- 2) Carlisle Coatings & Waterproofing Inc.
- 3) GCP Applied Technologies Inc. (formerly Grace Construction Products).
- 4) Heckmann Building Products, Inc.
- 5) Hohmann & Barnard, Inc.
- 6) Polyguard Products, Inc.
- 7) W. R. Meadows, Inc.
- 8) Williams Products, Inc.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

B. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use flexible flashing with a metal flashing receiver with drip edge.
4. Where flashing is fully concealed, use metal flashing or flexible flashing.
5. Flashings at all openings in the exterior wall and interior partitions.

C. Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

1. Elastomeric Sealant: ASTM C 920, chemically curing urethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

E. Termination Bars for Flexible Flashing: Stainless-steel sheet 0.019 inch by 1-1/2 inches with a 3/8 inch sealant flange at top.

3.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips (backer rod) complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.

B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Configuration: Provide one of the following:

- a. Strips, full depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent clogging with mortar droppings.
- b. Strips, not less than 1-1/2 inches thick with surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

- C. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- D. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).
- E. Expanding Waterstop Strips: Self adhering strip located at first course of CMU and top of the footing to resist hydrostatic pressure.
- F. Weep/Cavity Vent Products: Use the following unless otherwise indicated:
 - 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in **color selected from manufacturer's standard colors**.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Advanced Building Products Inc.
 - 2) Heckmann Building Products, Inc.
 - 3) Hohmann & Barnard, Inc.

3.7 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Diedrich Technologies, Inc.; a division of Sandell Construction Solutions.
 - b. EaCo Chem, Inc.
 - c. PROSOCO, Inc.

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that foundations are within tolerances specified.
 - 2. Verify that reinforcing dowels are properly placed.
 - 3. Verify that substrates are free of substances that impair mortar bond.

- B. Before installation, verify that all rough-in and built-in construction for conduit and piping systems are installed in the correct locations of pathways for building systems to provide fully concealed conduit and piping and connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and mock-up has been approved.

4.2 INSTALLATION, GENERAL

- A. Thickness: Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Coordinate chases widths and recesses to accommodate electrical conduits and plumbing fixture piping as specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. 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.

4.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For 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.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. 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.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

4.4 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: Unless otherwise indicated, **lay exposed masonry in running bond**; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond. 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: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel door frames and masonry solidly with mortar unless otherwise indicated. **Verify the extent of mortar placement with finish door frame and hardware requirements.**
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and grout into core.

- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated. Follow the Structural Drawings' Masonry Specification requirements specifications for specific grout requirements.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Form continuous reinforced bond beam at top of partition. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. See Drawings for smoke stop detail and requirements at CMU partitions at underside of roof deck.

4.5 MORTAR BEDDING AND JOINTING

- A. Lay 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.
 - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units 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. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive other masonry drainage material unless otherwise indicated.
- E. Cut joints flush where indicated to receive waterproofing and flashings.

4.6 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together using one of the following methods:
 - 1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
- B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

- C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
- D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 - 1. Provide individual metal ties not more than 16 inches o.c.
 - 2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
 - 3. Provide Rigid Anchors as required by Structural Specifications on Structural Drawings.

4.7 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
 - 1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Parge cavity face of backup wythe in a single coat approximately 3/8 inch thick. Trowel face of parge coat smooth.

4.8 CMU WALLS

- A. Construct walls as follows:
 - 1. CMU wythe.
 - a. Grout solid and reinforce with horizontal and vertical reinforcing as shown on the Structural Drawings.
 - b. Trowel all joints flush and smooth to receive drainage materials.
 - c. Install perimeter and through wall and opening flashings.

4.9 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. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- C. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- D. 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 602/ACI 530.1/ASCE 6 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.**
- E. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- F. Provide continuity at wall intersections by using prefabricated T-shaped units.
- G. Provide continuity at corners by using prefabricated L-shaped units.
- H. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, pipe enclosures, and other special conditions.

4.10 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or interior partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
 - 4. Install foam-plastic backer rod masonry for application of sealant.
- C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints **beneath** shelf angles supporting masonry as part of the control and or expansion joint assemblies.

4.11 LINTELS

- A. Install steel lintels per "Steel Lintel Schedule" on Structural Drawings.
- B. Provide masonry lintels where shown and where openings of more than 24 inches for CMU units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.
- D. See Structural Drawing for additional information and requirements.

4.12 FLASHING, WEEP HOLES, CAVITY DRAINAGE, 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. Install flashing as follows unless otherwise indicated:
 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels and shelf angles, extend flashing the full length of structural member and masonry at each end. **At heads and sills, extend flashing a minimum of 6 inches beyond openings at ends and turn up in a head joint not less than 2 inches to form end dams.**
 3. Form end joints of sheet metal flashing by overlapping not less than 3 inches, and seal lap with two beads of elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
- C. Install flexible flashing system membrane and accessories where indicated on Drawings in compliance with manufacturer's written instructions.
- D. Install weep holes in head joints in the first course of masonry immediately above embedded flashing and as follows:
 1. Use specified weep/vent products to form weep holes.
 2. Space weep holes 24 inches o.c. or 32 inches based on unit length of lintel.

4.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: The Owner shall provide special Inspection & Testing Agency to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and

work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

- B. Inspections: Special inspections according to Level 3 Quality Assurance in TMS 602-02/ACI 530.1-02 ASCE 6-02.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing During Construction: Every 5000 sq. ft. of construction.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

4.14 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 caulk or 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. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

4.15 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.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units from site.

END OF SECTION 042000

SECTION 047200 - CAST STONE MASONRY

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. Wall panels and Lintels.
 - 2. Trim units.
 - 3. Decorative elements.
 - 4. Anchors & Accessories.

1.3 ACTION SUBMITTALS

- A. Design drawings, calculations, reactions and installation requirements and details including but not limited to internal reinforcing, attachment clips, dowels, field repairs and modifications are the sole responsibility of an engineer licensed in the State New York. See Delegated Design under Article 1.6 A. of QUALITY ASSURANCE of this Section.
- B. Product Data: For each type of product.
- C. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
- D. Samples:
 - 1. For each color and texture of cast stone required, 4 inches square in size.
 - 2. For each trim shape required, 4 inches in length.
 - 3. For colored mortar.

1.4 INFORMATIONAL SUBMITTALS

- A. Material test reports.

1.5 QUALITY ASSURANCE

- A. Delegated Design: Engage a professional engineer licensed in New York to design all cast stone panels.

- B. Structural Performance: Provide cast stone panels capable of withstanding design loads within but not limited to the following conditions indicated.

1. Design Loads: Roof, Wind, Seismic as required on the Structural Drawings.
2. Loading: Lateral & Shear connections at coiling door, roof framing and CMU.
3. Deflection Limits: Design opening lintels to withstand design loads without deflections greater than the following:
 - a. Cast Stone Lintels: Vertical deflection of $1/360$ of the span for live or snow load and $1/240$ of the span for total load.
4. Design lintels to provide for movement of cast stone components located outside the insulated building envelope without damage or overstressing connections causing sealant or mortar failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

- C. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute (CSI) or National Precast Concrete Association (NPCA).

1. Cast Stone Units to be manufactured from a similar mix design to match color and texture as a single source supplier.

PART 2 - PRODUCTS

2.1 CAST STONE UNITS

- A. Manufacturers: Basis of Design: Pompili Precast Concrete. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. JCF Companies
- b. New Cast Stone
- c. Reading Rock, Inc.
- d. Tuscan Stoneworx.

- B. Cast Stone Units: Comply with ASTM C1364.

1. Units shall be manufactured using the vibrant dry tamp or wet-cast method.
2. Wall Panel units include the entry columns, sign band and lintels.
3. Trim units including window sills, wall pilasters, door and widow lintel jamb trim and continuous horizontal wainscot cap as indicated on Drawings.
4. Cast Stone Masonry units are to be manufactured from a same mix design to match color and texture.

- C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
 - 1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
 - 2. Fabricate trim units in the longest lengths to minimize joints and horizontal & vertical wall panel joints as shown on the Drawings.
 - 3. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 - 4. Provide min 1/8" deep drip groove on the bottom of projecting elements unless otherwise indicated.
- D. Cure Units as Follows:
 - 1. Cure units in enclosed, moist curing room at 95 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
 - 2. Keep units damp and continue curing to comply with one of the following:
 - a. No fewer than five days at mean daily temperature of 70 deg F or above.
 - b. No fewer than seven days at mean daily temperature of 50 deg F or above.
- E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- F. Texture: Smooth
- G. Color: **Selected from submitted samples. Pending final approval by Owner.**
- H. Test Results:
 - 1. Compressive Strength, ASTM C 1194: Minimum 6,500 psi at 28 days.
 - 2. Absorption, ASTM C 1195: Maximum 6 percent, by the cold water method, at 28 days.
 - 3. Linear Shrinkage, ASTM C 426: Less than .065 percent.
 - 4. Density, ASTM C 140: Greater than 120 pounds per cubic foot.
 - 5. Freeze-Thaw, ASTM C 666: Less than 5 percent cumulative mass loss after 300 cycles.
 - 6. Air Content: ASTM C 173 or C 231 for wet cast product shall be 4-8% for units exposed to freeze-thaw environments; air entrainment is not required for VDT products.

2.2 ACCESSORIES

- A. Anchors: Type and size as required by Delegated design engineer and as shown on the Drawings, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666.
- B. Dowels: 1/2-inch- diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666.
- C. Cleaner: Prosoco Sure Klean Custom Masonry Cleaner, Prosoco Sure Klean 600 Detergent Prosoco Sure Klean Vana Trol, Prosoco Light Duty Cleaner or EaCo Chem NMD-80, as recommended by manufacturer.

2.3 MORTAR MIXES

- A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.
- B. Preblended dry mortar mix complying with ASTM C1714/C1714M and capable of producing mortar strength as indicated in ASTM C270.
 - 1. For setting mortar, use Type N.
 - 2. For pointing mortar, use Type N.
- C. Pigmented Mortar: Use colored cement product. Color to match cast stone.

2.4 SOURCE QUALITY CONTROL

- A. The Owner's qualified independent testing agency to sample and test cast stone units according to ASTM C1364.

PART 3 - EXECUTION

3.1 SETTING CAST STONE IN MORTAR

- A. Set cast stone as indicated in TMS 604.
- B. Install cast stone units to comply with requirements in Section 042000 "Unit Masonry."
- C. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
- D. Set units in full bed of mortar with full head joints unless otherwise indicated.
 - 1. Fill dowel holes and anchor slots with mortar.
 - 2. Fill collar joints solid as units are set.
 - 3. Coordinate **concealed flashing** with bedding mortar joints as units are set.
 - 4. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
 - 5. Keep joints at shelf angles open to receive sealant.
- E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- G. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.

3.2 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone as indicated in TMS 604.
- B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.
- C. Fill anchor holes with sealant.
 - 1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
- D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
- E. Rake out joints for pointing with sealant to depths of not less than 3/4 inch. Scrub faces of units to remove excess mortar as joints are raked.
- F. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated.
 - 1. Keep joints free of mortar and other rigid materials.
 - 2. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/4 inch in 10 ft..
- B. Variation from Level: Do not exceed 1/4 inch in 20 ft. maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver units secured to shipping pallets and protected from damage and discoloration.
 - 2. Provide itemized shipping list.

3. Number each piece individually, as required, to match shop drawings and schedules.

B. Storage:

1. Store units and installation materials in accordance with manufacturer's instructions.
2. Store units on pallets with non-staining, waterproof covers.
3. Do not double stack pallets.
4. Ventilate units under covers to prevent condensation.
5. Prevent contact with dirt and splashing.

C. Handling:

1. Protect units, including corners and edges, during storage, handling, and installation to prevent chipping, cracking, staining, or other damage.
2. Handle long units at center and both ends simultaneously to prevent cracking.
3. Do not use pry bars or other equipment in a manner that could damage units.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

- C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.

- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by methods described in Cast Stone Institute Technical Bulletin #39.
6. Clean cast stone with proprietary cleaner applied according to manufacturer's written instructions.
7. **Do not use** the following to clean units:
 - a. Muratic acid.
 - b. Power Washing
 - c. Sandblasting
 - d. Harsh cleaning materials or methods that would damage or discolor surfaces.

3.6 REPAIR

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.
- B. Repair with touchup materials provided by manufacturer in accordance with manufacturer's instructions.
- C. Repair methods and results to be approved by Architect.

3.7 INSPECTION AND ACCEPTANCE

- A. Inspect completed installation in accordance with contract documents and industry standards.

3.8 WATER REPELLANT

- A. Apply water repellant for weatherproofing in accordance with water repellant manufacturer's instructions.
- B. Apply water repellant after installation, cleaning, repair, inspection, and acceptance of units are completed.

3.9 PROTECTION

- A. Protect installed units from splashing, stains, mortar, and other damage.

END OF SECTION 047200

SECTION 055000 - METAL FABRICATIONS

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.
- B. This section supplements Structural Specifications on Structural Drawings
- C. See Section 083313 "Aluminum Coiling Doors" for support and framing requirements at overhead coiling doors.

1.2 SUMMARY

A. Section Includes:

- 1. Steel framing and supports for mechanical and electrical equipment.
- 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- 3. Galvanized Steel coatings on zinc-coated metal and compatible with finish paint systems.
- 4. Miscellaneous steel trim including steel angle corner guards and steel edgings.
- 5. Metal bollards.
- 6. Loose bearing and leveling plates for applications where they are not specified in other Sections.
- 7. Jamb support framing at overhead coiling doors.

B. Products furnished, but not installed, under this Section include the following:

- 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
- 2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- 3. Angle support brackets for countertops.

C. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
- 2. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
- 3. See Structural Specifications on Structural Drawings for additional requirements.
- 4. Section 099123 "Painting" for preparation and the application of paint systems on exterior and interior substrates.

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 metal fabrications that are anchored to or that receive other work. 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.
- C. All metal fabrications embedded in CMU or Concrete and exposed to moisture shall be galvanized.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products including but not limited to primers and top coats.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel framing and supports for mechanical and electrical equipment.
 - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 3. Miscellaneous steel trim including steel angle corner guards and steel edgings.
 - 4. Metal bollards.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Refer to Structural Specifications on Structural Drawings for the required engineer's qualifications in the preparation of all drawings for all items in this section.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- C. Galvanized Coating Standard: ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products for minimum coating thicknesses according to material category as well as finish and adherence requirements.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication. **Show this field verified information and conditions on all submitted Shop Drawings.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: As required to support load.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B or structural steel, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch nominal thickness.
- F. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- G. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

- H. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- I. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- H. Post-Installed Anchors: Torque-controlled expansion anchors or adhesive anchor bolts anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

3. Refer to Structural Drawings and Specifications for adhesive anchor bolts requirements.

- I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099123 "Painting".
- B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete: Comply with reinforcement requirements in Structural Specifications and Structural Drawings and in Section 033000 and "Cast-in-Place Concrete".

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. 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. Cut, drill, and punch metals cleanly and accurately. **Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.** Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. 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, grind exposed welds smooth with adjacent surfaces and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water will accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications including structural lintels, as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes, attached bearing plates, anchors, and braces as required on structural drawings, coordinate all framing with partition manufacturer.

2.7 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from 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.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize and prime miscellaneous steel trim.
- D. Prime miscellaneous steel trim with zinc-rich primer.

2.8 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe and steel shapes, as indicated.
 1. **Bollards caps shall be 1/4-inch-thick steel plate. Concrete wash is unacceptable.**
 2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and chase(s) for wire.
- B. Fabricate sleeves for removeable bollards from steel pipe or tubing with 1/4-inch-thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
- C. Prime bollards with zinc-rich primer.

2.9 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.

2.10 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel studs anchors for embedding in concrete.

2.11 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean metal fabrication and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 1. Shop prime with primers specified in Section 099123 "Painting" unless zinc-rich primer is indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.13 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. 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.
- B. 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.
- C. 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 by grinding smooth exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 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.
- B. Anchor supports for building equipment, fixtures and components securely to, and rigidly brace from, building structure.

3.3 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
 1. Do not fill removable metal-capped bollards with concrete.
- B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete or in formed or core-drilled holes not less than 8 inches deep and 3/4 inch larger than OD of bollard. Fill annular space around bollard solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. **Slope grout up approximately 1/8 inch toward bollard.**
- C. Anchor bollards in place with concrete footings. Center and align bollards in holes and maintain 3 inches of concrete under bottom of bollard. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.4 INSTALLING 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 nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded 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/A 780M.

END OF SECTION 055000

SECTION 055213 - PIPE AND TUBE RAILINGS

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. Galvanized steel pipe railings.

1.3 COORDINATION

- A. Coordinate type of and installation methods of brackets for railings. Furnish setting drawings, templates, and directions for installing anchorages.
- B. Schedule installation so attachments are made only to completed construction. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Include plans with adequate dimensions, elevations, sections, details, and attachments to other work.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of ramp runs and landings and other construction by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Provide products by manufacturer experienced in this type of construction.
- B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 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. Steel: 72 percent of minimum yield strength.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails:
 - 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.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 - 1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt that provides 1-1/2-inch clearance from inside face of handrail to face of finished support post.

2.4 STEEL

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, 1 ½" outside diameter, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.5 FASTENERS

- A. General: Provide the following:
 - 1. Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.

2. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

- B. Fasteners for Anchoring Railings: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting".

2.7 FABRICATION

- A. General: Fabricate handrails 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. Shop assemble handrails 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 work true to line and level with accurate angles and surfaces.
- D. Connections: Fabricate handrails with welded connections unless otherwise indicated.
- E. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 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.
- F. Nonwelded Field Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- G. Form Changes in Direction as Follows:
 1. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.

- H. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- I. Brackets, Flanges, Fittings, and Anchors: Provide mounting brackets no wider than supporting posts, flanges, miscellaneous fittings, and anchors to connect handrail members to other work.
- J. Fabricate anchorage devices capable of withstanding loads limits imposed by handrails limits as stipulated under Performance Requirements in this specification section. Coordinate anchorage devices with supporting structure.

2.8 STEEL FINISHES

- A. Galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify the vertical, horizontal and slope alignments of railing post supports.
- B. Verify the all railing support framing shall withstand the effects of gravity loads and the loads and stresses within limits required under Performance Requirements in this specification section.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 2. Align handrails so variations from level for horizontal members and variations from parallel with rake of ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails 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. Comply with requirements for welded connections in "Fabrication" Article.

- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ATTACHING RAILINGS

- A. Provide brackets with 1-1/2-inch clearance from inside face of handrail and supportive construction (railing post). Locate brackets at spacing required to support structural loads.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."

3.6 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 061053 - CARPENTRY

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.
- B. This section supplements Structural Specification on Structural Drawing

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Pre-Engineered Lumber trusses
 - 3. Wood blocking and nailers.
 - 4. Plywood backing panels.
- B. Related Requirements:
 - 1. Section 061600 "SHEATHING" for roof sheathing.
 - 2. See Section 076200 "SHEET METAL FLASHING & TRIM" for additional requirements.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.
- C. Delegated Design: Engineer licensed in the State of New York is solely responsible for providing all structural calculations and design drawings of pre-fabricated lumber trusses. See Structural Notes in Structural Drawings for design parameters to be used.

1.4 ACTION 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 and net amount of preservative retained.
 - 2. Manufacturer's complete installation instructions and details for framing, blocking and sheathing of engineered framing components.

3. Manufacturer's complete installation instructions and details for each size, type and locations of anchors and mounting hardware.
- B. Shop Drawings: Show fabrication, installation and attachment details for all pre-engineered wood trusses.
 1. Design drawings for metal-plate-connected wood trusses including but not limited to calculations and installation requirements, truss bridging, anchoring hardware used at bearing walls, and beams. All field repairs and modifications are the sole responsibility of the licensed truss engineer to design of pre-engineered wood trusses. See Delegated Design under Article 1.6 A. of QUALITY ASSURANCE of this Section.
 2. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 3. Indicate sizes, stress grades, and species of lumber.
 4. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 5. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 6. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 7. Show splice details and bearing details.
- C. Provide all drawings and calculations as soon as possible. Final building permit approval is contingent upon approval of documents by Local Authorities.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Data for each of the following:
 1. Preservative-treated wood.
 2. Fire -retardant wood.
 3. Fasteners used with preservative-treated wood.
 4. Power-driven fasteners.
 5. Post-installed anchors.
 6. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Delegated Design: Engage a professional engineer licensed in the State of New York to design pre-fabricated lumber trusses. See Structural Notes in Structural Drawings for design parameters to be used.
- B. Structural Performance: Provide trusses capable of withstanding design loads within limits and under conditions indicated.
 1. Design Loads: As indicated in Structural Design Criteria as shown on the Structural Drawings.
 2. Loading due to HVAC, electrical, plumbing, fire protection and interior finishes that may be suspended from trusses.
 3. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:

- a. Roof Trusses: Vertical deflection of $1/360$ of the span for live or snow load and $1/240$ of the span for total load.
- 4. Design trusses to provide for movement of truss 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

1.8 WOOD PRODUCTS, GENERAL

- A. Lumber: See Rough Carpentry Specification on Structural Drawing S-001 for, pre-engineered trusses, engineered framing, dimensional lumber design criteria requirements.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

1.9 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood nailers, curbs, equipment support bases, blocking, ceiling battens, stripping, and similar members in connection with roofing, flashing, waterproofing and as indicated on the Drawings.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete and as indicated on the Drawings.

1.10 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch thick.

1.11 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

1.12 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 1. Treatment shall not promote corrosion of metal fasteners.
 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- E. Application: Treat all miscellaneous carpentry unless otherwise indicated.

1.13 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Utility Shelving: Lumber with 19 percent maximum moisture content of the following species and grades:
 - 1. Mixed southern pine or southern pine No. 2 grade; SPIB.
 - 2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 - 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

1.14 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, C-C Plugged, not less than 3/4-inch nominal thickness. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

1.15 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems compatible with substrate that meet or exceed structural strength requirements for the application.
- D. Post-Installed Anchors: Use fastener hardware used to anchor the bottom framed wall plate that is acceptable to and compatible with the pressure treated lumber manufacturer and authorities having jurisdiction.
 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

1.16 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Cleveland Steel Specialty Co.
 2. KC Metals Products, Inc.
 3. Phoenix Metal Products, Inc.
 4. Simpson Strong-Tie Co., Inc.
 5. USP Structural Connectors.
- B. Refer to Structural Specifications and Structural Drawings for requirements for size, type and locations of anchors and mounting hardware.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated on Structural Drawings. 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.
- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch thick.
 1. Use for wood-preservative-treated lumber and where indicated.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304.
 1. Use for exterior locations.

1.17 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- B. See Section 076200 "SHEET METAL FLASHING & TRIM" for additional requirements.

PART 2 - EXECUTION

2.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening through interior wall finish to CMU; coordinate locations, thickness and required spacing behind backing panels with project requirements.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- H. Where wood-preservative-treated lumber is installed in contact with Standing Seam Metal Roof Panels install continuous flexible flashing separator between wood and metal roof panels.
- I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. The latest and applicable sections of New York Building Code and as required by the authorities having jurisdiction.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

- J. Use steel common 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. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- K. Install required bridging and blocking as required in written recommendations and requirements of the pre-engineered roof truss manufacturer to meet the deflection requirements stated in the Structural Specification.
- L. Refer to Structural Drawings for required types of connection hardware and locations.

2.2 TRUSS INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- J. Replace wood trusses that are damaged or do not meet requirements.

2.3 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for 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. Coordinate attachment of roof sheathing to meet or exceed the structural loads required by the Standing-Seam Metal Roof Panel manufacturer.

- C. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- D. Provide blocking and framing as required to support facing materials, fixtures, specialty items, hand and guard rails, toilet accessories and trim.
- E. Verify that all required roof and wall flashings have been installed during construction as required in Section 074113 Standing-Seam Metal Roof Panels.
- F. Verify that all required shear, crush and anchor blocking, roof truss bracing, bridging, and attachment blocking are installed prior to exterior or interior finish materials are applied.

2.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. This section supplements Rough Carpentry Specification Section on Structural Drawing S-001
- B. See SECTION 074113 "Standing-Seam Metal Roof Panels" for underlayments, flashings and attachment requirements.

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof sheathing.
 - 2. Sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- B. Roof Joist Installation Manual: Manufacturer's Pre-Engineered roof truss installation drawings, instructions, roof sheathing span tables, fastening and adhesive requirements.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated plywood.

PART 2 - PRODUCTS

2.1 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
- B. Mark sheathing with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Exterior dimensional lumber and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.2 ROOF SHEATHING

- A. Orientated Strand Board Sheathing: Exterior Grade (APA Rated 32/16) sheathing in full compliance with Voluntary Standards PS-2.
- B. Thickness: Shall be determined by the Pre-Engineered Truss manufacturer for all truss spans but not less than 5/8" thickness.
- C. Fastening: Types, diameters, minimum truss penetration, and center to center spacing are determined by the Pre-Engineered Truss Pre-Engineered Truss
- D. Coordinate sheathing edge locations and attachment with Pre-Engineered Truss Pre-Engineered Truss and Structural Specifications and Drawings.

2.3 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel as recommended by manufacturers of both adhesives and plywood panels.

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. **Arrange joints so that pieces are supported by no less than three support members.**
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach panels and sheathing to framing components by complying with the following:
 - 1. The latest and applicable sections of New York Building Code and as required by the authorities having jurisdiction.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. Manufacturers of Pre-Engineered framing components (roof truss) anchoring recommendations and requirements.
- D. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Roof Sheathing:
 - a. Install required blocking and framing to provide continuous support at all openings, penetrations through sheathing and areas behind flashings.
 - b. Space panels 1/8 inch apart at edges and ends.
 - c. Install required edge support clips.

END OF SECTION 061600

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

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. Wood roof trusses.
 - 2. Wood girder trusses.

1.3 ALLOWANCES

- A. Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Section 012100 "Allowances."

1.4 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
 - 1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.

6. Show splice details and bearing details.

- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preserved-treated lumber.
 2. Fire-retardant-treated wood.
 3. Metal-plate connectors.
 4. Metal truss accessories.

1.7 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- D. Special Inspector Qualifications: A qualified person employed or retained by an approved agency that has the recommended experience and certifications as summarized in Appendix C of the current International Code Council (ICC) Special Inspection Manual.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection under Design Loads: As indicated.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Grade and Species: For truss chord web members and permanent bracing, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required

loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

- C. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for bottom chords 2 by 6 inches nominal for both top and bottom chords.
- D. Minimum Specific Gravity for Top Chords: 0.42.
- E. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

- A. Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
 - 1. Use for interior locations unless otherwise indicated.

2.4 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 - 2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Allowable design loads, as published by manufacturer, shall comply with 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. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick.

- D. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.
- E. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.
- F. Drag Strut Connectors: Angle clip with one leg extended for fastening to the side of girder truss.
 - 1. Angle clip is 3 by 3 by 0.179 by 8 inches with extended leg 8 inches long. Connector has galvanized finish.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

2.7 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.8 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
 - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
 - 2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten temporary bracing as indicated in the latest Building Component Safety Information (BCSI) document.
- J. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- K. Install wood trusses within installation tolerances in TPI 1.
- L. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- M. Replace wood trusses that are damaged or do not comply with requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

- B. Repair damaged galvanized coatings on exposed surfaces according to ASTM A780/A780M and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Special Inspections and field quality control testing: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - 1. Refer to drawings for testing and special inspection requirements.
 - 2. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
 - 3. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
 - 4. Prepare and submit reports within 7 days of completing tests and inspections. Distribute reports to Architect, Engineer, Owner (or owner's representative), and Contractor. Clearly indicate non-compliance on reports.
- B. Non-Compliant Work:
 - 1. The contractor shall remove and replace all non-compliant work, or, at the contractor's expense, perform additional testing to verify compliance. Contractor shall submit results of additional testing to Architect, Engineer, and Owner (or owner's representative) for review and approval.

END OF SECTION 061753

SECTION 064023 – INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standing and running trim.
2. Miscellaneous materials.
3. Plywood Ceilings.
4. Shop finishing of interior architectural woodwork.

B. Related Requirements:

1. Section 061600 "SHEATHING" for roof sheathing.
2. See Section 061053 "ROUGH CARPENTRY" for additional requirements.
3. See Section 099123 "PAINTING" for additional requirements.

1.2 DEFINITIONS

- A. Board or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.3 ACTION SUBMITTALS

A. Shop Drawings:

1. Include the following:
 - a. Dimensioned plans, elevations, and sections.
 - b. Attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.

- B. Samples: Shop-applied color and finish specified for each exposed product and square edge profile for standing, running trim and opening casings.

1.4 FIELD CONDITIONS

- A. Environmental Limitations with Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

2.2 INTERIOR RUNNING TRIM FOR TRANSPARENT FINISH

- A. Running Trim (occupied areas and rooms):
 - 1. Species: Doug-fir
 - 2. Cut: Plain sliced/plain sawn
 - 3. Wood Moisture Content: 5 to 10 percent.
 - 4. For trim items wider than available lumber, use veneered construction. Do not glue for width.

2.3 INTERIOR RUNNING TRIM FOR OPAQUE (PAINTED) FINISH

- A. Miscellaneous Trim (service / storage / equipment spaces and rooms):
 - 1. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
 - 2. Species: Eastern white pine – minor knots.
 - 3. Wood Moisture Content: kiln-dried to less than 15 percent moisture content.
- B. Plywood Ceiling (See Reflected Ceiling Plan for locations):
 - 1. Finish Ceiling Panels: Pressure Treated Plywood – Use APA Category UC2 with waterborne preservative CCA, Grade B sanded, not less than 3/4-inch nominal thickness.
 - 2. Species: Eastern white pine – minor knots.
 - 3. Wood Moisture Content: kiln-dried to less than 15 percent moisture content.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
 - 1. Preservative Treatment: Provide softwood lumber treated by pressure process, AWP A U1; Use Category UC3b.
 - a. Provide where in contact with concrete or masonry where indicated on Drawings.
 - b. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - c. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - d. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.

2.5 FABRICATION

- A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
 - 1. Ease exposed square edges to radius indicated for the following:
 - a. Exposed edges of Solid-Wood (Lumber) each exposed product and profile for standing, running trim and opening casings: 1/16 inch unless otherwise indicated.
 - b. Exposed edges of each exposed product and profile for standing, running trim and opening casings, rails and similar members more than 3/4 inch thick: 1/8 inch.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

- A. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- B. Install interior architectural woodwork level, plumb, true in line, and without distortion.
 - 1. Shim as required with concealed shims.
 - 2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes in accordance with AWP A M4.
- E. Plywood And Batten Finish Ceilings:
 - 1. Use stainless steel fasteners on all plywood ceilings.
 - 2. Apply a continuous wide bead of sealant at plywood seams.
 - 3. Apply continuous sealant at perimeter of plywood ceilings and interior partitions and exterior walls.

- F. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails for exposed fastening, Countersunk And Filled Flush With Interior Architectural Woodwork.
 - 3. For shop-finished items, use filler matching finish of items being installed.
- G. Running Trim:
 - 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
 - 2. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary.
 - 3. Scarf running joints and stagger in adjacent and related members.
 - 4. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
 - 5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

END OF SECTION 064023

SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program.

B. Research reports.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: AWI's Quality Certification Program accredited participant.

B. Installer Qualifications: AWI's Quality Certification Program accredited participant.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
- B. Grade: Custom.
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: Full overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Lamin-Art, Inc.
 - c. Pionite; a Panolam Industries International, Inc. brand.
 - d. Wilsonart LLC.
- F. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: PVC edge banding.
 - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.
- I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Basis of Design: Wilsonart matte or velvet matte finish. Color to be selected from a full range of manufacturers' standard colors.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 - 2. Particleboard: ANSI A208.1, Grade M-2.
 - 3. Straw-Based Particleboard: ANSI A208.1, Grade M-2, except for density.
 - 4. Softwood Plywood: DOC PS 1, medium-density overlay.
 - 5. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction as determined by testing performed on identical products by a qualified testing agency.
 - 1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening.
- C. Pulls: Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- D. Catches: Magnetic catches, BHMA A156.9, B03141.
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: BHMA A156.9, B04013; metal.
- G. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted.
 - a. Type: Full extension.
 - b. Material: Zinc-plated steel with polymer rollers.
2. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
3. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
4. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.

H. Door and Drawer Silencers: BHMA A156.16, L03011.

I. 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.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, 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 metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.6 FABRICATION

A. Complete fabrication, including assembly 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.

B. Shop-cut openings to maximum extent possible to receive hardware, appliances, 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.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.
- B. Grade: Install cabinets to comply with quality standard grade of item to be installed.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips, No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

END OF SECTION 064116

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic sheet paneling.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories colors.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319. Panels are to be USDA accepted for incidental food contact.
 - 1. Surface-Burning Characteristics: As follows when tested by a qualified testing agency in accordance with ASTM E84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less - Class A
 - b. Smoke-Developed Index: 450 or less.
 - 2. Nominal Thickness: Not less than nominal thickness of 1/8" (0.12 inch).
 - 3. Surface Finish: Molded pebble texture.
 - 4. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color: As selected by Architect from manufacturer's full range.
- B. Adhesive Nonflammable NFPA Class A Fire Rated, trowel applied adhesive compatible with substrate and ASTM C557.
 - 1. Basis of Design: Titebond Ultimate Advanced Polymer Panel Adhesive.

- C. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

3.2 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive.
- D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- E. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 071113 - BITUMINOUS DAMPPROOFING

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. Cold-applied, cut-back-asphalt dampproofing.
 - 2. Cold-applied, emulsified-asphalt dampproofing.
 - 3. Molded-sheet drainage panels (Pool Equipment Pit).

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for bituminous vapor retarders under slabs-on-grade.
 - 2. Section 042000 "Unit Masonry" for mortar parge coat on masonry surfaces.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide protection course, drainage panels, and auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

2.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. APOC, Inc; a division of Gardner Industries.
 - 2. BASF Corporation; Construction Systems.
 - 3. Brewer Company (The).
 - 4. ChemMasters, Inc.
 - 5. Euclid Chemical Company (The); an RPM company.
 - 6. Henry Company.
 - 7. Karnak Corporation.
 - 8. W. R. Meadows, Inc.
- B. Trowel Coats: ASTM D 1227, Type II, Class 1.
- C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.4 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D 1668/D 1668M, Type I.
- D. Patching Compound: Epoxy or latex-modified repair mortar or Asbestos-free fibered mastic of type recommended in writing by dampproofing manufacturer.
- E. Protection Course: Recommended by manufacturer. ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.
 - 1. Thickness: Nominal 1/4 inch.
 - 2. Adhesive: Rubber-based solvent type recommended in writing by waterproofing manufacturer for protection course type.
- F. Protection Course: Recommended by manufacturer. Fan folded, with a core of extruded-polystyrene board insulation faced on one side or both sides with plastic film, nominal thickness

1/4 inch, with a compressive strength of not less than 8 psi per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272/C 272M.

2.5 MOLDED-SHEET DRAINAGE PANELS (Pool Filter Pit)

- A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."
- B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel acceptable to dampproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core, with or without a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Hydrotech, Inc.
 - b. BASF Corporation; Construction Systems.
 - c. Carlisle Coatings & Waterproofing Inc.
 - d. CETCO, a Minerals Technologies company.
 - e. GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - f. Insulation Solutions, Inc.
 - g. Polyguard Products, Inc.
 - h. Urethane Polymers International, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.
- B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

- C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.
- D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.
 - 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. **Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks by embedding an 8-inch-wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.**
- C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto items that penetrate inner wythe.
 - 1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
 - 2. Lap dampproofing at least 1/4 inch under through wall flashings.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft..
- B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, primer and one fibered brush or spray coat at not less than 3 gal./100 sq. ft. or primer and one trowel coat at not less than 5 gal./100 sq. ft..
- C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft..
- D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft..

- E. Concrete Backup for Masonry Veneer Assemblies: Apply one brush or spray coat at not less than 1 gal./100 sq. ft..
- F. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft..

3.5 PROTECTION COURSE INSTALLATION

- A. Install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
 - 1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
 - 2. Install protection course on same day of dampproofing installation (while coating is tacky) to ensure adhesion.

3.6 DRAINAGE PANEL INSTALLATION

- A. Molded- Sheet Drainage Panels: Install panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate dampproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.7 PROTECTION

- A. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where panels are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- B. Correct dampproofing that does not comply with requirements; repair substrates, and reapply dampproofing.

END OF SECTION 071113

SECTION 074113 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes prefinished standing-seam metal roof panels on self-adhering underlayment on roof sheathing, roof penetrating flashings, prefinished roof edge and fascia conditions, eaves, ridges, valleys, rakes, and counter flashings.
- B. Roof assembly contains no insulation and is continuously vented from soffit to ridge.
- C. All visible roof flashings, trim, fascia, gutters and downspouts shall match the color and finish of the prefinished roof panels.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product and finish.
- B. Sample Warranties: Provide initial Weathertightness and Finish warranties showing required warranty term and conditions.
- C. Shop Drawings: Provide scaled drawings showing installation layouts of metal panels; fastener patterns for roof panels roof panel profiles and joints; details of edge conditions, trim, flashings, closures, accessories; and required details of corners, anchorages, penetrations showing how wall, roof flashings and underlayment provide a continuous watertight barrier.
- D. Include soffit panel & ridge vent details, net free area testing data, material descriptions, dimensions of individual components, accessories and profiles, and finishes for each type of panel and accessory.
- E. Provide certified testing reports showing compliance with items listed in article 2.1 PERFORMANCE REQUIREMENTS in this Section.
- F. Provide a letter from the standing seam roof panel manufacturer stating that all roof assembly materials and methods of construction are compliance with requirements listed in articles 1.6 WARRANTY and 2.1 PERFORMANCE REQUIREMENTS in this Section.
- G. Samples: Provide a color charts for initial selections. The final finish will be selected from actual product finish samples for each type of metal panel indicated.
- H. Proposed Substitutions: Submit all documentation as required in SECTION 012500 SUBSTITUTION PROCUDERS.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Warranties: Weathertightness and Finish warranties issued by roofing manufacturer.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by the roofing manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard non prorated form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. 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 panels that show evidence of deterioration of factory- applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 35 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
 - 2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E 1980.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Uplift Loads: As indicated on Structural Drawings and Structural Specifications and in compliance with UL 580

2. Other Design Loads: As indicated on Structural Drawings and Structural Specifications.
- C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 or ASTM E 283 at the following test-pressure difference:
 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:
 1. Test-Pressure Difference: 2.86 lbf/sq. ft.
- E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- F. Soffit: Minimum of 19.1 square inches of net free area per square foot is required.
- G. Ridge Vent: Minimum of 20 square inches of net free area per lineal foot is required.
- H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with 90 degree seam joint type and mechanically attaching panels to roof assembly shown on Drawings using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Vertical-Rib Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming the vertical ribs 90 degrees to form a water tight seam.
 1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 22 gauge - 0.0299
 - b. Exterior Finish: Two-coat fluoropolymer
 - c. Color: As selected by Architect from manufacturer's full range of standard colors.
 - d. Seam: 2" tall single with 90 degree mechanically locked panel seams
 2. Clips: One-piece fixed to accommodate thermal movement.
 - a. Material: 0.064-inch- nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

3. Panel Coverage: 18 inches
4. Panel Height: Maximum 2 inches
5. Basis of Design: Drexel Metals DMC 200S
6. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pac- Clad
 - b. Atlas International. Inc.
 - c. MS Metal Sales

C. Roof Ventilation:

1. Roof intake is achieved by continuous perforated soffits and exhaust is provided continuous ridge vents that are part of the Standing Seam Metal Roof Panel roof assembly.

2.3 UNDERLAYMENT MEMBRANE

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils thick, consisting of slip-resistant, polyethylene- film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release- paper backing. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 3. Fire Resistance: Class A ASTM E 108 and UL 790
 4. Membrane Air Permeance: Not to exceed 0.02 cfm/sq. ft. of surface area at 1.57 lbs/sq. ft. pressure difference; ASTM E2178.
- B. Basis of Design: Carlisle WIP 300HT
- C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.6 ROOF SHEATHING

- A. See Specification Section 061600 "SHEATHING" for roof deck sheathing requirements.
- B. General: Roof Sheathing panels shall be the minimum thickness and anchored to roof framing to meet the written requirements by Standing Seam Roof Panel manufacturer and approved for use in FM Approvals' RoofNav-listed roof assemblies. See Structural Specification and Drawings for additional requirements.

2.7 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for attachment, support and alignment of metal roofing panels.

- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fascia, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal 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 panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, crickets, rakes, corners, bases, framed openings, ridges, fascia, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Soffit and Trim: Provide continuous channels and trim formed from same material as soffit panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, exterior soffits. Finish flashing and trim with same finish system as adjacent metal panels.
1. Basis of Design: TruLine HP 16" Full Vent
- E. Ridge Vent and Trim: Provide continuous Cor-A-Vent ridge flashing (cap) Z closure flashings double sided tape sealant and trim formed from same material as roof panels as required to seal against weather and to provide finished appearance. Locations include all continuous ridges. Finish flashings and trim with same finish system as adjacent metal panels.
2. Basis of Design: Drexel Metals Cor-A-Vent vented ridge flashing with Cor-A-Vent V-600.
- F. Gutters and Downspouts: Plain rectangular, formed from the same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual" finish to match metal roof
- G. Downspout Boot: Provide cast iron downspout boot transition to drainage pipe.
- H. ROOF SHEET METAL FABRICATIONS
1. Apron, Step, and Backer Flashing: As shown on the Drawings and required by Roof Panel Manufacturer to provide Special Watertightness and Finish Warranties as required in this Section. All visible flashings shall be prefinished to match Roof Panel finish. The following are minimum thickness and metal types:
 - a. Valley and Step Flashing: Aluminum-Zinc Alloy-Coated Steel: 22-gauge minimum thickness.
 - b. Drip Edges: Aluminum-Zinc Alloy-Coated Steel 22-gauge minimum thickness.
 - c. Eave, Rake, Ridge, and Hip Flashing: Aluminum-Zinc Alloy-Coated Steel 22-gauge minimum thickness.
- I. Snow Guards: Two rail system using set screw seam clamps, finish to match roof panels as manufactured by S-5! or Architect approved equal.

- J. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- K. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 7/8 inch wide and 3/16 inch thick.
 - 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.8 ROOF PANEL FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, 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.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including raised side edges, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.9 ROOF FLASHING INSTALLATION

- C. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- D. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.
- E. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- F. 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 minimum of 4 inches.

- G. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

2.10 FINISHES

A. Roof Panels, Fascia, Flashings, Trim, and Accessories:

1. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

B. Soffit:

1. Manufacturer's standard finish. Color selected by Architect from manufacturer's full line of standard finishes.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to support concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
 1. Install clips to support self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommended in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vent flashings, sky light curbs and accessories.
 - c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. Roof Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

- D. Flashing and Trim: Comply with uplift and thermal movement performance requirements, manufacturer's written installations, requirements to obtain manufacturer's weathertightness warranty, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners and set units true to line. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.3 UNDERLAYMENT MEMBRANE INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions during installation of underlayment as stated in the manufacturer's written requirements. Apply under all Standing-seam metal roof panels, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Extend underlayment under fascia trim. Roll laps with roller. Cover underlayment as required by manufacturer or within 30 days maximum.
 - 1. Apply over the entire roof surface directly to roof sheathing.
 - 2. Apply over the roof areas as indicated below:
 - a. Roof perimeter for a distance up from eaves of 36 inches beyond interior wall line.
 - b. Valleys from lowest point to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches
 - c. Rake edges for a distance of 18 inches
 - d. Hips and ridges for a distance on each side of 12 inches
 - e. Roof-to-wall intersections for a distance from wall of 18 inches and vertically on wall to minimum 24-inches above roof plane.
 - f. Around pipe / vent flashings, skylights, and other penetrating elements for a distance from element of 18 inches
- B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.5 ROOF SHEATHING INSTALLATION

- A. See Specification Section 061600 "SHEATHING" for roof deck sheathing requirements.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain a clean condition during construction.

END OF SECTION 074113

SECTION 074600 – FIBER CEMENT SIDING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY: Section includes fiber-cement siding, trim and accessories and PVC trim.

- A. See Section 076200 SHEET METAL FLASHING & TRIM for formed wall and roof sheet metal flashings.
- B. See Section 079200 JOINT SEALANTS for Joint-sealant application, joint location, and joint preparation requirements.
- C. See Section 099113 EXTERIOR PAINTING for field applied coatings.
- D. See Section 074113 STANDING SEAM METAL ROOF PANELS for roofing and soffit materials & installation.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: 12" sample showing texture of each type of lap siding and trim used.
- C. Manufacturer's complete installation instructions including flashing, painting, and sealant installation requirements for fiber-cement products and PVC products.
- D. Fasteners for fiber cement siding & trim, use hot-dip galvanized or stainless-steel fasteners and as required by fiber cement siding manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer issued Warranty.

1.4 MAINTENANCE MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of each siding and trim types including related accessories, in a quantity equal to 2 percent of amount installed.

1.5 QUALITY ASSURANCE

- A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- B. Source Limitations: Obtain each type, color, texture, and pattern of siding, including related accessories, from single source from single manufacturer.

1.6 WARRANTY

- A. Special Warranty (fiber cement siding & trim): Standard Manufacturer's Warranty in which manufacturer agrees to repair or replace siding that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING AND TRIM

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide James Hardie products or comparable products by one of the following:
 - a. Cemplank.
 - b. CertainTeed Corp.
 - c. GAF Materials Corporation.
 - d. MaxiTile, Inc; a California corporation.
 - e. Nichiha Fiber Cement.
 - 2. Types and Patterns:
 - a. Texture: Cedarmill Wood grain for siding.
 - b. Texture: Smooth for trim, board and batten.
 - 3. Factory Priming: Manufacturer's standard acrylic primer.
- B. Nominal Siding Thickness: Not less than 5/16 inch.
- C. Siding Exposure: 6"
- D. Nominal Batten Thickness and Width: Not less than 5/16 inch thick by 2-1/2 inch width.
- E. Nominal Board (Panel) Thickness: Not less than 5/16 inch thick.
- F. Fiber Cement Trim at all locations.
 - 1. 2" min of roof surface at roof rakes and eaves

2. 6" min above finished adjacent grade.
3. See manufacturer's written installation guidelines for trim at precast stone or masonry.

2.3 ACCESSORIES

- A. Flashing: Provide prefinished flashing at all windows and door heads and at all individual siding head seams. Locate siding's vertical seams, attachment fasteners, and at light gauge Z furring.
- B. Provide starter strips, continuous vent strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer required for installations shown on the Drawings.
- C. See Section 079200 JOINT SEALANTS for Joint-sealants and joint preparation requirements.
- D. Fasteners:
 1. Strictly follow siding & trim manufacturer's fastener requirements and patterns and fastener types.
 2. Use stainless steel fasteners of sufficient length to penetrate a minimum of 1 inch into cold formed metal furring.
 3. Staples shall not be used to anchor or attach fiber cement siding.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall sheathing and substrates for compliance with requirements for siding & trim installation tolerances and other conditions affecting performance of siding and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION - SIDING

- A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 1. Do not install damaged components.
 2. Siding seams shall be 1/8" and filled with joint sealants as specified by Section 079200 JOINT SEALANTS to produce weathertight installation.
 3. Install fasteners no more than 24 inches on center or as required by manufacturer with 1" minimum penetration into cold formed stud framing or Z furring.
 4. Stagger vertical butt joints minimum 24 inches on center.
 5. Coordinate flashing and trim to maintain ventilation behind siding.
- B. Install screws in siding with 1/16" deep divots. Fill and sanded smooth.

3.3 INSTALLATION - TRIM BOARDS AND FASCIA

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten trim per manufacturer's requirements. Fastener length, type, and rust resistance shall be in compliance with manufacturer's written requirements.
- C. Place fasteners no closer than 3/4 inch and no further than 2 inches from side edge of trim board and no closer than 1 inch from end. Fasten maximum 16 inches on center or as directed by manufacturer, whichever is smaller.
- D. Install fasteners in trim boards flush with surface. Fasteners that create divots shall be filled and sanded smooth.
- E. Soffit edge trim shall be held back from trim 1/8" and caulked.
- F. Install joint sealants as specified in Section 079200 "Joint Sealants" and siding manufacturer to produce weathertight installation.
- G. Provide adequate blocking to secure and support all trim (openings / running and corner trim) on exterior wall.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074600

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed drainage sheet metal fabrications for roof, walls and wall openings.
2. All visible roof flashings, trim, fascia, gutters and downspouts shall match the color and finish of the prefinished roof panels.

1.2 RELATED REQUIREMENTS:

1. Section 042000 "Unit Masonry" for cavity wall mock-up requirements and cavity wall insulation at foundation.
2. Section 071113 "Bituminous Damproofing" used at Foundation walls.
4. Section 074113 "Standing-Seam Metal Roof Panels" for continuous tie in requirements for membrane requirements and all flashings, penetrations, and fascia sheet metal fabrications.
5. Section 0746000 "Fiber Cement Siding & Trim" for fastener requirements.

1.3 ACTION SUBMITTALS

B. Product Data: For each type of product with uncoated and prefinished (painted) coatings

C. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details showing attachment and sealing to adjacent work.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.5 QUALITY ASSURANCE

- ##### A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. Roof fascia, edge, penetration flashings shall be installed in compliance with Special Weathertightness Warranty requirements in Section 074113 "Standing-Seam Metal Roof Panels".
2. Window, door, siding flashings shall be installed in compliance with compatibility with and in a manner as required by fiber cement siding & trim manufacturer's written requirements. See Section 0746000 "Fiber Cement Siding & Trim" for submittal requirements.

1.6 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
 1. Design Pressure: As indicated in Structural Specifications & Drawings'.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 1. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 18 gauge (.040") or thicker.

- a. Color: To be selected by Architect from manufacturers full line.
- b. Visible roof flashings shall match color of Standing Seam Metal Roof Panel.
- c. Visible siding flashings shall match color of adjacent siding and or trim.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal with factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

- I. Flashing & Counter Flashings : See Drawings & Section 0746000 “Fiber Cement Siding & Trim” for siding, window and door flashing requirements and details.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Obtain field measurements for accurate fit before shop fabrication.
 - 2. Form sheet metal flashing and trim to fit substrates without oil canning, buckling, and tool marks; true to line, levels, and slopes; all exposed edges folded back to form hems.
 - 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard in this Section.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or if required to secure an accessory from compatible, noncorrosive metal.
- E. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.6 FINISHES

- A. Flashings, Trim, and Accessories:
 - 1. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

2.7 SHEET METAL FABRICATIONS

- A. General: Coordinate wall, trim, and siding flashings with Section 074113 “Standing-Seam Metal Roof Panels” & Section 0746000 “Fiber Cement Siding & Trim” to ensure continuous tie in requirements for water & air barrier requirements of sheet metal fabrications.
- B. Through Wall, Step, Base and Counterflashings and Backer Flashing: Fabricate from the following materials:

1. Aluminum: 0.048 inch- 18-gauge min. thick.
- C. Drip Edges: Fabricate from the following materials:
 1. Aluminum: 0.048 inch 18gauge min thick.
- D. Through Wall Flashing: Fabricate from the following materials:
 1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, 0.025 inch 24 gauge min thick.

FINISHES

- B. Roof Panels, Fascia, Flashings, Trim, and Accessories:
 1. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.2 INSTALLATION, GENERAL

- 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, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 2. 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.
 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.3 ROOF FLASHING INSTALLATION

- A. General: See Section 074113 "Standing-Seam Metal Roof Panels" for continuous tie in requirements for water & air barrier requirements and all flashings, penetrations, and fascia sheet metal fabrications.

3.4 ALUMINUM WINDOWS AND FRP DOORS

- A. General: See Drawings for required sheet metal fabrications and Sections 085113 "Aluminum Windows" and 082200 "FRP Doors And Frames" for flashing requirements at each window door jamb - head.

3.5 SIDING & TRIM FLASHING INSTALLATION

- A. General: See Section 0746000 "Fiber Cement Siding & Trim" for continuous tie in requirements for water barrier requirements and drainage requirements at all trim flashings, penetrations, and fascia sheet metal fabrications.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.

- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 078413 - FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. See G-201 for fire rated roof/ceiling assembly, and walls.
2. Firestopping systems for the following applications:
 - a. Penetrations in fire-resistance-rated roof/ceiling assembly, and walls.
 - b. Horizontal joint assemblies at fire-resistance rated walls.
 - c. Vertical joint assemblies at fire-resistance rated walls.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Include plan locations, illustration of firestopping system, and design designation of qualified testing and inspecting agency for each type of penetration and joint assembly firestopping system.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Installer Certificates: Installer shall provide, on company letter head, certifying that all penetration and joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions prior to Substantial Completion.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval of Firestop Contractors," or **Submit a certificate showing the completion of U.L. qualified firestop contractor program.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Penetration and joint firestopping materials and assemblies are identical to those tested per testing standard referenced on the Drawings. Provide rated systems complying with the following requirements:
 - a. Penetration and edge firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration and edge firestopping correspond to designations and material assemblies as listed by the following:
 - 1) The latest edition of Underwriters Lab "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction. Firestopping systems shall be compatible with one another, with the substrates forming openings, between different assemblies (Interior Partitions / Roof assemblies) and with penetrating items.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. HoldRite; Reliance Worldwide Company.
 - d. International Fireproof Technology Inc.
 - e. NUCO Inc.
 - f. Tremco, Inc.

B. Vertical Penetrations and Joint Assemblies in Fire-Resistance-Rated Walls: Firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Horizontal Penetrations and Joint Assemblies: Firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or 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

If fill materials are Contractor's choice, retain only those paragraphs below that suit Project. If retaining fill materials in the Penetration Firestopping Schedule, coordinate paragraphs with materials specified in the Schedule.

- A. 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.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

- G. 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.
- H. 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. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: 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 sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

Retain this article if products are specified that require mixing before application.

- A. For those products requiring mixing before application, comply with penetration firestopping 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 of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove foreign materials, coatings, loose materials or debris from substrates surfaces and from penetrating items that could interfere with adhesion of penetration firestopping.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping.
 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by 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 penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening and joint configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- C. Install forming 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.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- D. Install fill materials by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Preformed joint sealants.
5. Acoustical joint sealants.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers samples of materials that will contact or affect joint sealants. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction compatibility and adhesion test reports.
- C. Preconstruction field-adhesion test reports.

D. Warranties.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace 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.

- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

- C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant Silicone Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. BASF Building Systems.
 - b. Dow Corning Corporation.
 - c. GE Advanced Materials - Silicones.
 - d. May National Associates, Inc.
 - e. Pecora Corporation.
 - f. Polymeric Systems, Inc.
 - g. Schnee-Morehead, Inc.
 - h. Sika Corporation; Construction Products Division.
 - i. Tremco Incorporated.
 - j. Approved equal.
2. Type: Single component (S).
 3. Grade: nonsag (NS).
 4. Class: 50.
 5. Uses Related to Exposure: Nontraffic (NT).

2.3 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Building Systems.
 - b. Bostik, Inc.
 - c. Lyntal, International, Inc.
 - d. May National Associates, Inc.
 - e. Pacific Polymers International, Inc.
 - f. Pecora Corporation.
 - g. Polymeric Systems, Inc.
 - h. Schnee-Morehead, Inc.
 - i. Sika Corporation; Construction Products Division.
 - j. Tremco Incorporated.
 - k. Approved equal.
2. Type: multicomponent (M).
3. Grade: Pourable (P).
4. Class: 50.
5. Uses Related to Exposure: Traffic (T).

2.4 JOINT SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.5 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.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by 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.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer 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.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of kind 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.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- 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 in 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 in subparagraphs 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 sealant from surfaces adjacent to joints.
 - 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 profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- F. Clean off excess sealant 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.

3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between plant-precast architectural concrete paving units.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Urethane.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - e. Control and expansion joints in ceilings and other overhead surfaces.
 - f. Other joints as indicated.
 - 2. Joint Sealant: Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Urethane.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical joints on exposed surfaces of interior unit masonry, concrete walls and partitions.
 - d. Joints on underside of plant-precast structural concrete beams and planks.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - f. Other joints as indicated.
 - 2. Joint Sealant: Latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

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. Fire Rated hollow metal doors and frames.

B. Related Sections:

- 1. Division 01 Section "General Conditions".
- 2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
- 3. Division 08 Section "Door Hardware".
- 4. Division 09 Sections "Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

- 1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
- 2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
- 3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
- 4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- 5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
- 6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- 7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- 9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
- 10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
- 11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of anchorages, joints, field splices, and connections.
 6. Details of accessories.
- D. Samples for Verification:
 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
 1. Temperature-Rise Limit: Where indicated provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
 - 1. CECO Door Products (C).
 - 2. Pioneer Industries (PI)
 - 3. Steelcraft (S).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard fire door core as required to provide fire-protection and temperature-rise ratings indicated.
 - 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 - 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
 - 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 - 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Manufacturers Basis of Design:
 - 1. Curries Company (CU) - 727 Series (Temprise)

2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 - 3. Manufacturers Basis of Design:

- a. Curries Company (CU) - M Series.

- C. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.7 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Frames:
 - 1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 6. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
 7. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- D. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

2.8 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.
- E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION 081113

SECTION 082200 – FRP FACED DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fiber reinforced polyester (FRP) faced flush exterior doors.
- B. Related Sections include the following:
 - 1. See SECTION 079200 "Joint Sealants" for perimeter sealants.
 - 2. See SECTION 087100 "Door Hardware" for hardware requirements and schedule.

1.2 SUBMITTALS

- A. Product Data: Submit door manufacturer's product data for each type of door, including details of core and edge construction, trim for openings, and finishing specifications.
- B. Shop Drawings: Submit shop drawings showing location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware reinforcements, requirements for attachment to aluminum-framing and other pertinent data.
- C. Samples: Provide manufacturer's full range of color samples of FRP material, approximately 3" x 5" size.

1.4 SYSTEM PERFORMANCE

- A. Provide doors that have been designed and fabricated to comply with requirements for system performance characteristics listed below, as demonstrated by testing manufacturer's corresponding standard systems according to test methods designated.
- B. Thermal Transmission (exterior doors): "U" value of not more than 0.09 (BTU/Hr. x SF x degrees F.) per AAMA 1503.01.
- C. Flame Spread/Smoke Developed: Provide FRP doors and panels with the following ratings in according with ASTM E84-79a:
 - 1. Flame Spread: Not greater than 170 (Class C).
 - 2. Smoke developed: Not greater than 390 (Class C).
- D. Class A flame spread and smoke developed rating on interior faces of exterior doors shall be no greater than 15, smoke developed no greater than 310 per ASTM E-84.

- E. Additional Criteria: Provide FRP doors and panels with the following performance:
 - 1. ASTM D 256 – nominal value of 20.0
 - 2. ASTM D 570 – nominal value of .20 to .40%
 - 3. ASTM D 2583 – nominal value of 50
- F. Abrasion Resistance: Face sheet to have no greater than .029 average weight loss percentage after Taber Abrasion Test – 25 cycles at 500 gram weight with H-18 wheel.
- G. Stain Resistance: Face sheet to be unaffected after 24 hour exposure to SVS-1 white spray enamel. Must retain DE of .57 or less with MacBeth Colorimeter. Dark Brown (Bronze) FRP to be used as a basis.
- H. Chemical Resistance: Face sheet to be unaffected after 4 hour exposure to acetic acid (10% solution), acetone, sodium hypochlorite (5.25% solution) and hydrochloric acid (10% solution). No discoloration or panel damage will be allowed.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Obtain doors from the same manufacturer to ensure uniformity in quality of appearance and construction.
- B. Standards: Comply with the requirements and recommendations in applicable specification and standards by AAMA, except to the extent more stringent requirements are indicated.
- C. Performance: A minimum ten year record of production, doors and panels and completion of similar projects in type and size.
- D. Instruction: The manufacturer or his representative will be available for consultation to all parties engaged in the project including instruction to installation personnel.
- E. Field Measurement: Field verify all information prior to fabrication and furnishing of doors.
- F. Regulation and Codes: Comply with the current edition in force at the project location of all local, state and federal codes and regulations, including the American with Disabilities Act of 1992.

1.6 PRODUCTION DELIVERY, STORAGE AND HANDLING

- A. Protect FRP doors during transit, storage and handling to prevent damage, soiling and deterioration. Package doors at factory prior to shipment using manufacturer's standard method.
- B. Identify each door with individual opening numbers which correlate with those shown on the design drawings. Use temporary, removable or concealed markings.

1.7 PROJECT WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other

rights of 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. Provide a written warranty signed by manufacturer, installer and contractor, agreeing to replace, at no cost to the Owner, any doors, which fail in materials or workmanship, within the warranty period. Failure of materials or workmanship includes: excessive warping, faulty operation of entrances, deterioration of finish or construction in excess of normal weathering and defects in hardware installation. The minimum time period of warranty is ten (10) years from acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide the products of one of the following:
 - 1. FRP Faced Doors:
 - a. Kawneer, Flushline FRP
 - b. Special-Lite, SL-17 FRP (800-821-6531)
 - c. Commercial Door Systems F200 FRP (215-288-9803)

2.2 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Alloy and temper as recommended by manufacturer for strength, corrosion resistance and application of required finish and control of color; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate.
- B. Coordinate door construction with the frame and hardware.
- C. Fasteners: Aluminum-non-magnetic stainless steel or other non-corrosive metal fasteners guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors and other items being fastened. For exposed fasteners (if any) provide Phillips head screws with finish matching the item to be fastened.

2.3 FABRICATION

- A. Sizes and Profiles: The required sizes for door units, are shown on the drawings.
- B. Coordination of Fabrication: Field measure before fabrication, and show recorded measurements on final shop drawings.
- C. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to assembly. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1/64".

- D. Maintain continuity of line and accurate relation of planes and angles. Secure attachments and support at mechanical joints, with hairline fit at contacting members.
- E. Prepare and reinforce for all scheduled hardware.

2.4 FIBERGLASS REINFORCED POLYESTER FRP FLUSH DOORS

A. Materials and Construction:

1. Construct 1-3/4" thickness doors of 6063-T5 aluminum alloy stiles and rails. Construct with mortise and tenon style corners and provide joinery of 3/8" diameter full width tie rods through extruded splines top and bottom. Stiles and rails shall be .125" thick or reinforced with .125" thick aluminum extrusions to accept hardware as specified. Furnish integral reglets to accept face sheet to permit a flush appearance.
2. Extruded top and bottom rail legs for interlocking continuous rigidity weather bar. Lock face sheet material in place with extruded interlocking edges to be flush with aluminum stiles and rails. Top rail shall be minimum 5" deep or reinforced. The full width of door on both faces to depth of 5" with .125" aluminum extrusion.
3. Door face sheeting .120" thickness fiberglass reinforced polyester. Provide doors with an abuse resistant engineered surface of the standard colors: white, gray, blue, beige, bronze or black as selected by Architect.
4. Core of Door Assembly: Minimum five pounds per cubic foot density poured-in-place polyurethane free of CFC. Minimum "R" value of 11.
5. Weather-stripping: Meeting stiles on pairs of doors with nylon brush weather-stripping.
6. Premachine doors in accordance with templates from the specific hardware manufactures and approved hardware schedule. Factory install hardware to greatest extent possible.

2.5 FRP FINISHES

- A. General: Architect will select one (1) color of FRP sheet for exterior face and a different color of FRP sheet for interior face. Manufacturer must offer at least six (6) different color choices.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine 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 plumb jambs and level heads.
 2. Reject doors with defects.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see SECTION 087100 "Door Hardware".
- B. Manufacturer's Written Instructions: Install FRP doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING AND PROTECTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors damaged during installation.
- C. Protect assemblies as recommended by door manufacturer to ensure that doors and frames are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 082200

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Counter doors.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for door-opening framing and corner guards.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type and size of coiling counter door and accessory.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 2. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 COUNTER DOOR ASSEMBLY

- A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

B. Basis of Design:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alpine Overhead Doors, Inc.
 - b. Alumatec Pacific Products.
 - c. ASTA Door Corporation.
 - d. C.H.I. Overhead Doors, Inc.
 - e. Clopay Building Products.
 - f. Lawrence Roll-Up Doors, Inc.
 - g. McKeon Rolling Steel Door Company, Inc.
 - h. Overhead Door Corporation.
 - i. Raynor.
 - j. Wayne-Dalton Corp.
- C. Operation Cycles: Door components and operators capable of operating for not less than 10,000.
- D. Curtain: Interlocking slats, 1-1/2 inches high by 1/2 inch deep, Type F-158 fabricated of 22 gauge ASTM A653 galvanized steel. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.
- E. Door Curtain Slats: Flat profile slats.
- F. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated hot-dip galvanized steel and finished to match door.
- G. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- H. Integral Frame, Hood, and Fascia: Stainless steel.
 1. Mounting: Face of wall.
- I. Sill Configuration: No sill.
- J. Locking Devices: Equip door with locking device assembly.
 1. Locking Device Assembly: Two point dead locks with mortise cylinders.
- K. Manual Door Operator: Push-up operation.
- L. Curtain Accessories: Equip door with push/pull handles.
- M. Door Finish:
 1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.
 - 1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.3 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
- B. Integral Frame, Hood, and Fascia: Welded sheet metal assembly of the following sheet metal(s):

2.4 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - 1. Lock Cylinders: Master cylinder lock operable from both sides of bottom bar.
 - 2. Keys: Three for each cylinder.
- B. Chain Lock Keeper: Suitable for padlock.
- C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.5 CURTAIN ACCESSORIES

- A. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.6 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.
- B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf (111 N).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313

SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Entry doors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
 - 1. Design Wind Load: Uniform pressure (velocity pressure) of 30 lbf/sq. ft., acting inward and outward.

2.2 DOOR ASSEMBLY

- A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
 - 1. Manufacturers: **Basis of Design: Cornell ESD10** (Entry Door). Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Cookson.
 - b. Clopay Building Products.
 - c. Overhead Door Corporation.
 - d. Wayne-Dalton Corp.
- B. Operation Cycles: Standard construction for normal use of up to 20 cycles per day maximum, and life cycle expectancy of up to 50,000.
- C. Door Curtain Material: 20-gauge grade 40 Galvanized Steel, ASTM A653.
- D. Door Curtain Slats: Flat profile slats.
- E. Bottom Bar: Two angles fabricated from reinforced extruded aluminum interior face with exterior skin slat to match curtain material and gauge.
- F. Windlock: Provide as required. Steel to match curtain material.
- G. Bellmouths: Steel to match curtain material.
- H. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- I. Hood: Match curtain material and finish.
 - 1. Mounting: Face of wall.
- J. Locking Devices: Equip door with locking device assembly.
 - 1. Locking Device Assembly: Single bottom bar keyed cylinder lock, operable from outside with cylinder. Provide interlock switches on motor operated units.
- K. Electric Door Operator:
 - 1. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
 - 2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.

3. Motor Exposure: Interior.
4. Motor Electrical Characteristics:
 - a. Horsepower: 1/2 hp.
 - b. Voltage: 208 V ac, three phase, 60 Hz.
5. Emergency Manual Operation: Chain type.
6. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.
7. Control Station(s): Interior mounted.
8. Other Equipment: Connect to remote activation.

L. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.3 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.5 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
1. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

2.6 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
1. Lock Cylinders: As standard with manufacturer and keyed to building keying system.

2. Keys: Three for each cylinder.

- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
- C. Provide endlocks/windlocks as required to meet 30 lbf/sq. ft.

2.7 CURTAIN ACCESSORIES

- A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.8 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.9 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. 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.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Motors: Reversible-type motor for motor exposure indicated for each door assembly.
 - 1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
 - 2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
- D. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening.

1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
 - b. UL325-2010 compliant entrapment protection for motor operation.
- E. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- F. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
- G. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 1. Operator shall be equipped with an emergency manual chain hoist assembly that safely cuts operator power when engaged. A disconnect chain shall not be required to engage or release the manual chain hoist.
- H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- I. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.
- J. Portable Radio-Control System: Consisting of the following per door operator:
 1. Three-channel universal coaxial receiver to open, close, and stop door.
- K. The electrical contractor shall mount the control station and supply the appropriate disconnect switch, all conduit and wiring per motor operator wiring instructions.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 085113 - ALUMINUM WINDOWS

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 fixed aluminum windows for exterior locations.
- B. Related Requirements:
 - 1. See Section 082200 "FRP Doors & Frames" to coordinate window finish with FRP Door & Frames.
 - 2. See Section 088000 "Glazing" for additional requirements.
 - 3. See Section 074600 "Fiber Cement Siding & Trim" for additional requirements.
 - 4. See Section 076200 – "Sheet Metal Flashing And Trim" for continuous flashings at all windows.
- C. PREINSTALLATION MEETINGS
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 - 2. Review and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters and protecting finishes.
 - 3. Review the sequence of work required to construct a watertight and weathertight exterior building envelope.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

- C. Samples: Provide a 2'-8" x 2'-8" sample of aluminum window perimeter frame and sill to Contractor for incorporation into masonry wall mock-up.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Product Schedule: Use same designations indicated on Drawings for each window type.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- B. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

- A. Manufacturer shall certify that windows have been tested and conform to AAMA/WDMA 101/I.S.2.
 - 1. Performance Class: AW Architectural.
 - 2. Performance Grade: Not less than 60.
- B. Energy Performance: Windows shall have energy performance ratings per NFRC.
 - 1. Thermal Requirements (assembly) U-0.35, maximum, (R-2.9 minimum).
 - 2. Air Leakage: Shall not exceed 0.2 cfm/ft² when tested at a pressure of at least 1.57 pounds per square foot (psf) in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400.
- C. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- D. Mockups: Participate in construction of mockup wall to demonstrate installation requirements and set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.

- b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Deterioration of materials and finishes beyond normal weathering.
 - d. Failure of glass or seals.
- 2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: 10 years from date of Substantial Completion. Incorporate glass manufacturer warranty, listing the Owner as recipient of warranty.
 - c. Finish: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain aluminum window systems and accessories from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: AMMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 - 1. Minimum Performance Class: AW.
 - 2. Minimum Performance Grade: 60.
- C. Thermal Movements: Provide aluminum windows, including anchorage, 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: 120 deg F, ambient; 180 deg F material surfaces.
- D. Outside-Inside Transmission Class (OITC): Rated for not less than 26 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

2.3 ALUMINUM WINDOWS

- A. Basis-of-Design: Fixed window product subject to compliance with requirements, provide EFCO. 810-I System or equivalent product.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Oldcastle Glass/Moduline.
 - 2. Wausau Window and Wall Systems; Apogee Wausau Group.
 - 3. YKK AP America Inc.
- C. Operating Types: Provide the following operating types in locations indicated on Drawings.
 - 1. Fixed.
- D. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins 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.
- E. Glass: Refer to Section 088000 "Glazing".
- F. Insulating-Glass Units: None
- G. Glazing System: Manufacturer's standard factory-glazing system that produces air barrier and weathertight seal.
- H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible.
 - 2. Installation Fasteners: Use stainless steel only.
 - 3. No head fastener shall penetrate any through wall flashing.

2.4 ACCESSORIES/ANCHORS

- A. Subsills: Use extruded-aluminum subsills in configurations required by manufacturer to provide a water and airtight seal.
- B. Mullion Covers: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- C. Interior Trim/Anchors: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

- D. Supplemental Anchor System: It shall be assumed that interior trim/anchors indicated are insufficient to transfer all loads and forces from the windows to the steel angle and masonry openings. Manufacturer and or installer shall be responsible to design and provide all supplemental supports and anchors required. All materials shall be corrosion resistant equivalent to galvanized steel angle. All anchors shall be concealed.

2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- D. Complete fabrication, assembly, finishing, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" 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.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA611.

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 and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions and levelness of sill plate.
- C. Examine wall flashings and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, anchors, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- 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 to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner's qualified testing agency will perform tests and inspections.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: If the Owner decides to proceed with testing and inspecting of installed windows, the following testing criteria and methods shall be used:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
 - 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.

- b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
- 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
- 4. Testing Extent: Windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
- 5. Test Reports: Prepared according to AAMA 502.
- C. Remove and replace noncomplying windows and retest as specified above. Prepare test and inspection reports.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- C. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes glazing for exterior Aluminum Windows, exterior FRP doors, interior Hollow Metal doors.
- B. Related Requirements:
 - 1. Section 085113 “Aluminum Windows”.
 - 2. Section 082200 “FRP Faced Doors”
 - 3. Section 081113 “Hollow Metal Doors”

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300, ICC's 2018 International Building Code, and applicable sections New York Building Code by a qualified professional engineer, using the following design criteria:
 - 1. Design Wind Pressures: As indicated on Drawings.
 - 2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 - 3. Fire Protection-Rated glazing for use in fire doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same window and entry door designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturers of window and door glazing.
- B. Product Certificates: For each type of glass.
- C. Product Test Reports: For tempered safety glazing tests performed by a qualified testing agency.
- D. GANA Publications: Latest editions.
 - 1. Glazing Manual.
 - 2. Guide to Architectural Glass.
 - 3. Sealant Manual.
 - 4. Engineering Standards Manual.

- 5. Glass Informational Bulletins – Vol. 1.
- E. Consumer Products Safety Commission: 16 CFR 1201.
- F. Sample Warranties: For glass and glazier's warranties.

1.5 QUALITY ASSURANCE

- A. 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's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 - 3. Tempered Glass in Sliding Window: ASTM C1048 Type I; Quality-Q3; Kind FT; Class 1 clear.
- B. Safety Glazing Labeling: Where safety glazing requires labeling, permanently mark glazing with certification label of the SGCC or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: ¼ inch minimum. Provide glass in thicknesses as needed to comply with "Performance Requirements" Article in this Section.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data.

2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated. All glass to be tempered.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. AFG Industries, Inc.; Krystal Klear.
 - b. Guardian Industries Corp.; Ultrawhite.
 - c. Pilkington North America; Optiwhite.
 - d. PPG Industries, Inc.; Starphire.

2.3 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 - 1. Neoprene complying with ASTM C 864.
 - 2. EPDM complying with ASTM C 864.
 - 3. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.4 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; 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; 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; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.7 GLASS TYPES

- A. Glass Type: Clear, fully tempered float glass.
 1. Thickness: 1/4 inch.
 2. Provide safety glazing labeling.
 3. Window glazing.

PART 3 - EXECUTION

3.1 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. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- 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. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. 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.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- 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.

3.2 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. Apply heel bead of elastomeric sealant.
- F. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to 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. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. 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.

3.4 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.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 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. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing 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.

END OF SECTION 088000

SECTION 089000 - LOUVERS AND VENTS

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.
- B. Refer to Mechanical Drawings and Specifications for sizes, locations and additional requirements.
- C. Section 081113 "Hollow Metal Doors and Frames" for louvers installed in hollow metal doors.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fixed, extruded-aluminum louvers.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- D. Storm-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity and wind loads without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.
- C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories.

1. Show frame profiles and blade profiles, angles, spacing and Net Free Area of each louver.
2. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
3. Show the water tight sections, details depicting wall thickness and materials at each louver location. Show anchors, mounting frame, mullion profiles and dimensioned locations on elevations.
4. Wiring Diagrams: For power, signal, and control wiring for motorized adjustable louvers.
5. Finish coatings data and sample warranty.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.
- C. UL and NEMA Compliance: Provide motors and related components for motor-operated louvers that are listed and labeled by UL and comply with applicable NEMA standards.
- D. Provide extended 20 year warranty for Kynar finish on all louvers.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions (height x width x depth) of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.
- D. Fasteners: Use types and sizes to suit unit installation conditions.
 1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 2. For fastening stainless steel, use 300 series stainless-steel fasteners.

3. For color-finished louvers, use fasteners with heads that match color of louvers.
- E. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- F. Finish: All louvers shall be finished with Kynar coating, 1 mil thick 70% resin Fluoropolymer coating. Coating shall be applied by the louver manufacturer and shall meet the requirements of AAMA 605.2 & 2605. Color shall be as selected by the Architect from manufacturer's full list of standard colors.

2.2 FABRICATION, GENERAL

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches o.c., whichever is less.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal Storm-Resistant Louver
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Airolite Company, LLC (The) Air Balance Inc.
 - b. Air Balance Inc.; a Mestek company
 - c. Air Flow Company, Inc.
 - d. Construction Specialties, Inc.
 - e. Ruskin Company; Tomkins PLC.
 2. Louver Depth: See Mechanical Drawings and Specifications for louver size and depth . Provide all required flashings, subframes and gaskets to ensure a watertight installation.
 3. Frame and Blade Nominal Thickness: Not less than 0.060 inch for blades and 0.080 inch for frames.
 4. Louver Performance Ratings: must equal or exceed basis of design product.
 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same kind and form of metal as indicated for louver to which screens are attached.
 - 2. Finish: Same finish as louver frames to which louver screens are attached.
- D. Louver Screening for Aluminum Louvers:
 - 1. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.
- E. Louver Cover (for interior side in the off-season):
 - 1. Removable Aluminum Cover

2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.6 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. Fluoropolymer coating 1 mil thick 70% resin:
 - 1. Color: As selected by Architect from full range of manufacturer's standard colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Test operation of adjustable louvers and adjust as needed to produce fully functioning units that comply with requirements.
- B. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- C. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- D. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089000

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

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.
- B. This Section supplements the Structural Drawings and Specifications
- C. See Section 078413 "Firestopping" for fire rated penetrations, horizontal & vertical joint assemblies.
- D. See Section 079219 "Joint Sealants" for sealants used at non fire rated metal stud & gypsum board furring and in- fill at top of CMU walls and partitions to underside of roof sheathing.
- E. Section 092900 "Gypsum Board" for additional requirements.

1.2 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing steel framing systems for in-fill above CMU partitions, wall & ceiling furring.
 - 2. Miscellaneous steel framing systems supporting interior finishes.
- B. Requirements:
 - 1. See Section 078413 "Firestopping" for fire rated systems used at sealing horizontal and vertical joints and penetrations at fire rated gypsum board roof/ceiling assemblies.

1.3 DEFINITIONS

- A. Gages: Metal gages referenced in this Section shall have thicknesses not less than those listed below. Thickness indicated is base metal, exclusive of coatings. Where manufacturer's standard gage is less than specified below, furnish heavier gage to comply with thickness requirements.
 - 1. 12 gage: 0.1000 inch: 97 mils
 - 2. 14 gage: 0.0700 inch: 68 mils
 - 3. 16 gage: 0.0560 inch: 54 mils
 - 4. 18 gage: 0.0450 inch: 43 mils
 - 5. 20 gage: 0.0340 inch: 33 mils
- B. Minimum 20 GA for all interior members.
- C. All light gauge framing components shall be hot-dip galvanized unless otherwise indicated.

1.4 DESIGN REQUIREMENTS

- A. The following design performance criteria and requirements shall be used as the basis of design for the Shop Drawings structural calculations for primary, secondary cold formed framing members and their associated details.
1. Install cold formed steel framing according to standards listed in Quality Assurance in this section and AISI S200, AISI D110-16, AISI S202 and manufacturers written instructions unless more stringent requirements are required by Structural Drawings and Specifications.
 2. Studs supporting interior finishes shall be types, gages, spacing and arrangement shown and required to meet the project requirement as specified in this section. The selection of heavier gage or closer center to center spacing may be required to meet design loads and lateral deflection criteria based on Contractor selected light gauge framing manufacturer published design criteria.
 3. Design Parameters:
 - a. Vertical Stud Spacing: Not to exceed 16 inch centers, unless otherwise noted.
 - b. Stud Gages:
 - 1) Supporting Vertical Live Load: Minimum 18 gage.
 - Supporting Lateral Loads: Minimum 20 gage.
 - c. Stud Flange Width: Minimum 1-1/2 inches.
 - d. Dead Load Support / Anchors:
 - 1) Vertical Studs: Provide at lowest level that stud can fasten to.
 - 2) Horizontal Studs: Provide by either masonry or stud wall specified herein or structural steel framing specified elsewhere.
 - e. Horizontal Load Support/Anchors:
 - 1) Vertical Studs: Provide at floors, roofs and diagonal bracing.
 - 2) Horizontal Studs: Connected to structural steel framing or light-gage studs, bracing and strapping.
 - f. All punched holes in web shall be a minimum 12" from the top and bottom of wall studs.
 4. Dead and Live Loads, vertical:
 - a. Refer to Structural Drawings and Specifications to determine loading & deflection criteria and requirements.
 5. Lateral Load, horizontal positive and negative:
 - a. Interior: Loads listed on project Structural Drawings and listed below:
 - 1) Design for lateral loads in accordance with the governing code, and based as following:
 - i. Typical: 5 psf.
 - ii. Within 15 ft. of Exterior Entry Doors: Use exterior wind loads.
 - iii. Interior sheathing 5/8" gyp board on both sides of wall.
 6. Deflection for Composite Wall Assemblies:
 - a. Vertical members:
 - 1) Interior: Not to exceed $L/240$ of wall height.
 - b. Horizontal members:
 - 1) Interior: Not to exceed $L/360$ of total span.

1.5 ACTION SUBMITTALS

A. Product Data Submittals:

1. Product Data and Installation Instructions: Submit for each item of cold-formed metal framing and accessories including, but not limited to:
 - a. Single and double deflection tracks at roof sheathing for fire rated assemblies and non-fire rated assemblies.
 - b. Gauges and coatings of each stud, stud tracks, Z furring, carrying, bridging and resilient channels used on ceiling framing locations, double slide joints, blocking, strapping, bracing, bridging and headers.
 - c. All fasteners and attachments providing load transfer from cold formed framing to structural steel, concrete and masonry.
2. Shop Drawings: Show length, location and details of all light gage framing materials, including any subassemblies to be shop fabricated. Show all welds, whether shop or field, and indicate, and detail all connections to steel frame, concrete, and masonry portions of the work.
 - a. Framing elevations shall show stud spacing, locations of different gage members, double or multiple studs, slide joints, blocking, strapping, bracing and bridging, headers at openings and supplemental accessories and embeds required for proper installation and performance.
 - b. Coordinate locations of expansion /control joints with exterior and interior finish materials.
 - c. Indicate type, length, diameter and number of fasteners.
 - d. Include identification code for different gage studs.

B. Product Certificates: Certification documentation for each type of framing member (thickness of galvanized coating, use in fire rated assembly etc.) and accessory for studs and tracks.

C. Evaluation Reports: For firestop tracks, post-installed anchors and power-actuated fasteners, from ICBO or other qualified testing agency acceptable to authorities having jurisdiction.

D. Evaluation Reports of Studs and Tracks: Provide latest documentation that framing members that have been evaluated by ICBO.

1.6 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the latest edition of the following codes, specifications and standards, except where more stringent requirements are shown or specified.

1. American Iron & Steel Institute (AISI): SG-671 Design of Cold-Formed Steel Structural Members, S211-07 Standard for Cold Formed Steel Framing Wall Stud Design. S212 Header Design.
2. American Society of Civil Engineers (ASCE): ASCE 7-95 Minimum Design Loads for Buildings and Other Structures.
3. American Society for Testing and Materials (ASTM):
 - a. A446 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

- b. A525 General Requirements of Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- c. A570 Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality (Re-approved 1993).
- d. A611 Steel, Sheet, Carbon, Cold-Rolled, Structural Quality.
- e. A780 Practice for Repair of Damaged Hot-Dip Galvanized Coatings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Provide light gauge steel framing materials constructed in an identical manner to meet U.L. Fire-resistance-rated tested assemblies shown on the Drawings.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G60, hot-dip galvanized unless otherwise indicated.
 - 3. Steel Studs and Tracks ASTM C645: Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ClarkDietrich Building Systems
 - b. MarionWARE
 - c. Gold Bond Building Products
 - d. Telling Industries
 - e. Uni Mast, Inc.
 - 4. Minimum Base-Steel Thickness: As required to meet or exceed the performance requirements in 1.4 DESIGN REQUIREMENTS listed under Design Parameters.
 - 5. Width: As indicated on Drawings.
- B. Slip-Type Head Joints: Where required, provide the following:
 - 1. Double-Track System: ASTM C645 top outer tracks, inside track with 2½ x 14 ga: .0700, 68 mills deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track. The track system shall accommodate minimum of 1" vertical movement.
 - a. Products: Available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) BlazeFrame Industries; Bare Slotted Track (BST/BST2).
 - 2) CEMCO; California Expanded Metal Products Co.; CST Slotted Deflection Track.
 - 3) ClarkDietrich Building Systems; SLP-TRK Slotted Deflection Track.
 - 4) MBA Building Supplies; FlatSteel Deflection Track

- 5) Metal-Lite; The System
 - 6) Steel Network, Inc. (The); VertiClip SLD
 - 7) Telling Industries; Vertical Slip Track
- C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich Building Systems.
 - b. MRI Steel Framing, LLC
 - 2. Minimum Base-Steel Thickness: 0.0329 inch.
- D. Cold-Rolled Resilient Channels: 16 gauge, 0.0598 inches thick uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
- 1. Size: Depth 1/2 inch x 2 1/2 inch wide
- E. Z-Shaped Furring (Exterior): Galvanized 2" depth and 1 1/4" wide exterior return. Grade 33ksi minimum yield strength.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
- 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including all openings, trim conditions at inside and outside corners, plumbing and electrical penetrations / fixtures, cast-in anchors, and structural framing for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
- 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment, access doors, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

- D. Install supplementary framing, bracing, and blocking at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated on the drawings.
 - 1. Single-Layer Application: As required by horizontal deflection performance requirements.
 - 2. Multilayer Application: As required by horizontal deflection performance requirements.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above (roof sheathing) suspended ceilings except where partitions are indicated to terminate. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports (roof decking / sheathing), install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Fire-Resistance-Rated Infill: Install framing to comply with fire-resistance-rated partition assembly indicated to provide continuous fire rated assembly from top of CMU to underside of solid structure and or roof sheathing. Seal the top of the top track to roof sheathing with non-combustible fire safing materials.
 - a. Firestop Track: Where indicated, install firestop track to maintain continuity of fire-resistance-rated in fill partition assembly indicated.
 - b. All duct work, electrical conduits, plumbing and fire protection piping, and any other rigid penetrations through rated partitions shall be continuously sealed on both sides with fire safing joint assembly. See Mechanical Drawings for locations of fire dampers.
 - c. All UL Fire Rated infill assemblies shall be continuously sealed to walls, partitions and to roof decking / sheathing on both sides with fire safing joint compound.
- E. Direct Furring: Attach to concrete or masonry with pneumatic powder-driven fasteners, screws designed for masonry attachment, spaced 24 inches o.c maximum.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings required to support finish ceiling materials and fixtures, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Hangers: 48 inches o.c.
 - 2. Carrying Channels (Main Runners): 48 inches o.c.
 - 3. Furring Channels (Secondary Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend 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 suspension system.
 - a. 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 locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within $L/360$.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Do not connect or suspend steel framing from ducts, pipes, or conduit.
 - 5. Fire-Resistance-Rated Assemblies: Wire tie furring channels as required to be in compliance with the applicable UL Roof – Ceiling Fire-Resistance-Rated Assembly.
- E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Moisture resistant gypsum board in all high humidity areas.
 - 2. Fire-resistive gypsum board at all Fire Rated walls and partitions.
 - 3. Fire-resistive gypsum ceiling board at all Fire Rated roof-ceiling assemblies.

1.2 RELATED SECTIONS

- A. Section 092216 NON STRUCTURAL METAL FRAMING for cold formed metal framing materials and execution methods.
- B. Section 078413 FIRESTOPPING to coordinate fire rated penetrations and joint assembly requirements.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Drawings showing locations of control joints.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119. and UL design designation numbers, assemblies and fire-resistant ratings for wall, partition, and roof ceiling assemblies.
- B. Basis of Design: Underwriters Laboratory (UL) design designation numbers, assemblies and fire-resistant ratings for wall, partition, and roof ceiling assemblies. All gypsum board assemblies shall be coordinated with horizontal & vertical firestopping to achieve fire rated penetration and joint assembly required. See Section 012500 "Substitution Procedures" for required documentation to use other than UL tested assemblies for wall, partition, and roof - ceiling assemblies.

2.2 GYPSUM BOARD

- A. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces. (All high moisture areas including but not limited to Locker Rooms, Restrooms, Concessions, Lobby, Mechanical and Janitor.)
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

- B. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
 - 1. Core: 5/8 inch, Type X where Fire Rated Ceiling / Roof Assemblies are required.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered.

2.3 MANUFACTURERS

- A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Georgia-Pacific Building Products.
 - d. National Gypsum Company.
 - e. Temple-Inland Building Products by Georgia-Pacific.
 - f. United States Gypsum Company.
 - 2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings but not less than 5/8 inch.
 - 3. Long Edges: Tapered.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.

- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.

- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.6 AUXILIARY MATERIALS

- A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- B. Substrate materials required to provide the fire resistant rating of fire resistant joint & penetration assemblies See Drawings for the locations of Fire Rated Assemblies and SECTION 078413 – FIRESTOPPING for fire rated penetrations and joint assembly requirements.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

- A. Comply with ASTM C 840.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide ¼ wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with sealant.
- D. Install 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.
 - 1. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- E. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 2: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 4: At panel surfaces that will be exposed to view.
 - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
- H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient cove base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Use same designations indicated on Drawings.

C. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

D. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. 5 percent, but not less than 1 box of each material and color installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
2. Smoke Generation: Maximum specific optical density of 450 or less when tested per ASTM E 662.

2.2 THERMOPLASTIC-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Flexco.
3. Mondo Rubber International, Inc.
4. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous)
 2. Type and Location: Cove. Provide in areas with resilient floor coverings or sealed concrete. See Room Finish Schedule for locations.
- C. Thickness: 0.125 inch.
- D. Height: 6 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Preformed.
- H. Colors: As selected by Architect from full range of manufacturer's standard colors

2.3 INSTALLATION MATERIALS

- A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

- G. Preformed Corners: Install preformed corners before installing straight pieces.

END OF SECTION 096513

SECTION 096723 - RESINOUS FLOORING.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes resinous flooring systems as required in the Room Finish Schedule.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of exposed finish required.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Applicator's experience and manufacturer's authorization.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's approved applicator who is trained and approved for installation of all phases of flooring systems required for this Project.
 - 1. The applicator shall have a minimum of 5 years' experience in the installation of decorative resinous flooring systems.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from 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. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 48-inch square floor area selected by Architect.
 - a. Include 48-inch length of integral cove base with inside corner.
 - 2. Simulate finished lighting conditions for Architect's review of mockups.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions and requirements for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Conditions of new concrete to be coated with resinous flooring. Verify the following criteria and conditions of the substrate with the resinous flooring manufacturer.
 1. Concrete shall be moisture cured for a minimum of 7 days and have fully cured a minimum of 28 days in accordance with ACI-308 prior to application of the coating system pending moisture tests. This supersedes the general concrete specification for concrete curing.
 2. Concrete shall be finished as required by resinous flooring manufacturer.
 3. Sealers and curing agents should not be used.
 4. Concrete surfaces on grade shall have been constructed with a fully sealed vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.
- C. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- D. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- E. Site Requirements:
 1. Application may proceed while air, material and substrate temperatures are between 60 F. and 90 F. providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
 2. The relative humidity in the specific location of the application shall be less than 85% and the surface temperature shall be at least 5 F above the dew point.
 3. The applicator shall ensure that adequate ventilation is available for the work area.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Dur-A-Flex, Inc. Dur-A-Quartz, Epoxy-Based Seamless Flooring System or comparable product by one of the following:
 1. American Hi-Tech Flooring Company.
 2. Atlas Minerals & Chemicals, Inc.; Polymer Flooring Division.
 3. BASF Construction Chemicals, Inc.; BASF Building Systems.
 4. ChemMasters.
 5. Crossfield Products Corp.; Dex-O-Tex.

6. Delta Polymers, Inc.
7. Epoxy Systems, Inc.
8. ICS Garland Inc.
9. International Coatings Inc.
10. Key Resin Company.
11. Marbelite International Corp.
12. NEOGARD; Division of JONES-BLAIR.
13. Nox-Crete Products Group.
14. POLY-CARB, Inc.
15. PPG Industries, Inc.
16. Sherwin-Williams Company; General Polymers.
17. Tamms Industries, Inc.; a division of The Euclid Chemical Company.
18. Tnemec Company, Inc.
19. Valspar Flooring.

B. Performance Requirements: Comply with the following:

1. Coefficient of Friction (COF): Not less than 0.60 as tested in accordance with ANSI B101.1.
2. Dynamic Coefficient of Friction (DCOF): Not less than value of 0.42 as tested in accordance with ANSI A137.1 / A326.3.

2.2 MATERIALS

- A. VOC Content of Liquid-Applied Flooring Components: Not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

2.3 RESINOUS FLOORING

- A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, decorative-aggregate-filled, epoxy-resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.

B. System Characteristics:

1. Color and Pattern: As selected by Architect from manufacturer's full range.
2. Wearing Surface: Textured for slip resistance.
3. Overall System Thickness: Minimum 1/8 inch.
4. Federal Agency Approvals: USDA approved for food-processing environments.

C. Body Coats:

1. Dur-A-Flex, Inc. Dur-A-Quartz, Epoxy-Based Seamless Flooring System
 - a. Primer: Dur-A-Flex, Inc, Dur-A-Glaze #4 WB resin and hardener.
 - b. Broadcast Coats: Dur-A-Flex, Inc, Dur-A-Glaze #4 WB resin and hardener.
 - c. The quartz aggregate shall be Dur-A-Flex, Inc. Q-28 or Q-11 colored quartz aggregate.
 - d. Grout Coat: Dur-A-Flex, Inc, Dur-A-Glaze #4 resin and Water Clear hardener.
 - e. Topcoat: Dur-A-Flex, Inc, Armor Top Resin, hardener and grit.

D. Patch Materials:

1. Shallow Fill and Patching: Use Dur-A-Flex, Inc, Dur-A-Glaze #4 Cove Res.
2. Deep Fill and Sloping Material (over 1/4"): Dur-A-Flex, Inc, Dur-A-Crete.

2.4 ACCESSORIES

- A. Reinforcing Membrane: Flexible resin formulation that is recommended by manufacturer for substrate and primer and body coats indicated and that prevents substrate cracks from reflecting through resinous flooring.
 1. Provide fiberglass scrim embedded in reinforcing membrane.
- B. Transition Trim: Metallic wall termination trim as recommended by the manufacturer for wall cove applications (top of cove base).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 1. Roughen concrete substrates as follows:
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions. Perform testing by one of the following methods as required by manufacturer.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.
 - b. Perform plastic sheet test, ASTM D 4263. Proceed with application only after testing indicates absence of moisture in substrates.
 - c. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

- B. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- C. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- D. Provide a smooth floor transition between resinous flooring system and sealed concrete with a continuous 3/8 inch x 3/8 inch saw cut located at the centerline of door.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

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.
 - 3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply reinforcing membrane to substrate cracks and at floor/wall joint.
- D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
 - 1. Integral Cove Base: 6 inches high.
- E. Apply self-leveling slurry body coats in thickness indicated for flooring system.
 - 1. Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.
- F. Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When cured, remove trowel marks and roughness using method recommended by manufacturer.
- G. Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat and to produce wearing surface indicated.
- H. Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.
- I. Protect resinous flooring from damage and wear during the remainder of construction period.

3.3 FIELD QUALITY CONTROL

A. Tests, Inspection

1. The following tests shall be conducted by the Applicator:
 - a. Temperature
 - 1) Air, substrate temperatures and, if applicable, dew point.
 - b. Coverage Rates:
 - 1) Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.4 CLEANING AND PROTECTION

- A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completions of the curing process.
- B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

END OF SECTION 096723

SECTION 099123 – PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior and interior substrates.
 - 1. Concrete.
 - 2. Concrete masonry units (CMU).
 - 3. Steel.
 - 4. Cast iron.
 - 5. Aluminum (not anodized or otherwise coated).
 - 6. Wood Trim and Plywood and Batten Finish Ceiling
 - 7. Cement siding and trim.
 - 8. Gypsum board.
 - 9. Plastic trim fabrications.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.
- C. Product List: For each product indicated, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 2 gal. of each material and color applied.

1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 degrees Fahrenheit.
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 degrees Fahrenheit.
- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 degrees Fahrenheit 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements of this Specification and Section 012500 SUBSTITUTION PROCEDURES, provide the following manufacturers as listed in each of the Exterior and Interior paint category indicated in this Section.
 - 1. Sherwin Williams
 - 2. Pittsburgh Paints
 - 3. Architect approved equal
- B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 50 g/L.
 - 3. Dry-Fog Coatings: 150 g/L.
 - 4. Primers, Sealers, and Undercoaters: 100 g/L.
 - 5. Rust-Preventive Coatings: 100 g/L.
 - 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 - 7. Pretreatment Wash Primers: 420 g/L.
 - 8. Shellacs, Clear: 730 g/L.
 - 9. Shellacs, Pigmented: 550 g/L.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List" (www.paintinfo.com.) for each applicable interior and exterior material.
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another, and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. Colors and Gloss: As selected by Architect from manufacturer's full range.
- D. Severe Environment are defined as any interior rooms or spaces that experience high moisture, semi caustic vapor including but not limited to: Filter Pits, Mechanical Rooms, Chemical Rooms, Filter Rooms, Rest Rooms, Plumbing Chases, and Storage Rooms.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. 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. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
 - 3. Cementitious Substrates: Prepare concrete, brick, concrete masonry block surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
 - a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
 - b. 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 coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 - 4. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Smoothly sand surfaces exposed to view and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer, before applying primer.
 - b. Immediately on delivery, prime edges, ends, faces, undersides, and backsides of wood to be coated.
 - c. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - 5. Ferrous Metal Substrates: 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 SSPC recommendations.
 - a. Blast-clean steel surfaces as recommended by coating manufacturer and according to 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, solvent clean, and touch up with same primer as the shop coat.
 - 6. Nonferrous-Metal Substrates: Clean nonferrous and galvanized surfaces according to manufacturer's written instructions for the type of service, metal substrate, and application required.
 - a. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

- E. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 - 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 - 3. Use only the type of thinners approved by manufacturer and only within recommended limits.
 - 4. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of 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

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- C. General: Apply high performance coatings according to manufacturer's written instructions.
 - 1. Use applicators and techniques best suited for the material being applied.
 - 2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film
 - 3. Coating surface treatments, and finishes are indicated in the coating system descriptions.
 - 4. Provide finish coats compatible with primers used.
 - 5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, covers for finned-tube radiation and similar components are in place. Extend coatings in these areas as required to maintain system integrity and provide desired protection.
- D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Do not paint the following work where exposed in equipment rooms:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Plastic conduit.
 - f. Tanks that do not have factory-applied final finishes.
 - g. Duct, equipment, and pipe insulation having paintable insulation covering.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.

- e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having paintable insulation covering or other paintable jacket material.
- 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
- 4. Paint all plywood wood panels serving as backboards for mechanical, electrical, communication and technology systems equipment and interior finish ceilings prior to installation of light fixtures and other devices.
- E. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. The number of coats and film thickness required is the same regardless of application method.
 - 2. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.
- F. All paints and coatings are to be VOC compliant with State and Local regulations.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINT SYSTEMS

- A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
 - 1. Full-Gloss Alkyd-Enamel Finish: Two finish coats over a rust-inhibitive primer (primer required for items not shop-primed).
 - a. Primer for Items Not Shop-Primed: Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils.
 - b. Exterior full-gloss alkyd enamel finish: Pittsburgh Paints; 7-814 Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel: Applied at a dry film thickness of not less than 1.5 mils.
- B. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated metal surfaces:
 - 1. Full-Gloss Alkyd Enamel Finish: Two finish coats over a galvanized metal primer.

- a. Primer: Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils.
 - b. Exterior full-gloss alkyd enamel finish; Pittsburgh Paints; 7-814 Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel: Applied at a dry film thickness of not less than 1.5 mils.
- C. Aluminum: Provide the following finish systems over exterior aluminum surfaces:
- 1. Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils.
 - b. Exterior full-gloss alkyd enamel finish: Pittsburgh Paints; 7-814 Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel: Applied at a dry film thickness of not less than 1.5 mils.
- D. Fiber Cement Siding: Provide the following finish systems over exterior cement lap siding:
- 1. Acrylic-Enamel Finish: One intermediate and one topcoat over a primer.
 - a. Primer: Exterior acrylic primer Sherman Willams; Loxon Concrete and Masonry Primer Series US LX02W0050. Applied at a dry film thickness of not less than 3.0 mils.
 - b. Exterior full-gloss acrylic exterior topcoat finish: Sherman Willams; Loxon Acrylic Coating A24W300 Series. Apply each coat at a dry film thickness of not less than 3.7 mils.

3.6 INTERIOR PAINT SYSTEMS

- A. Concrete Substrates, Nontraffic Vertical Surfaces including horizontal soffits and ledges.
- 1. High-Performance Epoxy Modified Latex System: PS1 (MPI INT 3.1G)
 - a. Prime Coat: Epoxy modified latex, MPI #115 X-Green with VOC content less than 50 g/l.
 - b. Topcoat: Epoxy modified Latex, interior, high performance, gloss (Gloss Level 6), MPI #115 X-Green with VOC content less than 50 g/l.
- B. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces. Two finish coats over a primer:
- 1. Primer:
 - a. Primer-Zero VOC: Pittsburgh Paints; 9-900 Pure Performance Interior Latex Primer: Applied at a dry film thickness of not less than 1.4 mils.
 - b. Interior semigloss acrylic enamel-Zero VOC: Pittsburgh Paints; 9-500 Series Pure Performance Interior Semigloss Latex: Applied at a dry film thickness of not less than 1.7 mils.
 - 2. Epoxy Top Coats:
 - a. Industrial interior one coat dry fog primer/finish
 - b. Pittsburgh Paints: Speedhide Interior Epoxy Ester Dry Fog Flat.
- C. Plywood Ceilings: Provide the following finish systems over interior ceiling surfaces. Two finish coats over a primer:
- 1. Primer:

- a. Primer-Zero VOC: Pittsburgh Paints; 9-900 Pure Performance Interior Latex Primer: Applied at a dry film thickness of not less than 1.4 mils.
 - b. Interior semigloss acrylic enamel-Zero VOC: Pittsburgh Paints; 9-500 Series Pure Performance Interior Semigloss Latex: Applied at a dry film thickness of not less than 1.7 mils.
 - 2. Epoxy Top Coats:
 - a. Industrial interior one coat dry fog primer/finish
 - b. Pittsburgh Paints: Speedhide Interior Epoxy Ester Dry Fog Flat.
- D. Ferrous Metal: Provide the following finish systems over ferrous metal. Two finish coats over a primer:
- 1. Acrylic Finish:
 - a. Primer: Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
 - b. Interior full-gloss alkyd enamel Low odor: Pittsburgh Paints; 7 814 Series Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel: Applied at a dry film thickness of not less than 1.5 mils.
- E. Zinc-Coated Metal: Provide the following finish systems over interior zinc-coated metal surfaces. Two finish coats over a primer:
- 1. Acrylic Finish:
 - a. Primer: Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
 - b. Interior full-gloss alkyd enamel Low odor: Pittsburgh Paints; 7-814 Series Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel: Applied at a dry film thickness of not less than 1.5 mils.

3.7 INTERIOR HIGH PERFORMANCE COATING SYSTEMS (All interior masonry.)

- A. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block:
- 1. Severe Environment (Semigloss Finish): One finish coat over an intermediate coat and a block filler.
 - a. Block Filler: Epoxy block filler.
 - 1) PPG: 97-685 Series Aquapon Polyamide-Epoxy Block Filler.
 - b. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 4.0 to 6.0 mils
 - 1) PPG: 97-130 Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating.
 - c. Topcoat: Semigloss epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 4.0 to 6.0 mils
 - 1) PPG: 97-130 Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating.
- B. Ferrous Metal: Provide the following finish systems over interior ferrous-metal surfaces:
- 1. Severe Environment (Semigloss Finish): One finish coat over an intermediate coat and a primer.
 - a. Primer: Epoxy primer.

- 1) PPG: 97-145 Series Pitt-Guard DTR Polyamide Epoxy Coating at 5.0 to 7.0 dry film thickness.
 - b. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 4.0 to 6.0 mils
 - 1) PPG: 97-130 Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating.
 - c. Topcoat: Semigloss epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 4.0 to 6.0 mils
 - 1) PPG: 97-130 Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating.
- C. Nonferrous Metal: Provide the following finish systems over interior nonferrous-metal surfaces:
 - 1. Severe Environment (Semigloss Finish): One finish coat over an intermediate coat and a primer.
 - a. Primer : Epoxy primer.
 - 1) PPG : 97-145 Series Pitt-Guard DTR Polyamide Epoxy Coating.
 - b. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 4.0 to 6.0 mils
 - 1) PPG: 97-130 Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating.
 - c. Topcoat: Semigloss epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 4.0 to 6.0 mils
 - 1) PPG : 97-130 Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating

END OF SECTION 099123

SECTION 09 9300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:
 - 1. Interior Substrates:
 - a. Dressed lumber (finish carpentry or woodwork).

1.2 RELATED SECTIONS

- A. Section 064023 INTERIOR ARCHITECTURAL WOODWORK for interior running wood trim materials and execution methods.
- B. Section 099123 PAINTING for coating requirements of interior and exterior materials and execution methods.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: 12 inch long of each type of wood stains and transparent gloss finish of topcoat.

- C. Product List: For each product indicated, with the proposed product highlighted.
- D. Submittals:
 - 1. Product Data: For stains and varnish, indicating VOC content.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each finish coating system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in each finish coating system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Water Based Varnish, Clear: 275 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Interior Wood Substrates: 9 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by manufacturer.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Wood Substrates: Wood trim, architectural woodwork.
 - 1. Water-Based Varnish:
 - a. First Intermediate Coat: Water-based varnish matching topcoat.
 - b. Second Intermediate Coat: Water-based varnish matching topcoat.
 - c. Topcoat: Varnish, water based, clear, semi-gloss (MPI Gloss Level 5)

END OF SECTION 09 9300

SECTION 099726 - SPECIAL COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes water based chemical resistant acrylic concrete sealer flooring coating as required in the Room Finish Schedule.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Substrate Requirements: Required moisture level testing, surface cleaning and preparation.
- C. Floor Protection: Submit what protective measures & materials are used to prevent staining concrete indicated to receive clear sealer.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Applicator's experience and manufacturer's authorization.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that are from same production run (batch mix) as materials applied and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Quantity: Furnish additional material (sealer and anti-skid additive) to reseal all concrete to be sealed twice.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with concrete sealer manufacturer's written instructions and requirements for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting concrete sealer application.
- B. Conditions of new concrete to be coated with concrete sealer. Verify the following criteria and conditions of the substrate with the concrete sealer manufacturer.
 - 1. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of concrete sealer only after manufactures requirements.

- C. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- D. Close spaces to traffic during concrete sealer application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- E. Site Requirements:
 - 1. Application may proceed while surface and air temperature above 40 F and at least 5 F above the dew point.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS COATINGS

- A. Concrete sealer.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Bases of Design: Slip Doctors Deck Grip Concrete Sealer with Anti-Skid Additive
 - b. Dura Kote Waterborne Polyurethane Concrete Sealer
- B. Performance Requirements: Comply with the following:
 - 1. Coefficient of Friction (COF): Not less than 0.60 as tested in accordance with NFSI B101.1.
 - 2. Dynamic Coefficient of Friction (DCOF): Not less than value of 0.42 as tested in accordance with ANSI A137.1 / A326.3.
- C. Other Materials: Provide crack fillers, and related materials that are compatible with cementitious finish-coat materials and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- D. Colors: Clear.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility.
 - 1. Do not utilize concrete curing agents that are incompatible with sealer.
 - 2. Allow concrete to cure a minimum of 30 days or per manufacturer recommendations for concrete to be sealed.
 - 3. Remove concrete stains that occurred during construction prior to sealing.
- C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, incompatible coatings, and loose substrate materials.

1. Staining locations should utilize Super Concrete Renovator (SCR) mild acidic detergent that cleans concrete thoroughly. The use of a black scrubbing pad with water on a rotational floor scrubbing machine.
- D. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- E. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.
- F. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- G. Comply with manufacturer's written instructions for mixing and preparing materials and as applicable to substrates indicated.
- H. Apply coatings according to manufacturer's written instructions. Use applicators and techniques suited for coating and substrate indicated.
- I. Apply each material at not less than the manufacturer's recommended spreading rate. Provide total cured material thickness indicated or as recommended in writing by manufacturer.
- J. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- K. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 099726

SECTION 101400 - SIGNAGE

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. Plaques.
 - 2. Dimensional characters.
 - 3. Interior tactile panel signs (Room Signs).
- B. Related Sections include the following:
 - 1. Division 22 Section "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 2. Division 23 Identification for labels, tags, and nameplates for HVAC systems and equipment.
 - 3. Division 26 Section "Electrical Identification" for labels, tags, and nameplates for electrical equipment.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."
- B. The current edition of 2020 Building Code of New York Chapter 11 including addendums, and ICC A117.1 and the requirements of the authorities having jurisdiction (AHJ) are the governing room signage regulations.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.

- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for each sign material selected:
 - 1. Aluminum.
 - 2. Acrylic sheet.
 - 3. Polycarbonate sheet.
 - 4. Fiberglass sheet.
- D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Plaque Casting: 6 inches square including border.
 - 2. Dimensional Characters: Full-size Samples of each type of dimensional cast character.
 - 3. Interior Tactile Panel Signs (Room Signs): One full size room I.D.
- E. Sign Schedule: Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1 and 2020 Building Code of New York Chapter 11.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing (dimensional characters) signs.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), 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-H32.
- B. Aluminum Castings (Dimensional characters): ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
- C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), 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.
- D. Bronze Castings (Plaque): ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
- E. Fiberglass Sheet (Room Signage option 1): Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi when tested according to ASTM D 790.
- F. Acrylic Sheet (Room Signage option 2): ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- G. Polycarbonate Sheet (Room Signage option 3): Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
 - 1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
 - 2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
 - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
 - 4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.
 - 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

2.2 PLAQUES

- 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. All-Craft Wellman Products, Inc.
 2. Matthews International Corporation; Bronze Division.
 3. Mills Manufacturing Company.
- B. Cast Plaques: Provide dedication type plaque castings free of pits, scale, sand holes, and other defects, as follows:
1. Plaque Material: Cast Bronze.
 2. Plaque thickness: 0.50 inch.
 3. Background Texture: Manufacturer's standard pebble texture, simulated oxidized finish.
 4. Border Style: Square, polished.
 5. Mounting: Concealed studs, noncorroding for substrates encountered.
 6. Plaque Size: As indicated on drawings.
 7. Character Size: As indicated on drawings.
 8. Character Finish/Color: Polished face as indicated on drawings.
 9. Text/Message/Logo: As supplied by Owner.
 10. Location: As selected by Owner.

2.3 DIMENSIONAL CAST CHARACTERS

- 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. All-Craft Wellman Products, Inc.
 2. Mills Manufacturing Company.
 3. Mohawk Sign Systems.
 4. Signature Signs, Incorporated.
- B. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.
1. Character Material: Aluminum.
 2. Thickness: 3/4"
 3. Color: Clear anodized aluminum.
 4. Mounting: 2" space from wall to back of character. Use Concealed stainless steel studs.
 5. Character Size: As indicated on drawings.
 6. Font/Message: Arial. As indicated on drawings.
 7. Location: As indicated on drawings.

2.4 INTERIOR TACTILE PANEL SIGNS

- 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. ACE Sign Systems, Inc.
 2. Advance Corporation; Braille-Tac Division.
 3. APCO Graphics, Inc.
 4. ASI-Modulex, Inc.
 5. Best Sign Systems Inc.
- B. Interior Tactile Panel (Room) Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
1. Basis of Design: Acrylic Sheet: 0.125 inch thick.
 2. Laminated Sheet: High-pressure engraved stock with white face laminated to acrylic core in finishes and color combinations as selected by Architect from manufacturer's full range.
 3. Laminated, Etched Photopolymer: Raised graphics with Braille 1/32 inch above surface with contrasting colors in finishes and color combinations as selected by Architect from manufacturer's full range and laminated to acrylic back.
 4. Laminated, Sandblasted Polymer: Raised graphics with Braille 1/32 inch above surface with contrasting colors in finishes and color combinations as selected by Architect from manufacturer's full range and laminated to acrylic back.
 5. Edge Condition: Bullnose.
 6. Corner Condition: Rounded to radius indicated.
 7. Mounting: Unframed.
 - a. Wall mounted with silicone adhesive combined with two-face tape to hold signs in place until adhesive has fully cured.
 8. Color: As selected by Architect from manufacturer's full range.
 9. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
 10. Interior Room Sign Type as indicated:
 - a. Sign Size: As indicated on drawings.
 - b. Message Panel Material: As indicated on drawings.
 - c. Message Panel Finish/Color: As selected by Architect.
 - d. Background Finish/Color: As selected by Architect.
 - e. Character Size: As indicated on drawings.
 - f. Character Finish/Color: As selected by Architect.
 - g. Text/Message: As indicated on drawings.
 - h. Location: As indicated on drawings.
 - i. Room: Room numbers as determined by Owner.
- C. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1 and 2020 Building Code of New York Chapter 11. Text shall be accompanied by Grade 2 Braille.

Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

1. Raised-Copy Thickness: Not less than 1/32 inch.
- D. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
 1. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.
- E. Subsurface Engraved Acrylic Sheet: Reverse-engrave back face of clear acrylic sheet. Fill resulting copy with enamel. Apply opaque background color coating over enamel-filled copy.

2.5 ACCESSORIES

- A. Anchors and Inserts: Provide stainless steel 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. Furnish inserts, as required, to be set into concrete or masonry work. All exposed fasteners shall have tamper resistant heads.

2.6 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
 1. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 2. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 3. Conceal all fasteners.

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 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.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a brushed finish, complying with AAMA 611.
- B. 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 instructions for cleaning, conversion coating, and painting.
 - 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.

2.9 COPPER-ALLOY FINISHES

- A. Cast-Bronze Plaque Finishes: Exposed surfaces free of porosity, burrs, and rough spots; with returns finished with fine-grain air blast.
 - 1. Raised Areas: Hand-tool and buff borders and raised copy to produce manufacturer's standard polished finish.
 - 2. Background Finish: Dark oxidized.
- B. Clear Protective Coating: Coat exposed surfaces of copper alloys with manufacturer's standard, clear organic coating specially designed for coating copper-alloy products. Finish: Clear Satin.

2.10 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, and are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Partition Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Two-Face Tape: For temporary positioning. Do not use this method for final or primary attachment.
 - 2. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or non porous surfaces.
 - 3. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 4. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
- C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions 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 2 inches.
- D. Cast-Metal Plaques: Mount plaques using standard fastening methods to comply with manufacturer's written instructions for type of wall surface indicated.
 - 1. Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.

3.3 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 101400

SECTION 102116 – SOLID PLASTIC TOILET COMPARTMENTS

1.1 SUMMARY

A. Section Includes:

1. High Density Polyethylene (HDPE), toilet compartments configured as toilet enclosures and urinal screens.

B. Related Sections:

1. Division 10 Section "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show dimensioned locations of centerlines of toilet fixtures to toilet compartments. Include plans, elevations, sections, and attachment details.

C. Samples for each type of toilet compartment material and hardware indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 WARRANTIES

- A. Provide manufacturer's 25 year warranty providing coverage against breakage, corrosion, and delamination of solid plastic panels.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

- B. Extra stock materials: Provide two of each hardware component and enough fasteners of the required size to install the hardware components.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 75 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Fire Performance: Tested in accordance with, and pass the acceptance criteria of NFPA 286.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1- 2017 for toilet compartments designated as accessible.
- D. Provide units that comply with regulatory requirements for accessibility at compartments designated as handicap accessible.

2.2 MATERIALS

- A. Plastic Doors, Panels, Pilasters, and Urinal Screens:
 - 1. HDPE (High Density Polyethylene), integrally colored, fabricated from extruded polymer resin forming single, one piece, solid construction sheet.
 - 2. Waterproof, non-absorbent, with self-lubricating surface resistant to marks from pens, markers, and paints.
 - 3. Free from urea-formaldehyde resins.
 - 4. No volatile organic compounds (VOC) emissions.
 - 5. Stainless Steel: ASTM A167.

2.3 SOLID PLASTIC TOILET COMPARTMENTS

- A. Basis of Design: AMPCO by AJW (Color Through HDPE High Density Polyethylene) Partitions or comparable product by one of the following:
 - 1. BobrickBradley Corporation; Mills Partitions.
 - 2. General Partitions Mfg. Corp.
 - 3. Metpar Corp.
 - 4. Santana Products, Inc.
 - 5. Sanymetal; a Crane Plumbing company.
- B. Toilet-Enclosure: Floor supported, wall anchored and overhead braced.
- C. Urinal-Screen: Floor anchored, wall braced.

- D. Door, Panel, Pilaster and Urinal Screen Construction: 1 inch thick, 55-inch tall Solid HDPE (High Density Polyethylene), integrally colored, fabricated from extruded polymer resin panel material with rounded edges. Panels, Pilasters, Urinal Screens and Doors shall be mounted 14" above finish floor.
- E. Urinal-Screen: Provide with wall brackets and floor mounting bracket and shoe cover sleeve.
- F. HDPE Panel Finish:
 - 1. Finish: One color and pattern in each room.
 - 2. Color and Pattern: As selected by Architect from manufacturer's full range with manufacturer's standard colors.

2.4 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty Type 304 stainless steel operating hardware and accessories, Number 4 satin finish.
 - a. Hinges: Manufacturer's standard continuous, self-closing type that can be adjusted to hold doors open at any angle up to minimum of 110 degrees.
 - b. Door Strike and Keeper: Manufacturer's standard 3 1/2 inch long surface-mounted latch with wrap around flanges unit designed for emergency access and with combination rubber-faced door strike and keeper.
 - c. Door Pull: Manufacturer's standard unit at out-swinging doors. Provide units on both sides of all out-swinging doors.
 - d. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - e. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors
 - f. Floor mounting: Pilaster anchor bracket with 3 inch tall cover sleeve.
 - g. Wall Brackets: Full-Height (Continuous) 14 gauge stainless steel brackets fastened to walls, pilasters, urinal screens and panels.
 - h. Head Rail: Fabricated from continuous heavy duty extruded aluminum, anti-grip design, fastened to pilaster and secured to adjacent construction with stainless steel brackets.
- B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position. Coordinate plaster location to avoid placing them over floor drains.
 - 3. Urinal Screens: Attach continuous wall brackets with anchoring hardware to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.
 - 4. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.17

SECTION 102800 - TOILET, BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Restroom accessories.
2. Electrical hand dryer.
3. Shower accessories.
4. Diaper changing station
5. Under lavatory guards.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Warranty
- C. Materials for Owner stock: One of each product listed below complete with all required mounting or attachment hardware.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

Basis-of-Design Product: Subject to compliance with requirements, provide product indicated below or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
6. Tubular Specialties Manufacturing, Inc.

- A. Soap Dispenser: SD
 - 1. Furnished and Installed by Owner
- B. Mirror Unit: MG
 - 1. Basis-of-Design Product: Bobrick B-290 2436
 - 2. Frame: Stainless-steel channel.
 - a. Corners: Welded and ground smooth.
 - 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - 4. Size: 24" W x 36" H.
- C. Toilet Tissue (Roll) Dispenser: TTD
 - A. Basis-of-Design Product: Bobrick B-2888
 - 1. Description: Surface Mounted Multi-Roll Toilet Tissue Dispenser
 - 2. Capacity: Designed for 4-1/2 or 5-inch diameter tissue rolls.
 - 3. Finish: Satin Stainless Steel, No. 4 finish.
- D. Grab Bar: GB
 - 1. Basis-of-Design Product:
 - a. Toilet Stall: Bobrick; B-68137.99, with B-6806.99x18
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
 - 4. Outside Diameter: 1-1/2 inches.
 - 5. Configuration and Length: As indicated on Drawings.
- E. Sanitary-Napkin Disposal Unit: SND
 - 1. Basis-of-Design Product: Bobrick, B-270.
 - 2. Mounting: Surface mounted.
 - 3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
 - 4. Receptacle: Removable.
 - 5. Material and Finish: Satin stainless steel, No. 4 finish.
- F. Under-Lavatory Guard
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded plastic, white.

2.2 CHILDCARE ACCESSORIES

- A. Diaper-Changing Station: BC
 - 1. Basis of Design Product: Koala Kare, KB-200-00
 - 2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.

- a. Engineered to support minimum of 250-lb static load when opened.
3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: HDPE interior. Color as selected by Architect.
6. Liner Dispenser: Built in.

2.3 WARM-AIR DRYERS

A. Warm-Air Dryer: WD

1. Basis-of-Design Product: Excel Dryer, Inc. Ultra-Fast Xlerator, XL-C
2. Mounting: Surface mounted.
3. Operation: Electronic-sensor activated with timed power cut-off switch.
4. Cover Material and Finish: Chrome-plated steel.
5. Electrical Requirements: Refer to electrical drawings and or specifications for voltage and watt parameters.

2.4 SHOWER ACCESSORIES

A. Shower Curtain and Rod:

1. Shower Curtain Rod: Where indicated, provide stainless-steel shower curtain rod with 3-inch stainless-steel flanges designed for exposed fasteners, in length required for shower opening indicated, and complying with the following:
 - a. Products: Available products include the following:
 - 1) American #1204.
 - 2) Bobrick #B6047.
 - 3) Bradley #9531.
 - b. Heavy-Duty Rod: 1 ¼ inch OD; fabricated from nominal 0.05 inch thick stainless steel.
2. Shower Curtain: Where indicated, provide shower curtain complying with the following:
 - a. Antibacterial Shower Curtain: Minimum 10-oz., nylon-reinforced vinyl or 0.008-inch-thick vinyl material with integral antibacterial agent and corrosion-resistant grommets at minimum 6 inches o.c. through top hem.
 - 1) Size: Minimum 6 inches wider than opening by 72 inches.
 - 2) Color: White.
3. 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.

B. Robe Hook: Provide as indicated and one (1) robe hook per shower head complying with the following:

1. Products: Available products include the following:
 - a. American #7340

- b. Bobrick #B671.
 - c. Bradley #9115
- 2. Single Robe Hook: Stainless-steel Type 3041, bright polished robe hook with rectangular wall bracket and backplate for concealed mounting
- C. Folding Shower Seat: Where this designation is indicated, provide 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:
 - 1. Products: Available products include the following:
 - a. American #8210-AL.
 - b. Bradley #9565.
 - c. Bobrick #B5171.
 - 2. Configuration: L-shaped seat, designed for wheelchair access.
 - 3. Seat Material: Phenolic or polymeric composite of slat-type or one-piece construction. Color as selected by Architect from mfr's full range.

2.5 CUSTODIAL ACCESSORIES

- A. Mop and Broom Holder: MH
 - 1. Basis-of-Design Product: Bobrick, B-239 x 34
 - 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
 - 3. Hooks: Three.
 - 4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.
 - b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.6 FABRICATION

- A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 10 keys to Owner's representative.

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.
- B. Grab Bars: Install to withstand a downward load of at least 250 lb., when tested according to ASTM F 446.

END OF SECTION 102800

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.

1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type: 2-ABC UL-rated Size 10 pound nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 4416

SECTION 105153 – SOLID PLASTIC LOCKERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Solid plastic lockers on concrete base.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 2. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for each type of product indicated include fabrication details, description of materials and finishes.
 - 1. Product Test Reports: When requested by Architect, provide documentation indicating compliance of products with requirements, from a qualified independent testing agency.
- B. Shop Drawings: Include overall locker dimensions, floor plan, elevations, sections, details, and attachments to other work. Include choice of options with details.
- C. Samples for Selection: Furnish samples of manufacturer's full range of colors for initial selection.
- D. Samples for Approval: Furnish a physical sample of the material in the selected color.
 - 1. Size: 2 by 3 inch in type of finish specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Installation instructions.
- B. Warranty: Sample of special warranty.

1.5 MAINTENANCE SUBMITTALS

- A. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum 5 years experience in the manufacture of plastic lockers. Manufacturers seeking approval must submit the following in accordance with Instructions to Bidders and Division 01 requirements:

1. Product data, including test data from qualified independent testing agency indicating compliance with requirements.
 2. Samples of each component of product specified.
 3. List of successful installations of similar products available for evaluation by Architect.
 4. Submit substitution request not less than 15 days prior to bid date.
- B. Installers Qualifications: An experienced Installer regularly engaged in the installation of lockers for a minimum of 3 years.
- C. Source Limitations: Obtain plastic lockers and trim accessories from single manufacturer.
- D. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 100 or less.
 2. Smoke-Developed Index: 450 or less.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Do not deliver plastic lockers to the site until the building is enclosed. Deliver plastic lockers in manufacturer's original packaging. Store in an upright condition.
- B. Ship plastic lockers fully assembled.
- C. Lift and handle plastic lockers from the base not the sides.
- 1.8 WARRANTY
- A. Special Manufacturer's Warranty: 25 year against breakage, corrosion, and delamination under normal conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of Scranton Products, Scranton, PA, (800)445-5148, Website www.scrantonproducts.com.
1. Provide basis of design products or comparable products of one of the following approved manufacturers:
 - a. Bobrick.
 - b. Columbia Lockers
 - c. Scranton Products
- B. MATERIALS
1. Lockers: High Density Polyethylene (HDPE): Solid plastic formed under high pressure into solid plastic components with homogeneous color throughout, with smooth orange peel finish.

2. Recycled content: Minimum 25 percent.
3. Fasteners: Tamper-Resistant Fasteners: Stainless steel torx-head screws.
 - a. Locker Connectors: No. 10-24 sex bolts.
 - b. Anchors: Type and size required for secure anchorage.
 - c. Drilled-in-place Masonry Anchors: Minimum 1/4 by 1-3/4 inch (6 by 44 mm) screws.

2.2 STANDARD PLASTIC LOCKERS

- A. Basis-of-Design Product: Scranton Products TUFFTEC LOCKERS.
- B. Locker Configuration: Five tier
- C. Locker Dimensions
 1. Height, Nominal: 60 inches.
 2. Width: 12 inches.
 3. Depth: 12 inches.
- D. Locker Doors and Frames: 1/2 -inch thick HDPE plastic.
- E. Sides, Tops, Bottoms, Backs, and Shelves: 3/8 inch thick HDPE plastic.
- F. Locker Tops: Slope top.
- G. Doors: Fabricate from a single piece 1/2 inch HDPE plastic.
 1. Doors and Frame: 1/2 inch thick HDPE plastic with matte texture finish with ventilation slots.
 2. Cam Padlock Hasp: Surface-mounted.
 3. ADA compliant handle.
 4. Hinges Heavy duty extruded aluminum, full length, with corrosion-free stainless steel pin for corrosion resistance.
 - a. Color: Black.
 5. Latch Bar: Full-height latch bar constructed of 1/2 inch HDPE plastic secured to locker with stainless steel tamper-resistant screws.
 6. Base: 4" tall cast in place concrete base. See Drawings.
- H. Color: As selected by Architect from manufacturer's full range.
- I. Accessories:
 1. End Panels: 3/8 inch thick, with color and finish matching locker body.

2. Coat Hooks: Two-prong, high impact plastic, mounted to bottom of shelf or divider, one per door opening.
3. Number Plate: White acrylic with black film coating, laser etched with number specified. Provide one per locker.

2.3 LOCKER FABRICATION

- A. Fabricate locker box from a single sheet of HDPE solid plastic with corners fused together. Weld frames and shelves to box assembly. Provide all welded construction of locker parts without dovetail slots or metal fasteners. Add welded gussets in single tier full height lockers.
- B. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.
- C. Hardware Attachment: All hinges, handles, hasps, hooks, latch bars, and locks attached with tamper-resistant screws.
- D. Provide ventilated panels where indicated.
- E. Continuous Base: Set toe clearance 3 inch from locker front. Notch end caps for ease of installation.
- F. Continuous Sloping Tops: Fabricated in lengths indicated, without visible fasteners at splice locations; and finished to match lockers.
- G. Filler Panels: Fabricated in unequal leg angle shape; finished to match lockers.
- H. Finished End Panels: Fabricated with 3/8 inch wide edge dimension, configured to conceal fasteners and holes at exposed ends of plastic lockers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install lockers per manufacturer's requirements.
- B. General: Install on 4-inch masonry base. Install level, plumb, and true.
 1. Position locker base per approved shop drawing. Using fasteners provided by manufacturer, anchor base sections to the floor.
 2. Attach filler pieces to lockers with male-female sex bolts.
 3. Position first locker according to submittal layout. Square and plumb the locker using concealed shims. Secure the locker to the wall at the top and bottom of the locker. Position second locker next to first, square and plumb to align the tops and bottoms; and temporarily clamp lockers together. Drill four holes through the sides of the lockers and connect lockers using sex bolts provided by manufacturer.

- C. Accessories: Fit exposed connections of trim, fillers, and closures together to form tight, hairline joints, with concealed fasteners and splice plates furnished by locker manufacturer. Install as indicated on approved shop drawings.
 - 1. Identification Plates: Identify plastic lockers with approved identification numbers. Attach plates to each locker door.
 - 2. Sloping Tops: Attach sloping-tops to plastic lockers, with closures at exposed ends.
 - 3. Finished End Panels: Attach at ends indicated.

3.2 FINAL CLEANING

- A. Clean locker interior and exterior surfaces.
- B. Remove packaging and construction debris and legally dispose of off-site.

END OF SECTION

SECTION 114000 - FOODSERVICE EQUIPMENT (ALTERNATE 03)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes equipment for foodservice facilities.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For foodservice facilities.
 - 1. Indicate locations of foodservice equipment and connections to utilities.
 - 2. Key equipment using same designations as indicated on Drawings.
 - 3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.
- B. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 WARRANTY

- A. Refrigeration Compressor Warranty: Manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.

- B. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.
- C. Regulatory Requirements: Install equipment to comply with the following:
 - 1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
 - 2. NFPA 70, "National Electrical Code."

2.2 FABRICATED EQUIPMENT

- A. Stainless Steel Tables:
 - 1. Basis of Design:
 - a. Regency 600TS3060S, 30 inches by 60 inches, Qty 2
 - 2. Description: Prep table.
 - a. Tops: Stainless steel, Type 304, 16 gauge, reinforced and sound deadened.
 - b. Welded Undershelf: Stainless steel, Type 304.
 - c. Legs: Stainless steel tubing.
 - d. Feet: Stainless steel adjustable bullets].
 - 3. Materials:
 - a. Stainless Steel Sheet: ASTM A240/A240M, austenitic stainless steel, type as indicated.
 - 4. Stainless Steel Finish: Directional satin finish, ASTM A480/A480M, No. 4.

2.3 FOODSERVICE EQUIPMENT

- A. Refrigeration Equipment: Refrigerator in Concessions 105:
 - 1. Basis of Design: True T-12G-HC-FGD01
 - 2. Description: Reach-in type.
 - a. Exterior Finish: Stainless steel
 - b. Interior Finish: Manufacturer's standard.
 - c. Doors: Glass - Full length.
 - d. Accessories:
 - 1) Casters.
 - 2) Heavy-duty PVC coated wire shelves: Qty 6.
 - e. Electrical Service: Equip unit with plug and cord for service indicated on Drawings.
- B. Refrigerator Equipment: Refrigerator in Guards 102:
 - 1. Basis of Design: GE 21.9 cu ft Top-Freezer Refrigerator

- a. Exterior Finish: Fingerprint resistant stainless.
 - b. Interior Finish: Manufacturer's standard
- C. Refrigeration Equipment: Freezers.
 - 1. Basis of Design: Galaxy ICFF7-HC 33 7/8 inch flat top display freezer
 - 2. Description: Flat top display freezer.
 - a. Exterior Finish: White powder-coated steel, black.
 - b. Interior Finish: Manufacturer's standard.
 - c. Doors: Glass - Full length.
 - d. Accessories:
 - 1) Casters.
 - 2) Heavy-duty PVC coated wire shelves: Qty 6.
 - e. Electrical Service: Equip unit with plug and cord for service indicated on Drawings.
- D. Ice-Making Machine:
 - 1. Basis of Design: Manitowoc IYT-0300A
 - 2. Description: Freestanding units.
 - a. Production: Ice cubes, half-dice.
 - b. Capacity: 310 lb, 141(kg) per 24-hour period.
 - c. Accessories:
 - 1) Storage Bin: Manitowoc D400.
 - a) Storage Capacity: 365 lb, 165.70 (kg).
 - 2) Stainless steel stand and legs.
 - 3) Water filter.
 - d. Electrical Service: Equip unit for connection to service indicated on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.
 - 1. Connect equipment to utilities.
- B. Complete equipment assembly where field assembly is required.
 - 1. Provide closed butt and contact joints that do not require a filler.
 - 2. Grind field welds on stainless steel equipment until smooth and polish to match adjacent finish.

- C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

3.2 CLEANING AND PROTECTING

- A. After completing installation of equipment, repair damaged finishes.
- B. Clean and adjust equipment as required to produce ready-for-use condition.
- C. Protect equipment from damage during remainder of the construction period.

END OF SECTION 114000

SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.
4. Solid surface material for window sills.

1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials and integral sinks.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and integral sinks.
- C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Avonite Surfaces.
 - b. Formica Corporation.
 - c. Wilsonart LLC. (Basis of Design)
 2. Type: Provide Standard type.
 3. Colors and Patterns:
 - a. Basis of design: Wilsonart, Chilled Earth, 9228SS.
 - b. Or color selected by Architect comparable to Wilsonart Price Group 4.

2.2 COUNTERTOP FABRICATION

- A. Configuration:

1. Front: Straight, slightly eased at top.
 2. Backsplash: Straight, slightly eased at corner.
 3. End Splash: Matching backsplash.
- B. Countertops: 1/4-inch- (6.4-mm-) thick, solid surface material laminated to 3/4-inch- (19-mm-) thick particleboard with exposed edges built up with 3/4-inch- (19-mm-) thick, solid surface material.
- C. Backsplashes: 1/2-inch- (12.7-mm) thick, solid surface material.
- D. Joints: Fabricate countertops without joints.
- E. Cutouts and Holes:
1. Coordinate with sink.

2.3 WINDOW SILL FABRICATION

- A. Configuration:
1. Straight, slightly eased at exposed edge.
 2. 1-1/8 inch thick, solid surface material.
 3. Joints: Fabricate sills without joints.

2.4 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
1. Adhesives shall have a VOC content of 70 g/L or less.
 2. Adhesive 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."
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Secure countertops to metal support brackets per manufacturer's recommendations. Retain first paragraph below unless joints are not allowed.
- B. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- C. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.

- D. Install aprons to backing and countertops with adhesive.
- E. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- F. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16

SECTION 13 1500 - SWIMMING POOLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Description of Work
- B. Acceptable Manufacturers
- C. Contractor Experience Requirements
- D. Regulatory Requirements
- E. Drawings
- F. Testing
- G. Start-up Operations
- H. Warranties

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes but is not necessarily limited to the following:
 - 1. Layout of the pool.
 - 2. Pool walls and gutter systems.
 - 3. Return boxes, drains and other structures located in the pool tank.
 - 4. Interior pool finishes.
 - 5. Pool deck equipment shown or specified.

1.3 ACCEPTABLE MANUFACTURES

- A. Work in this section can be provided by approved manufactures with certified installers or by contractors capable of fabrication and installation performed by their own forces.
- B. Bidders providing an approved Manufacturer whose system requires changes to the bid documents shall include the cost to accommodate changes required by their system in their bid for a complete and operational system.
- C. Acceptable Manufactures
 - 1. Paddock Pools
 - 2. Myrtha Pools
 - 3. Natare Corporation

1.4 CONTRACTOR EXPERIENCE REQUIREMENTS

- A. All work under this section must be performed by a Contractor experienced and regularly engaged in building and renovating commercial swimming pools.
- B. Contractors bidding this work must submit a list of ten (10) similar projects building and renovating commercial swimming pools and a ten (10) year record of competence and experience in construction of similar facilities of this size and complexity.

1.5 REGULATORY REQUIREMENTS

- A. All work under this Division shall be inspected and installed in accordance with all current local and state codes and regulations. Contractor shall obtain the State Board of Health permit, inspections and final approval, and obtain structural and electrical inspections and final approvals on their portion of work.
- B. All materials and operations which are referenced to a published standard shall comply with the current specification or standard listed. All labor, material, and equipment necessary to complete all work required by the plans and in these specifications shall be furnished under this Division.
- C. Applicable requirements of the following Specifications and Codes apply to the Work of this Section:
 - 1. National Spa and Pool Institute (NPSI): Minimum Standard for Public Swimming Pools.
 - 2. All local building and health codes.
 - 3. National Electric Code (NEC).
 - 4. National Sanitation Foundation (NSF): Seal of Approval Program.
 - 5. American Society for Testing of Materials (ASTM): Specifications referenced herein.
 - 6. Department of Public Health
- D. Applicable Permits: The owner will obtain the Department of Health Permit for the pool and pool features. The contractor shall obtain all other permits.

1.6 TESTING

- A. Testing of Piping: The Contractor shall be responsible for discovering leaks and making necessary repairs.
 - 1. Pressure Piping: After the piping is installed and the joints completed, subject the lines to hydrostatic pressure of not less than 50 PSI. Joints shall remain water tight for a period of two hours. All air shall be expelled from the pipes prior to testing.
 - 2. Gravity Lines: A water test shall be applied to all gravity drain piping system, either in their entirety or in sections. All openings shall be tightly plugged and each system filled with water and tested with at least a 10 feet head of water. The water shall be kept in the system, or in the portion of the system being under test for at least 15 minutes before inspection starts. The system shall be maintained under test for 24 hours. The system shall be water tight at all joints.
 - 3. Provide written test results to the Architect/Engineer before covering the pipes. The results shall include a description of the system tested, when the test was performed and the results of the test.

4. Leaks shall be repaired and the tested repeatedly until leakage or infiltration is stopped.
5. Welds: Test welds by means of water washable Dy-Chek penetrant procedure utilizing WWI red penetrating liquid to reveal pin holes, surface cracks and similar defects. Defective welds shall be repaired and the tested repeatedly until they pass the testing.

1.7 DRAWINGS

- A. Piping locations shown on plans are schematic and precise locations shall be determined by actual field conditions by the Contractor and submitted to Architect for review.
- B. The Contractor shall include all fittings normally required for a complete installation of the system.
- C. Drawings are not to be scaled.
- D. The Contractor shall prepare and submit 4 copies of shop drawings and equipment cuts, if other than that specified to the Architect/Engineer for approval before ordering materials and equipment.

1.8 START-UP OPERATIONS

- A. At the completion of the work, the Pool Contractor shall furnish to the Owner 3 bound copies and one electronic copy of the operating manual. Minimum content of these manuals shall be:
 1. Operating maintenance, repainting, and cleaning instructions. Pool Contractor shall instruct the Owner's operating personnel in the operation of all equipment.
 2. Equipment literature with parts list of all new equipment.
 3. Suggested safety procedures. All chemical MSDS files.
 4. The Owner shall be responsible for furnishing water and filling the pool as part of the job completion. Contractor to meter pool when filling to provide Owner with accurate volume of water.
 5. Contractor shall furnish and supply start-up chemicals as required for start-up, including chlorine and requirements to balance pH, total alkalinity and calcium hardness. Water chemistry to have langelier index between -.3 and +.3.
 6. Contractor shall video tape the startup training procedures.
 7. Chemistry procedures, treatment sequence and treatment chart to be reviewed and given to Owner.
 8. Pool shall be treated, filtered and ready to use when contractor turns over to Owner.
 9. At the end of the first season, the pool contractor shall maintain the pool and prepare the facility for winter and instruct Owner's personnel in this procedure.
 10. At the end of the first year, the pool contractors shall maintain the pool and equipment and instruct Owner's personnel in this procedure.

1.9 WARRANTIES

- A. The Pool Contractor shall warrant his work, against defects in labor and equipment for a period of **(2) two years** from Substantial Completion. Such documentation shall be submitted to Owner prior to release of final payment.

- B. Substantial Completion shall be defined as the date of acceptance by the Architect/Engineer with final approval by the Department of Health and local Health Department.
- C. This warranty shall not include minor defects that do not affect the use of the pool, scratches, minor dents, minimal concrete curing cracks, etc. or contingent or liquidated damages.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete Materials: See other sections.
- B. Reinforcing Steel: See other sections.
- C. Water Stops: See other sections.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304, 12 GA plate for pool drains, gutters suction boxes, etc.
- E. Piping and Valves: See Division 13.
- F. Grout: Non-shrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.
- G. MISCELLANEOUS MATERIALS
 - 1. All accessory items such as drains, ladders, etc., shall be NSF listed and conform to State and Local Health Department Codes.
 - 2. Provide stainless steel recessed cup anchors for safety ropes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Separate dissimilar metals and metal products from contact with wood or cementitious materials, by painting each metal surface in area of contact with a bituminous coating or by other permanent separation. Coat carbon steel with coating where called for on the plans.

3.2 INSTALLATION OF MISCELLANEOUS POOL ACCESSORIES

- A. Incorporate accessories, such as deck tiles and other miscellaneous materials as shown on the drawings and specified elsewhere.

SECTION 13 1513 – SWIMMING POOL TANK

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pool Walls
- B. Pool Floor
- C. Pool Steps
- D. Pool Finish
- E. Installation

PART 2 - MATERIALS

2.1 POOL WALLS

- A. Stainless Steel Wall Panels:
 - 1. 12-gauge, 304 stainless steel, 2B finish.
 - 2. Majority of panels to be of uniform width in a single run.
 - 3. Bottom of panel to extend 2" (Min.) into concrete floor.
 - 4. Install 1" x 1" x 12"L stainless steel angle dowels (1/4 twisted), welded to backside of gutter, 3" from top of wall (2'-6" O.C.).
 - 5. All seems to have continuous welds.
- B. Stainless Steel Pool Walls:
 - 1. Fabricate and install stainless steel pool walls per drawings.
 - 2. Pool wall support system is to be fabricated from carbon steel as shown on the drawings.
 - 3. Stainless steel wall panels are to be attached to the carbon steel support frame by welding.
 - 4. Weld stainless steel panels to back up angles and then fill joints between panels with weld material and smooth joint after welding is complete.
- C. Subsurface Buttress Framing:
 - 1. A-36 mild steel angles, arc welded.
 - 2. Buttress framing width to be at least 1/2 the total height of pool wall. (See pool wall detail).
 - a. 2" x 2" x 1/4" L for pool wall depths up to 3'-0"
 - b. 3" x 3" x 1/4" L for pool wall depths 3'-0" and greater.

3. All non-stainless steel framing members to be coated with buttress coating.
4. Temporary Buttress Grade Beam:
 - a. 4000# concrete w/ 2" x 2" x 1/4" L framing, as shown in pool wall detail.
 - b. Use 3" x 3" x 1/4" L for pool depths greater than 3'-0".

D. Buttress Coating:

1. Approved manufacturers
 - a. Tnemec Tneme-TAR Series 47
 - b. Approved equal.

2.2 STAINLESS STEEL GUTTERS

- a. See section 13 1530 Swimming Pool Gutters, Piping and Valves.

2.3 POOL FLOOR

A. Cast-In-Place concrete over gravel fill.

B. Expansion Joint Material

1. Vinyl Expansion Joints material meeting the requirements of ASTM D 1752 and AASHTO M 153-98.
2. 1/2" thick - set joint material down 1/2" from top for sealant.
3. Approved Manufacturers:
 - a. "Pro-Flex" by Oscoda Plastic, Inc.
 - b. Approved equal.

C. Horizontal and Vertical Joint Water-stop:

1. 9" wide serrated polyvinylchloride (PVC) w/ center bulb.
2. Approved manufacturers
 - a. Horn
 - b. Grace
 - c. Greenstreak
 - d. Approved equal.

D. Joint Sealant

1. Use one of the following Waterproof, self-leveling, sealants approved for submerged use in water with higher than 5 ppm chlorine.
 - a. Thiokol 2235

- b. Pecora Synthacaulk GC2+
 - c. WR Meadows – Deck-O-Seal 125
 - d. Olympic 131 Thermoplastic
 - e. Provide color of sealant to match pool paint.
- E. Pool Floor Paint: Paint is to be POTA-POX PLUS N140 by Thnemec Company Inc.
- 1. Provide full line of manufacturer's colors.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Structure shall be assembled in accordance with drawings, specifications, and current standards of construction.
- B. All concrete preparation shall be performed within 72 hours of application of finish.

END OF SECTION

SECTION 13 1525 – SWIMMING POOL FILTRATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Filters
- B. Variable Frequency Drive
- C. Circulation Pumps
- D. Tablet Chlorinators
- E. Chemical Controllers
- F. Pool Heater
- G. Flow Meters
- H. Installation

PART 2 MATERIALS

2.1 REGENERATIVE MEDIA FILTER

It is the intent of this specification to describe a water filtration system complete with all necessary items. It is the further intent of these specifications that filtration unit from pump through precoat system, including all filter control valves as hereinafter specified and all accessories, be supplied and guaranteed by one manufacturer. Any filter offered under these specifications shall be NSF listed at time of offering (bid date). Such listing shall be evidenced by filter model number appearing in current NSF listing for swimming pool filters at filtration rate required for this project. Filter shall be a product of a manufacturer regularly engaged for 15 years in fabrication of water filtration equipment and who has a minimum of five (5) years experience in manufacturing this type of filter. Filter system must be an automatic Stainless Steel Regenerative Pressure Diatomaceous Earth (DE) or Perlite filter as supplied by Paddock Pool Equipment Company. All bidders are required to bid the named manufacturer in base bid. The contract may bid another manufacturer of like product as an alternate deduct.

A. Filter Tank:

1. Filter tank shall be diametrically divided into head and body components. Two shall be bolted together by means of external flanges and made water tight by an o-ring seal.
2. Filter body and head shall be of welded construction, with all welded surfaces, nozzles and brackets fabricated from Type 304L stainless steel. All joints shall be welded both internally and externally. Internal weld shall be a continuous seal weld to preclude crevice corrosion.
3. Support legs (3) shall be Type 304L stainless steel, stainless steel Type 304L pads shall be welded to filter body prior to leg attachment.
4. Both body and head flange bolting surfaces shall be entirely supported by a full perimeter spacer ring, to preclude distortion of those surfaces by varying bolt tension.

5. All bolt and fastenings, both internal and external, shall be of Type 304L stainless steel.
6. Inspection window shall be heat tempered Pyrex glass and will be covered by a clear acrylic safety shield.
7. Tank shall be designed for a 50-psi working pressure using non-code criteria and have a safety factor of 4.
8. Filter tank shall incorporate connections for filter influent and effluent, drain, pre-coat inlet, pressure and vacuum relief ports, (2) -1/4-18 NPTF pressure taps, inspection window (1) 4" nominal diameter, bump shaft gland mount.
9. Filter effluent and pre-coat recycle connection shall be common to assure a non-shock transition between the pre-coat recycle and service flows.
10. Nozzle sizes for influent and drain connections are specific for their respective functions. Accordingly, separate nozzles are used with sizes as indicated on drawings.
11. Filter body shall incorporate an integral full diameter inlet distributor which directs the water to be filtered to the Flex-Tube™ bundle. Adjustable legs and a short turn top elbow shall be provided as part of the filter. Not to exceed 9'-11" in height.
12. On completing fabrication, all internal surfaces of filter tank shall be passivity according to procedure set forth in federal specifications QQ-P-35B, for austenitic 300 series corrosion - resisting steel.

B. Flex-Tubes™ and Assembly

1. Flex-Tubes™ shall be cylindrical in shape with each tube closed at the bottom and open at the top. Open shall be flanged to fit into the tube sheet.
2. Outer wall of Flex-Tube™ shall be made of multi-filament polyester braid with filaments arranged so that external pressure causes a diminution of the tube diameter and pore size. Conversely, internal pressure results in an enlargement of the diameter. Each tube shall have an internal stainless spring to limit diameter diminution. Membrane ends shall be impregnated with a polyester thermo set resin to reinforce the spring compression points.
3. Flex-Tubes™ shall have a recommended operating differential rating of 25 psi, and an ultimate of 75 psi. Elements cannot be longer than 38", with a minimum number of elements based on the manufactures filter model.
4. Tube sheet shall retain Flex-Tubes™ and shall separate the filter tank into upper and lower sections. A seal shall be provided to prevent unfiltered water from bypassing the tube sheet into the upper clean side of the filter tank.
5. All components in the assembly shall be constructed from materials unaffected by corrosiveness of swimming pool water. Assembly shall be removed from filter tank for servicing as a unit; or, if desired, by dismantling the individual parts.

C. Bump Mechanism

1. Bump mechanism shall consist of an air-stroke™ actuator supported on a machined surface located on top of the filter head. It shall be connected to Flex-Tube™ assembly by a stainless-steel shaft and rod aligner.
2. During bumping, bump mechanism is alternately pressurized and de-pressurized, causing Flex-Tube™ assembly to move downward then upward in linear fashion over a stroke distance of approximately 2".
3. Bumping shall be both push-button initiated, and electronically programmed.

D. Media

Perlite or DE media can be used in this filter.

E. Controls and Gauge Assembly

Provide gauge panel with two (2) 4-1/2 inch diameter gauges connected to the influent lines of filter; bump controller, air pressure regulator, air lubricator, pressure stat, and associated airline.

F. Filter Assembly

Entire filter assembly shall be approved and listed by National Sanitation Foundation (NSF).

G. Filter Piping and Valves

Filter unit shall be provided with supports and brackets, manifold, and elements. Piping shall be arranged to carry out operations of filtering, pre-coating, rinsing, and draining. External piping connections shall be flanged when larger than two inches. Filter tank assembly shall be provided with necessary pipe, valves, and fittings to make a complete battery from inlet to outlet.

H. Filter Precaution

Filter tank must be properly anchored in place in full accordance with manufacturer's recommendations before being filled with water.

I. Automatic Filter Controller

1. Provide an automatic filter controller to automatically regenerate and precoat Flex-Tube™ on a timed basis. Controller shall be equal to Paddock Regenerator model "MOD-1-SSC". Installation shall include all materials, pilot operated valves, air piping, etc., for a complete operating system equal to, but not limited to, the following:

2. Enclosure: single door, continuous hinge enclosure conforms to the NEMA standard for type 12 industrial use enclosures. Equipped with quick acting external screw clamps for securing the neoprene gasket cover. A sub-panel to be provided for mounting components.
3. Circulation pump motor control: variable frequency drive shall be functionally interlocked with MOD-1-SSC solid state control program.
4. Regeneration process shall be time based. There shall also be an interlock with computerized pool management controller to effect regeneration whenever a user adjustable pressure differential occurs.
5. MOD-I-SSC controller shall incorporate (3) normally open interlock contacts (3 amp max) and (1) 115 VAC output for connection to ancillary filter room equipment (UV units, heat exchangers, water chemistry controllers, booster pumps, heat recovery systems & etc.) providing functional coordination with the filter controller operating program.
6. MOD-I-SSC controller shall incorporate a normally open run contact, 4-20 ma PID loop output, staged precoat output, and run/fault inputs for connection to a variable speed drive motor controller.
7. Pilot operated valves: provide (2) solenoid pilot, electrically actuated 4-way valves to control (2) double acting rotary actuators mounted to (2) butterfly valves (precoat recycle and on-stream). Butterfly valves to be cast iron body EPDM seat with stainless steel (316) disc and shaft with acetal bushing.
8. Program for automatic filter controller shall be as follows; when signal to start regeneration occurs (2 hrs, 4 hrs...30 hrs) controller automatically:
 - * Switches off recirculation pump
 - * Closes pool return valve
 - * Opens precoat re-cycle valve
 - * Initiates 3 bumps
 - * Starts recirculation pump for a short precoat recycle (6 minutes)
 - * Opens pool return valve
 - * Closes precoat re-cycle valve

J. Pneumatic Control System

Pneumatic control system shall be piped by pool contractor. Compressor and dryer shall provide 100 psi dry pneumatic air to filter controller. Pool contractor is also responsible for mounting the bump cylinder on top of the filter tank with four bolts provided. He must then connect the pneumatic air to this mechanism and from there to the two automatic valves.

K. Warranty

1. Tank to be free of defects in material and workmanship under normal use and service within 15 years of first use.
 2. Components and parts by other manufacturers are subject to terms, conditions, and limits under their warranty.
 3. Manufacturer's obligation under this warranty shall be limited to repair or replacement of any item which upon the manufacturer's examination shall disclose to its satisfaction to be defective.
- L. Acceptable Manufacturers:
1. Paddock Regnerator™
 2. Approved Equal.

2.2 VFD

- A. A Variable Frequency Drive (VFD) shall be provided with each pump for control of the pump motor.
- B. The Variable Frequency Drives (VFDs) shall be solid state, with a Pulse Width Modulated (PWM) output. The VFD package as specified herein shall be enclosed in a NEMA 12 enclosure, completely assembled, programmed, and tested by the manufacturer. The VFD shall employ a full wave rectifier (to prevent input line notching), capacitors, DC link inductors, and Insulated Gate Bipolar Transistors (IGBTs) as the output-switching device. The drive efficiency shall be 97% or better at full speed and full load. Displacement power factor shall be no less than 0.98 at all speeds and loads.
1. Exterior installation shall have NEMA 4X Enclosure.
- C. All CFW11 VFDs shall be factory programmed per the unique requirements of each job per Neptune Benson specifications. Programming shall include but shall not be limited to filter pump motor specifications, remote start/stop requirements, run confirm requirements and PM loop requirements.
- D. VFDs and options shall be UL and CUL listed as a complete assembly. VFDs and options shall be UL, CUL, and CE labeled as a component.
- E. Harmonic Distortion Control:
- The VFD design shall incorporate mechanisms that lower the harmonic currents caused by the drive as compared to standard six-pulse drives onto the AC power line. Harmonic calculations shall be supplied upon request based on a single line diagram of the electrical system. This diagram shall include transformer(s) KV, kVA and impedance percentage to accurately predict the harmonic levels at the PCC (Point of Common Coupling), as specified by IEEE519-1992. The calculations shall be made with the point of the common coupling being the utility feeder.
- F. Specifications:
1. Input voltage 208 VAC +/- 10%, 3 phase, 48-63 Hz.

2. Voltage tolerance + 10% or — 15% of specified line voltage.
 3. Output Frequency 0 to 300 Hz. Operation above 60 Hz shall require programming changes to prevent inadvertent high-speed operation.
 4. Environmental operating conditions: -10 to 50°C, 0 to 1000 meters above sea level, less than 90% humidity, non-condensing.
 5. Enclosure shall be rated NEMA 12.
- G. The VFD shall be wired into the RMF controller for on/off and run confirm functions. Wiring shall be by electrical contractor.
- H. The VFD shall be equipped with a bypass. Bypass option shall send the motor to bypass mode based on an easily accessible door-mounted selector or based on the drive's programmable relay. A bypass pilot light shall provide indication of the bypass mode. The bypass mode shall provide overload protection. Contactors shall be electrically and mechanically interlocked. An essential services mode shall send the motor to bypass regardless of the selected mode.
- I. A disconnect switch shall be provided.
- J. A digital flow meter shall be included with a 4-20mA 0-10 VDC analog output.
- K. The flow meter shall be wired into the VFD to provide automatic speed control of the filter pump motor.
- L. The VFD shall compensate for varying filter head losses by maintaining the specified flow rate with the 4-20mA output signal of the flow meter.
- M. Acceptable Manufacturers:
3. AccuDrive
 4. Approved Equal.

2.3 CIRCULATION PUMPS

- A. All pumps to be NSF 50 approved.
- B. Below Water Level: Close-Coupled Centrifugal Pumps. (See Pool Design Data for model numbers)
- C. All pumps to be bronze fitted with keylocked shafts.
- D. All pumps to have mechanical seal, John Crane, Type 21, Buna-N with Ceramic Seat.
- E. All pumps to be Totally Enclosed, Fan Cooled (TEFC).
- F. Contractor to install pressure / compound gauges on suction and discharge end of pumps.
- G. Impellers and volute case (wet-end of pump) to have Epoxy Fused Coating.
- H. Pool Contractor to provide (1) additional basket for filtration strainer.
- I. See Electrical Drawings for motor starter (VFD), disconnect and electrical service information.
- J. Acceptable Manufacturers:
1. Aurora

2. Approved Equal.

2.4 TABLET CHLORINATORS AND ACID FEEDERS

- A. All equipment to be NSF approved.
- B. See Pool Design Data for specific models for each pool.
- C. Dosing rate to be controlled by an automatic chemical controller. The chlorinators control panel shall be capable of receiving signals from the ORP output of the chemical controller.
- D. Control panel and Booster pump to be interlocked with its corresponding circulation pump.
- E. Contractor to provide briquettes per Section 13 1500
- F. Acceptable Manufacturers:
 1. Accu-Tab
 2. Approved Equal.

2.5 EQUIPMENT CONTROLLER

- A. WATER CHEMISTRY CONTROL
 1. The controller shall automatically activate the appropriate chemical feeders in order to maintain the sanitizer level within +/-0.1 parts per million (PPM) or +/- 10 mV (millivolts) of Oxidation-Reduction Potential (ORP) and the pH within +/- 0.1 pH unit of the setpoints selected by the operator. ORP and Sanitizer functions shall include seven-day, level-based chemical saver programs. All setpoint and calibration levels shall be adjustable with a numeric keypad mounted on the front panel of the unit. Controllers with internal switches or calibration adjustments will not be considered equal.
 2. The controller shall be capable of actuating all outputs in the following operator-selectable modes: off, manual, automatic and timer cycle. In the automatic mode, the operator shall be able to choose between on/off control with adjustable deadband or proportional feed control with adjustable deadband and progressive control zones.
 3. The controller shall include a programmable seven-day shock program with operator selectable ON and OFF times for each day of the week and optional separate chemical feeder relay control.
 4. The controller shall include automatic control of a chemical feeder for Automated Chloramine Treatment (A.C.T.). This will require the optional PPM sensor for chlorine control.
 5. The controller shall have the capability to operate an Ozone generator utilizing an internal spare relay with high ORP lockout.

6. The controller shall include a temperature sensor and automatic control of the heater with a seven-day energy saver program.
7. The controller shall continuously calculate and display the Langelier Saturation Index using either sensor data and/or manual input for pH, temperature, total alkalinity and calcium hardness. The resulting calculated water condition shall be displayed on the main screen as either "Scaling", "Corrosive" or "OK".
8. The controller shall be contained in a NEMA Type 4X (rain and splash proof) lockable fiberglass cabinet with an LCD graphic display screen of eight (8) lines of twenty two (22) alphanumeric characters. The main screen shall display current readings, control modes and operational status for ORP, PPM, pH, temperature (flow rate, influent and effluent pressure displays available with optional installation.) A 16-key touch pad shall be provided for direct access to all the menus and submenus and for entering numerical data. Controllers with smaller displays or displays that require scrolling through menus will not be considered equal. All screens shall have the capability of being displayed at any time in unabbreviated English, French or Spanish and in US or metric units.
9. The sensor bypass line shall include an in-line filter, a flowmeter, a safety flow switch, a sampling spigot and two flow control valves, or shall include a flow cell assembly with a safety flow switch.
10. The controller shall be factory set to water treatment industry standards. The operator shall be able at any time to adjust all programmable functions to preferred settings. The controller shall have a reset mode to reset all or selected functions to the original factory standards.
11. The controller shall have the capability to calibrate all sensor inputs, depending on the accuracy needed, using 1-, 2-, or 3-point calibration to determine respectively the origin, slope and curvature of the calibration curve.
12. The controller shall include programmable high and low alarm levels for all control functions with operator-selectable feed lockout and alarm buzzer options. A Remote Alarm relay shall be included in parallel with alarm buzzer for operator-selectable voltage or dry contact output.
13. The controller shall continuously monitor and alert for failure of ORP and pH probes using dynamic probe testing before the water chemistry gets out of range. Failure alarms based on safety timers or out-of-range alarms will not be considered equal.
14. The controller shall include a seven (7) day program for automatic sensor cleaning.
15. The controller shall record and display the elapsed run time for each activation event and a cumulative run time resettable at any time by the operator. The controller shall provide for operator-adjustable event run time limits and total run time alarms for all control functions.
16. The controller shall include a memory storage battery with minimum reserve power for six (6) months.

17. The controller shall include an on-board memory chip for storing of test data on operator-selectable schedules. RS-232 serial communications port shall be included for on-site downloading of the test data. Test data storage must consist of the following sensor inputs: ORP, PPM, pH, Temperature (Conductivity or TDS, Pressure influent of filter, Main flow rate available with optional sensors). The controller shall insert a test data every time power is turned on to indicate power failures. Controllers failing to data log all listed parameters will not be considered equal.
18. The controller shall include an on-screen visual display of all test data logged in memory. Controllers that require the use of external accessories or equipment, such as portable computers or remote access computers, to retrieve or display test data shall not be considered equal.
19. Installation of the controller and the chemical feed equipment shall be performed by a factory trained qualified dealer located within the state in which the project is located.

B. OPTIONS (ALL OPTIONS LISTED BELOW TO BE INCLUDED)

1. **OPTION PPM SENSOR:** A solid-state PPM SENSOR shall monitor and display the Free Chlorine concentration in water in ppm or mg/l and shall be used to control the chlorine feed device. The sensor readings must be accurate to 0.01 PPM and must not be affected by Cyanuric Acid and/or oxidizers. PPM values derived from ORP sensor readings shall not be acceptable. The PPM sensor shall not require the use of chemical reagents and/or of a special flow cell for water flow and pressure regulation. This option is required for all A.C.T. programs.
2. **OPTION FLOW3:** The controller shall include an electronic water flow meter for monitoring and displaying the main line water flow and cumulative flow. The operator shall be able to calibrate the flow sensor by entering its K-factor. The controller shall also include a programmable low flow alarm with operator selectable pump lockout and alarm buzzer options.
3. **OPTION LEVEL3:** The controller shall include a water level sensor and automatic water level control of a water fill valve. The sensor is an electro-optical sensor which can be located in the pool or in the surge pit. The controller shall be capable of operating the fill valve in the following operator-selectable modes of operation: OFF, Manual or AUTO. A programmable seven (7) day program shall be included for AUTO mode with operator selectable ON and OFF times for each day of the week. During Fill cycles, all chemistry control is set in stand-by mode to prevent improper chemical treatment and a "LOW LEVEL" message is displayed on the Main Screen.
4. **OPTION FCA:** The ORP and pH shall be mounted in a see-through flow cell with a clear cover, pre-assembled with a water spigot and (2) ball valves [Sch 80 PVC]. Optional Temperature and TDS sensors will be mounted on corner Tee inline with see-through flow cell.
5. **OPTION ETHCOM3:** The controller shall include an Ethernet / Internet modem for remote operation by PC-compatible computer using Ethernet / Internet network communication. A Windows-based software program shall be supplied with true duplex operation capability

representing the actual controller screen display with automatic downloading and visual graphics representation of test data. Controllers using simulation or virtual representation of the display screen shall not be considered equal.

C. WARRANTY

1. The controller shall be covered by a standard manufacturer warranty of five (5) years. Special extensions of more limited warranties shall not be considered acceptable. All sensors will be covered by a standard one (1) year warranty. Other parts shall be covered by their own manufacturer's warranty. The controller shall not require a service technician for annual calibration, seasonal start up, or whenever chemicals supplier or type are changed.
2. The manufacturer shall supply a complete instruction, operating and maintenance manual. Check-out of installation, start up, and instruction of operating personnel shall be performed by an authorized and properly trained manufacturer representative.

D. Acceptable Manufacturers / Models

1. Chemtrol PC3000
2. Approved Equal.

2.6 POOL HEATER

A. Provide and install pool heater.

1. Acceptable Manufactures
 - a. Ray-Pak Xtherm (see drawings for size).
 - b. Z-12 Condensation Kit shall be included.
 - c. External Heat exchanger shall be included.
 - d. Approved Equal upon request per substitution requirements in project manual.
2. Install per manufacturer's instructions and installation requirements including all connections to existing utilities and pool equipment and piping.

2.7 FLOW METERS (Stand Alone)

- A. A digital flowmeter shall be included with a 4-20mA 0-10 VDC analog output.
- B. The flowmeter shall be wired into the VFD to provide automatic speed control of the filter pump motor.
- C. The VFD shall compensate for varying filter head losses by maintaining the specified flowrate with the 4-20mA output signal of the flowmeter.
- D. Flow meters shall be installed on the discharge line of each circulation pump.
- E. Flow meter to be installed so as to have an undisturbed water flow 10 pipe diameters upstream and 5 pipe diameters downstream or per manufacturer's specifications.
- F. Flow meters to be installed per manufacturer's recommendations and have all components required for a complete installation.
- G. Approved Manufacturers

1. FlowViz
 2. Blue/White
 3. Approved Equal
- H. The pool controller has separate flow meters.

PART 3 - EXECUTION

3.1. INSTALLATION

- A. Pool Contractor to conduct pre-installation meeting with Owner and Architect prior to installation of any equipment in the pump room, walk-ways and clearances in this room are tight and need to be well coordinated.
- B. Pool Contractor to install all equipment as manufacturer specifies and shall include all items required for a complete installation.

END OF SECTION

SECTION 13 1530 – SWIMMING POOL GUTTERS, PIPING AND VALVES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Recirculation Gutter and Boxes
- B. Valves, Piping and Fittings

PART 2 - MATERIALS

2.1 RECIRCULATION GUTTER AND BOXES

- A. Tube and Gutter: 12 gauge, 304 stainless steel, 2B finish.
 - 1. Profile: See drawings for tube and gutter dimensions.
 - 2. Gutter Grating: Please note any manufacturer other than Basis of Design will be required to provide grating to meet requirements of specification. If details in drawings based on Basis of Design are required to change for other manufacturer's products then it will be the contractor's
 - a. Paddock Industries Polymer Grating (Basis of Design)
 - b. Ntare GPM Polymer Grating
 - c. Approved Equal
 - 3. Gutter Grating required to provide attic stock as follows:
 - a. (2) straight sections
 - b. (2) typical Radius sections for most common radius on pool
 - c. (1) CNC Digital File for owner's use in having new sections created in future for maintenance purposes.
- B. Gutter Collection Boxes
 - 1. 12 gauge, 304 stainless steel, 2B finish.
 - 2. See drawings for quantities of boxes for each pool & size of box.
- C. Inlet Converter Boxes
 - 1. 10 gauge, 304 stainless steel, 2B finish.
 - 2. See drawings for quantities of boxes for each pool & size of box.
- D. Drain Boxes
 - 1. 12 gauge, 304 Stainless steel, 2B finish
 - 2. See Drawings for quantities of boxes for each location and size of box.
 - 3. Minimum depth of drain box to be 1.5 times the Diameter of the connecting

2.2 POOL VALVES AND PIPING MATERIALS

- A. Work included:

1. Butterfly valves.
 2. Check valves.
 3. Flexible expansion connectors.
 4. PVC ball valves.
 5. Underwater service operators.
 6. Extension handles.
 7. Float valves.
 8. Piping, hangers and supports
 9. Eccentric and concentric reducers.
- B. Products: Provide valves of the same manufacturer throughout where possible and practical. Valves shall be marked manufacturer's name and pressure rating clearly on the outside of the body.
- C. Provide valve connections suitable to connect to adjoining piping as specified for pipe joint. Use pipe size valves.
- D. Use of Valves
1. Pipe sizes 3" to 12" use butterfly valves.
 2. Miscellaneous valves 1/2" to 2 1/2" - PVC True Union Ball Valves.
 3. All chemical lines and equipment - PVC True Union Ball Valves.
- E. Butterfly Valves
1. Butterfly valves 3" to 12" shall be wafer or lug bodies and shall be suitable use between ANSI 125 or 150 lbs. flanges.
 2. Bodies of the flangeless design shall be provided with at least two (2) bolt guides to center the valve in the pipeline.
 3. Valve Construction:
 - a. All butterfly valves shall be constructed with PVC bodies, PP disc with stainless steel shafts and EPDM seats and seals. Valves shall have an operating pressure rating of 150 psi.
 - b. All butterfly valves 6" and smaller shall be lever operated with a minimum of 10 position locking handles unless shown otherwise on the drawings. Butterfly valves larger than 6" shall be gear operated unless shown otherwise on the drawings.
 4. All valves shall be manufactured by Asahi America or equal.
 5. All bolts and nuts shall be stainless steel with stainless steel washers.
- F. Ball Valves: PVC True Union Ball Valves, Eslon, Assahi or Equal.
- G. Check Valves 1/2" thru 2 1/2" shall be PVC body, true union, ball type, seal material Buna-N as manufactured by Eslon, Assahi or equal.
- H. Check Valves 3" thru 12" shall be cast iron epoxy coated body, bronze split disc, stainless steel fitted and Buna-N seal material. Check valves shall be the CVXX style as manufactured by the Metraflex Company, model 5050 manufactured by Techno Corporation or equal.

- I. Expansion Joint/Flexible Connector shall be the Metrosphere Model as manufactured by Metraflex.
- J. Modulating Float Valves shall be used in the surge tank as specified in the Contract Drawings. The valves shall be constructed with stainless steel rod and PVC floats allowing 20 % flow when fully closed. Float valves shall be manufactured by Fluidtrol or approved equal.
- K. Drainage Valves: Provide minimum 3/4" True Union Ball Valves on all piping to allow complete drainage of system.
- L. Eccentric and Concentric Reducers
 - 1. Use Eccentric reducers on pump suction lines only and concentric reducers on pump discharge lines only.
 - 2. Reducers shall have stainless steel body and flanges, T304 materials, ANSI 125# rated flanges.
 - 3. Fluidtrol or approved equal.
- M. Automatic Air Relief Valve: A 1" valve shall be provided to automatically and continuously release air in the filter. The valve shall be fabricated of plastic with Buna-N seals. A plumbing kit shall be provided with two (2) PVC ball valves to allow manual air relief and isolation of the automatic valve. Valve fabricated of cast iron, bronze or stainless steel shall not be acceptable.
- N. Submerged Service Operators: Use only approved service operators for the valve requiring underwater operation in the surge tank or in manhole used for pool draining.
- O. Valve Operator Extension: Provide extension lengths as necessary to operate submerged or below surface valves and the appropriate valve box access cover. Extension shall be by same manufacturer as valve.
- P. Ball Valves:
 - 1. Ball valves shall be of thermal plastic construction and have no metal parts that come in contact with media. All valves suitable for use between ANSI 125 or 150 pound flanges.
 - 2. Bodies of flangeless design shall be provided with at least two (2) bolt guides to center the valve in the pipe line.
 - 3. Valve Construction: All ball valves shall be constructed with PVC bodies, PP discs with stainless steel shafts and EPDM seats and seals. Valves shall have an operating pressure rating of 150 psi.
 - 4. All valves shall be manufactured by Asahi America or approved equal by Architect / Engineer.
 - 5. All bolts and nuts shall be stainless steel with stainless steel washers.
 - a. Install per manufacturer's instructions and installation requirements including all connections to existing utilities and pool equipment and piping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Pool Contractor to install all equipment as manufacturer specifies and shall include all items required for a complete installation.

3.2 PIPING AND PIPE FITTINGS - HANGERS AND SUPPORTS

- A. Work included: Pipe, fittings, connections, wall penetrations, hangers and supports, equipment bases and supports, excavation and backfill.

B. REFERENCES

1. ANSI/ASTM D2564 - Solvent weld cements for polyvinyl chloride (PVC) plastic piping and fittings.
2. ANSI/ASTM D1785 - Standard specification for Polyvinyl chloride (PVC) plastic pipe schedules 40, 80 and 120, NSF seal for potable water.
3. ASTM B88 - Seamless copper water tube.
4. ASTM D2855 - Practice for making solvent cemented joints with PVC pipe and fittings.
5. Eslon Engineering Manual for plastic piping systems.

C. PLACEMENT AND USE

1. Use the prescribed pipe type in the following areas. All plastic pipe flanges shall be schedule 80 PVC with neoprene gaskets where required.
2. All pool gutter lines shall be schedule 80 solvent welded, conforming to ASTM D1785/76. All gutter lines shall drain by gravity to the surge tank.
3. All buried return lines shall drain by gravity to the surge tank.
4. All buried filter return lines, main drain lines, PVC schedule 80 solvent weld.
5. All chemical piping, schedule 80 PVC, solvent weld.
6. Piping must be laid so it will drain completely by gravity. In all instances where gravity drainage is not provided, the contractor shall install drain valves so the lines can be drained completely. Shop drawing will be required on any such installation.
7. Cut all pipe with a mechanical cutter without damaging the pipe.
8. Placing and laying pipe: Inspect pipe for defects before installation. Clean the interior of the pipe thoroughly of foreign matter and keep clean during laying operation. Pipe shall not be laid in water or when trench conditions are unstable. Water shall be kept out of the trench until the pipe is installed. When work is not in progress, open ends of the pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter the pipes or the fittings.
9. Threaded Joints: After cutting and before threading, the pipe shall be reamed and shall have burrs removed. Screw joints shall be made with graphite or inert filler and oil or with an approved graphite compound applied to the male threads only. Threads shall be full cut and not more than 3 threads shall remain exposed. Use Teflon II tape on the male threads of all threaded pipe joints. Unions shall be provided where required for disconnection of exposed piping. Unions shall be permitted only where access is provided.

10. Solvent welded joints shall be made in accordance with the manufacturer's printed instructions.
11. Make provisions for expansion and contraction by way of swing joints or snaking.
12. Protect piping from exposure to aromatic hydrocarbons, halogenated hydrocarbons and most esters and ketones that attack the material.
13. Protect all pipe from mechanical damage and long exposure to sunlight during storage.
14. PVC welding is not allowed.
15. Flanged Joints are not allowed on buried pipes.

D. HANGERS AND SUPPORTS

1. All mechanical room piping must be properly supported.
2. It shall be the contractor's responsibility to properly support piping at all valves, pumps, equipment, overhead areas, etc.
3. Use proper hanger for conditions is essential. All piping must be supported laterally as well as vertically hung.

E. PIPE IDENTIFICATION

1. Provide identification on all piping located in the filter room.
2. Identify the contents of the pipe and direction of flow.
3. Mark at least once on each five foot intervals minimum. Consult Health Department Code for minimum marking requirements. If none required follow industry practice.
4. Color code per Health Department requirements. If code does not identify color coding requirements, consult Architect / Engineer.
5. Brady, B-946, custom legend, self-sticking markers and arrows or equal.

3.3 EQUIPMENT BASES AND SUPPORTS

- A. Provide for major equipment reinforced concrete housekeeping bases poured directly on structural floor slabs. Housekeeping pads shall be a minimum of four inches thick and extend a minimum of four inches beyond the machinery base plate. Provide templates, anchor bolts, rubber vibration isolators and accessories required for mounting and anchoring the equipment. Consult with the equipment manufacturer for length and installation of the anchor bolts.

3.4 SLEEVES AND WALL PENETRATIONS

- A. Pipes penetrating all water tight walls shall use "Link Seal" Century line sleeves in combination with link seals having stainless steel service designation. Patch exterior side of wall penetrations with non-shrink grout.
- B. Provide shop drawings on proposed location of all pipes penetrating water tight walls.

- 3.5 Contractor shall mount in the filter room a laminated sheet showing the location of all valves and piping. All valves shall be numbered corresponding to valve tags supplied by contractor. The drawings shall include instruction for winterizing the pool with drain points clearly identified.

- 3.6 Contractor shall mount in the filter room a laminated sign showing how to backwash the filter.
All valves shall be numbered corresponding to valve tags supplied by contractor.

END OF SECTION 13 1530

SECTION 13 1540 – SWIMMING POOL ACCESSORIES

PART 1 – GENERAL – Not Used

PART 2 - MATERIALS

2.1 SAFETY LINE

- A. ¾ Inch blue and white twisted polypropylene rope. Recreonics 14-438.BW or Approved Equal
- B. Competitor 5" x 9" Blue and White EZ-Lock Float (5'-0" on center) Recreonics #14-382 or Approved Equal
- C. ¾" Standard Chrome-Plated Bronze Rope Hook (One for each end of Rope) Recreonics #14-456 or Approved Equal
- D. Reference drawings for quantities.

2.2 RACING LANES AND STORAGE REELS

- A. Racing lanes shall be Competitor Gold Medal 6" lane line is non-turbulent and designed for optimum wave quelling. Each disc has a flow through design which allows the wave to disperse along the channel of the revolving discs. Each lane line consists of injection-molded polyethylene discs and blow molded donuts strung on a 3/16" vinyl coated stainless steel cable. The discs and donuts have a protective additive within the plastic called LifeSPan+ which decreases fading and prevents breaking of the disc.
- B. Lane lines are attached to the pool wall using an EZ-Tensioner, which does not need a wrench and uses a button to release the lane.
- C. The lane lines are built to the length of the pool, arrive completely assembled and are available in 14 different colors.
- D. Lane lines shall meet all USA Swimming, NCAA, NFHS, and FINA swimming regulations.
- E. Reference plans for required length and quantity.
- F. The Elite lane line storage reel shall be fabricated from two powder-coated enclosed aluminum wheels joined together by a 1 ¼" aluminum axle. This unit must ride easily on four 6" stainless steel casters with individual brakes.
- G. The reel should have a collapsible tow handle for safe movability.
- H. The Elite lane line reel shall be Recreonics #14-361 or approved equal.
- I. Provide the proper amount of reels to accommodate the specified lane lines.

2.3 GRAB RAILS

- A. The Figure 4 grab rail shall yield a 35" height above the pool deck and shall be 26" wide from the front edge to the center of the end post.
- B. The rail centerline post to post dimension shall be 8". The front clear dimension shall be 9".
- C. Grab rails shall be spaced between 19" and 24" or as required by state and/or municipal codes.
- D. The grab rail shall be fabricated from one continuous length of tubing. The tubing shall be ASTM A-554 certified 1.90" x .109" wall thickness Type 304 stainless steel polished to a 320-grit finish. All bends shall be smooth and free of wrinkles.
- E. The grab rail shall be anchored in 4" deep bronze wedge anchor sockets, which shall be fully embedded in a concrete deck and properly bonded per NEC 680 and local electrical codes.
- F. Grab rails are to be provided in pairs.
- G. Figure 4 Grab Rails shall be Recreonics #44-072/Paragon 30102 or Approved Equal. 4" Bronze Anchors shall be Recreonics #44-300 or Approved Equal. Cast stainless-steel escutcheon plates with set-screws shall be Recreonics #44-333/Paragon 28301SS or Approved Equal.

2.4 STAIR RAILS

- A. The stair rail shall be fabricated from one continuous length of tubing. The tubing shall be ASTM A-554 certified 1.90" OD x .109" wall thickness Type 304 stainless steel polished to a 320-grit finish. All bends shall be smooth and free of wrinkles.
- B. The stair rail shall be anchored in 4" deep bronze wedge anchor sockets, which shall be fully embedded in a concrete deck and properly bonded per NEC 680 and local electrical codes.
- C. Reference drawings for rail design.
- D. The stair rails shall be Paragon or equal.
 - 1. 4" Bronze Anchors shall be Recreonics #44-300 or Approved Equal.
 - 2. Cast stainless-steel escutcheon plates with set-screws shall be Recreonics #44-333/Paragon 28301SS or Approved Equal.

2.5 POOL LADDERS

- A. The ladder frames shall be fabricated from ASTM A-554 certified 1.90" OD x 109" wall thickness Type 304 stainless steel polished to a 320-grit finish. All bends shall be smooth and free of wrinkles.

- B. The ladder steps shall be made of injected molded, UV inhibited ABS material (white). The step shall be 19" long x 4" wide with an integral non-skid surface. Molded rubber bumpers shall be provided on bottom returned end of ladder rails for support and to prevent marking of pool wall.
- C. The stair rail shall be anchored in 4" deep bronze wedge anchor sockets, which shall be fully embedded in a concrete deck and properly bonded per NEC 680 and local electrical codes. Reference drawings for rail design.
- D. The stair rails shall be Paragon or equal.
 - 1. 4" Bronze Anchors shall be Recreonics #44-300 or Approved Equal.
 - 2. Cast stainless-steel escutcheon plates with set-screws shall be Recreonics #44-333/Paragon 28301SS or Approved Equal.

2.6 BACKSTROKE STANCHIONS AND ANCHORS

- A. The 8'-0" stanchion post shall be furnished individually and shall be fabricated from ASTM A-554 certified 1.90" x 145" wall thickness Type 304 stainless steel polished to a 320-grit finish.
- B. An end cap with welded u-hook shall be provided on the end of the stanchion post. Provide one sliding collar for each stanchion post.
- C. The stanchion shall be anchored in 6" deep bronze anchor sockets with threaded cap, which shall be fully imbedded in a concrete deck. The stanchion shall be removable without the use of tools.
- D. The stanchion post shall be Recreonics #46-025/Paragon 38106 or approved equal.
 - 1. The anchor shall be Recreonics #46-041/Paragon 38201TC or approved equal.
 - 2. Sliding collar shall be Recreonics #46-030/Paragon 38301 or approved equal.

2.7 PORTABLE RECYCLED PLASTIC LIFEGUARD CHAIRS

- A. Lifeguard chairs shall be fabricated from white HDPE lumber made out of recycled plastic with UV inhibitors to resist fading.
- B. Lifeguard chairs shall be provided with Recreonics #42-798 hard surface wheel kit, umbrella and cup holder.
- C. Each guard chairs shall be provided with Recrenics #12-347 vinyl panel tilting umbrella (Confirm umbrella color).
- D. Lifeguard chair shall be
 - 1. Recreonics #42-633.W/Tailwind LG510-W or approved equal Short Chair with 40" seat height.

- 2. Recreonics #42-636.W/Tailwind LG515-W or approved equal Tall Chair with 50" seat height.
- E. Reference plans for quantity and chair heights required.

2.8 ADA POOL LIFT

- A. The pool lift must be a standard product of a company registered with the United States Food and Drug Administration (FDA) as a class 1 medical device manufacturer and that is regularly engaged in the manufacture of commercial grade swimming pool and spa accessibility equipment.
- B. The pool lift shall be structurally capable of supporting a 400-pound (181.44kg) load capacity and static load tested to 1.5 times the rated load.
- C. The pool lift shall be certified to be compliant with UL test standard 60335-2-1000 Standard of Household and Similar Appliances: Particularly Requirements for Electrically Powered Pool Lifts.
- D. The lift shall be tested and confirmed to comply with design standards outlined in the United States ADA Accessibility Standards for Accessible Designs.
- E. The pool lift's main structure shall be constructed of type 304 stainless steel; no dissimilar metallic components shall be allowed.
- F. The pool lift shall be finished with a minimum 4-mil thick, UV resistant powder coat finish.
- G. All fastening hardware shall be of type 316 stainless steel.
- H. Pool lift shall be supplied with a Linak Actuator suitable for medical use, a separate wall mount battery charger, a hand-held controller, and a 24-volt rechargeable battery.
- I. The chair of the pool lift shall be of a blue rigid one-piece, polyethylene, molded design.
 - a. The minimum seat width shall be 18-inches (45.72cm) and the seat back shall be a minimum height of 17.5-inches (44.45cm).
 - b. The seat shall feature dual flip-up arms and supplied with a 2-inch (5.08cm) wide adjustable safety belt with hook and loop fasteners.
- J. The pool lift shall be capable of accommodating a deck to water distance (water draft) of up to 12-inches (30.48cm) and capable of an anchor set back distance of up to 44-inches (111.76cm).
- K. An adjustable and removable footrest that moves with the seat shall be supplied with the pool lift.
- L. The pool lift shall be Aqua Creek #F-MTY400 or approved equal.
- M. The pool lift shall be supplied with Aqua Creek #F-808SA 1.90" x 6" bronze anchor.

2.10 DIVING STANDS AND BOARDS

- A. Diving stand shall be a Recreonics #42-201/Duraflex #1M 1-meter consisting of heavy-duty epoxy-coated cast aluminum ladder assembly, fulcrum assembly, and main support assembly. The stand to include double stainless-steel handrails on both sides Dive stand

shall include Recreonics #42-210/Duraflex #905-1M-8 set of (8) bronze castings. Reference drawings for quantities.

- B. Diving board shall be a Recreonics 40-324/Duraflex 14-DX (for recreation). Reference drawings for quantities.

2.11 PORTABLE POOL VACUUM

- A. Portable vacuum system shall be a Recreonics #10-818 Ultra-Sweep Vacuum System or approved equal.
- B. Shall include 1 HP (115-Volt) self-priming pump with 50' electrical cord and GFCI protector. (Requires 20-AMP Dedicated Circuit), 105 SF stainless-steel cartridge filter. All mounted on a stainless-steel cart with heavy-duty rubber wheels.
- C. Includes 24" wide vacuum head, 8'-24' telescoping pole, 1-1/2" x 50' heavy-duty vacuum hose.
- D. Provide (1) Recreonics #10-440 1'-1/2" x 25' vinyl discharge hose, #10-121 Pro Leaf Skimmer and (1) 10-124 Durapro Leaf Rake or approved equal.

2.12 AUTOMATIC POOL CLEANER

- A. Automatic pool cleaner shall be a Recreonics #10-419/Maytronics #9999359-W120 or approved equal.
- B. Pool cleaner to have a suction rate of 8,500 GPH and have the ability to climb walls and include a zero-depth sensor and have programmable cleaning cycle times of 4/6/8 hours.
- C. Pool cleaner to be provided with 131' of cable and caddy.

2.13 TEST KITS

- A. Provide (1) Recreonics #56-204/Taylor Technologies K-2006 Complete Test Kit.
- B. Provide (1) Recreonics #56-928/Palintest #LMP106 Lumiso 6 Pooltest Photometer Kit and (1) #56-848 Check Standards.

2.14 DEPTH MARKERS / NO DIVING TILES

- A. Tiles to be ceramic inset in concrete.
- B. Tiles to be spaced per drawings.
- C. Inlays or equal.

2.15 RING BUOYS AND RESCUE TUBES

- A. Provide (1) Recreonics #12-254 30-inch ring buoys or approved equal for each life guard chair.

- B. Ring buoy to be made from solid closed cell plastic and metal molded ring inside for durability. Each ring buoy to be provided with a throw line that is 1-1/2 times the width of the pool. Provide (1) Recreonics #12-259 T-304 stainless steel holder for each ring buoy.
- C. Rescue Tube shall be Recreonics #12-292 or approved equal 40" rescue tube made from vinyl-coated high-density, closed-cell foam. Includes shoulder strap and quick-release clip for each lifeguard. Provide (1) rescue tube for each guard chair plus (2) extra.

2.16 RESCUE BOARDS

- A. Provide (1) Recreonics #12-325/CJ Prowood 1000 Rescue Kit. Includes complete head immobilizer, runner caps, board bumpers and high-grade nylon body straps with Velcro® fastening system.

2.17 SHEPHERD'S CROOK AND POLE

- A. Provide (1) Recreonics #12-226 or approved equal Shepherd's Crook with 8'-0" fiberglass pole.

2.18 FIRST AID KIT

- A. Provide three (3) Recreonics #12-050 or approved equal 50-Person OSHA Aquatics First Aid Kits

2.19 SAFETY SIGNAGE

- A. Provide and install nearest phone, safety and precautionary safe use signs as required for approval.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. All equipment shall be installed as recommended and specified by manufacturer.
- B. Contractor to verify field dimensions prior to installing such components and notify the Architect of any discrepancies.
- C. All deck equipment shall be properly bonded in accordance with the NEC Article 680.

END OF SECTION 13 1540

SECTION 13 1660 – WATER FEATURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Scope
- B. Manufacturer
- C. Piping
- D. Installation

1.2 SCOPE

- A. Install water features and foundations per manufacturer's specifications, where shown on Drawings. Contractor shall provide all articles, items and material for a complete installation.

1.3 Regulations: The water features shall be designed to conform to all requirements of:

- A. The Public Health Department and all other state and local health departments.
- B. WWA Considerations for Operating Safety, Published by World Water Park Association.
- C. National Electric Code (NEC).
- D. American Society for Testing of Materials (ASTM): Specifications referenced herein.
- E. Applicable state and local building codes.

1.4 Design: The design shown on the drawings shows the intended use and desired locations of elements and relationship of adjacent deck uses. The Water Feature Manufacturer in providing its bid, warrants that it is licensed to do work in the jurisdiction and holds appropriate professional registrations, permits and/or meets other requirements by authorities having jurisdiction.

- A. The Water Feature Manufacturer shall indemnify and hold harmless the Architect/Engineer and the Owner from any and all actions caused by or related to the design, fabrication and installation of the work of this section.

1.5 Submittals: Product data, shop drawings, options available and manufacturer's color charts showing the full range of colors available for factory-applied finishes.

1.6 Warranties: Provide manufacturer's written warranty, without monetary limitations, signed by manufacturer agreeing to promptly repair or replace products that fail in materials or workmanship for a period of five years.

PART 2 - MATERIALS

2.1 MANUFACTURERS

A. Spray Features

1. Vortex, www.vortex-intl.com 1(877)586-7839.
 - a. See drawings for List of Features and details
 - b. Approved equal upon request following substitution procedures in project manual.
2. Materials
 - a. All aquatic play products installed above and below grade shall be manufactured from 304/304L stainless steel. The anchoring system shall be manufactured from 304/304L stainless steel. Rigid centricast fiber reinforced (FRP) and/or molded fiberglass, PVC, filament wound tubing, Galvanized Steel, or Aluminum shall not be utilized for any above or below grade play product structures.
 - b. All hardware and anchoring systems shall be 304/304L or 316 stainless steel. All Play Products and Ground Spay systems shall include an integrated anchoring and leveling system facilitating installation and a flush surface finish. Exposed and accessible hardware shall be tamper resistant, requiring a special tool for removal to deter vandalism and theft.
 - c. Spray nozzles, caps and heads: Shall be manufactured from lead free brass, UHMWPE or Polyurethane and shall use tamper resistant tools for installation and removal. PVC, Nylon, and Delrin™, shall not be utilized. All grade level play products are to be furnished with appropriate winterization caps.
 - d. Painted Finish shall be a polyester smooth glossy heat-cured powder coat that is UV and chemical resistant and suitable for public spaces.
 - e. All Polyethylene, Polyurethane, Elastomers and Seeflow Polymers used for paneling, signage or water deflection shall be resistant to chlorinated water and be ultraviolet stabilized to inhibit sunlight fading.
 - f. All accessible edges shall be machined to a rounded finish. All welds shall be watertight, buffed smooth or polished to a non-visible finish and factory pressure tested. Accessible nozzles and spray heads shall be recessed to ensure a completely safe play environment with no pinch points, head entrapments or protrusion hazards. All products shall be designed in accordance with ASTM F1487, ASTM F-2461 and CSA Z614-98 regulations for public playgrounds.
 - g. Lexan Polymer shall be specially selected for aquatic play products and shall have the following characteristics: translucent, highly resistant to shock and impact vandalism and must be non-flammable. The polymer shall present dimensional stability a high resistance towards chemical products, ultra-violets rays and be transparent presenting crystal clear surface throughout.

- h. Seeflow Polymer: The Seeflow Polymer shall be specially selected for aquatic play products and shall have the following characteristics: translucent, highly resistant to shock and impact vandalism and must be non-flammable. The polymer shall present dimensional stability a high resistance towards chemical products, ultra-violets rays and be transparent presenting crystal clear surface throughout.

B. Aquatic Play Structure

- 1. Vortex, www.vortex-intl.com 1(877)586-7839.
- 2. ELEVATIONS™ AQUATIC PLAY STRUCTURE

a. DESCRIPTION

- (1) Multi-level aquatic play structure including; a [large iconic dumping feature], a [waterslide], [multiple waterslides] several play features and water play features.
- (2) Refer to project drawing for footprint, model dimensions, colors and water requirements.
- (3) Refer to installation overview drawings for post anchoring details and plumbing connection locations.

b. MATERIALS

- (1) Stainless Steel Structural Tubing and Supports: Shall be type 304/304L stainless steel pipes, schedule 10 (0.120" (3.0mm)) minimum thickness, structurally strong, durable, and highly resistant to corrosive environments. Rigid fiber reinforced polymer (FRP) and/or molded fiberglass, PVC, filaments wound tubing, Galvanized Steel, or Aluminum shall not be utilized for components above or below the water level neither above nor below grade.
- (2) Play Decks, Entries and Stairs: Shall be formed from 12 GA (.105" - 2.6mm) type 304/304L stainless steel sheet with welded reinforcements. Standing surface shall be perforated for maximum water drainage and slip resistance. Entries shall be compliant with ADA regulations for transfer systems, when applicable. Protective painted finish shall integrate an anti-slip surface suitable for bare feet circulation.
- (3) Barrier Panels: Shall be made of transparent polycarbonate plastic sheets, clear or patterned as specified, ½" thick approved for safety glazing and barriers. The Barrier Panel shall be treated for extended UV durability, impact, and chemical resistant.
- (4) Below Deck Barrier: Decks and Stairs shall have a net barrier or plastic barrier panel located under deck and stair areas with a lockable door to prevent unauthorized access to valves.

- (5) Spray heads and Spray caps: Spray heads and Spray caps shall be manufactured from corrosion resistant solid Ultra-High Molecular Weight Polyethylene (UHMW) plastic, rigid UV treated polyurethane, Lead Free Brass or 304/304L Stainless Steel. Exposed hardware shall be tamper-resistant. PVC, Nylon, and Delrin™ material shall not be utilized.
- (6) Nozzles: Shall be manufactured from corrosion resistant Lead Free Brass or 304/304L Stainless Steel material and shall use tamper resistant tools for installation and removal.
- (7) Protective Painted Finish: stainless steel parts shall be coated with a multi-layer powder coating that offers UV, gloss and chemical resistance; and is suitable for high traffic environments.
- (8) Waterslides (Body slide): Shall be molded and constructed of high quality marine-grade fiberglass (FRP) using ISO polyester 0.020" (0.5mm) thick UV resistant gelcoat, ISO and ORTHO polyester resin and E glass type fiber reinforcement. Slide wall thickness shall be a minimum of 0,150" (4.0mm) with additional fiber and foam reinforcements integrated to sliding surfaces and/or flanges. Sliding surface finish shall be 600 grit or better.

PART 3 - EXECUTION

3.2. INSTALLATION

- A. Water Features to be installed per manufacturer's specifications.
- B. Feature base at anchors to be per manufactures recommendations.
- C. Manufacturer to submit installation drawings to Architect for review.
- D. Installation contractor to be experienced and regularly engaged in installing Interactive Water Features. (A list of similar type of installations will be required by bidder).

END OF SECTION 13 1660

132000 - POOL ULTRAVIOLET DISINFECTION EQUIPMENT

1.1 GENERAL

A. SECTION INCLUDES

1. Pool and Spray Pad ultraviolet disinfection equipment.

B. REFERENCES

1. The following latest edition reference specifications, guides and standards shall become part of this Specification as if herein written. If provisions conflict, the more stringent provisions shall apply.
 - a. NSF – National Sanitary Foundation
 - b. MET – Met Laboratories, Inc.
 - c. UL – Underwriters Laboratory
 - d. NEMA – National Electrical Manufacturers' Association
 - e. ANSI – American National Standards Institute
 - f. USEPA UVGM- U.S. Environmental Protection Agency Ultraviolet Guidance Manual

C. SUBMITTALS

1. Drawings and Instructions.
 - a. Provide detailed Shop Drawings of the items of equipment being provided, indicating the dimensions, material and characteristics.
 - b. Provide a typed sheet of Operating Instructions, embracing the operation functions and recurring maintenance processes.

D. WARRANTY

1. A factory trained representative of the manufacturer shall perform all warranty work.
2. Manufacturer to warranty Ultraviolet chamber Control panel for a period of 5 years excluding lamps, quartz and seals.
3. Medium pressure Ultraviolet bulbs shall be warranted for a period of 4,000 hours. Intermittently operated bulbs (≥ 1 on/off cycles per day) will be replaced free of charge

should failure occur prior to 3,000 hours and replacement will be prorated between 3,000 and 4,000 hours.

PART 2 PRODUCTS

A. GENERAL

1. Ultraviolet Disinfection Equipment: Shall operate within the UVC electromagnetic spectrum emitting wavelengths in the range of 200nm to 400nm.
2. The UV System shall have an MET or equivalent (ETL, CSA, or UL) listing, be NSF-50 certified including Section 13 and 3rd party validated to the USEPA UVGM 2006 Guidelines.
3. Equipment General Description
 - a. The Ultraviolet System shall be provided in a complete package to include: 316L Stainless Steel Chamber, Control System located in a NEMA 12 rated panel, Medium Pressure Bulb(s) designed to emit wavelengths within the UVC electromagnetic spectrum, strainer basket automatic wiper system, and Project Commissioning by a Certified Technician.
4. Acceptable Manufactures
 - a. Engineered Treatment Systems (Basis of Design)
 - b. ProMinent
 - c. Approved Equal – Must be submitted a minimum of 10 days prior to bid for acceptance.

B. UNIT TYPES:

1. Ultraviolet manufacturer to offer unit capability of a Horizontal OR vertical installation application using direct flow through characteristics. Direct flow will be required in order to reduce total head loss through the system.
 - a. Single Lamp Medium Pressure Unit:
 - 1) Bulb range of 1.0 kW to 1.3 kW power range.
 - 2) ANSI flange range of 2”– 3”
 - 3) Flow pattern up to 260 gpm.
 - b. Multiple Lamp medium pressure Unit:
 - 1) Bulb range of (2) 1.5 kW – (4) 3.3 kW power range.
 - 2) Multiple lamp system is required in order to maintain quality disinfection in the event of a single bulb failure.
 - 3) ANSI flange range of 6” – 14”
 - 4) Flow pattern of 665 to 4800 gpm.
2. Chamber and Control Cabinet shall be as indicated on the drawings.

3. Electrical requirements to include 480 volt 3-phase (XX) amp internal breaker.
4. Electrical contractor to take into account plus/minus 3% for external breaker.
5. All required electrical work to be performed by licensed electrician.
6. An external step-up transformer is required if supply voltage deviates from system requirements; consult with Manufacturer to confirm proper KVA rating.

C. ULTRAVIOLET CHAMBER

1. Pressure rated for 100 psi (tested to 150 psi).
2. The unit shall be constructed of 316L stainless steel.
3. The Ultraviolet chamber shall come complete with the following equipment:
 - a. Ultraviolet intensity monitor with built-in alarm system to notify operator when output level drops below required level of 60 mj/cm² (or operator set dosing levels).
 - b. Ultraviolet temperature control system shall be provided to maintain system integrity in the event of flow interruptions to the chamber.
 - c. Ultraviolet chamber shall come complete with annealed quartz sleeve with "O" ring seals for water tightness.
 - d. Chambers shall be complete with ANSI flanges and all ports or vents shall be threaded NPT.
 - e. The Ultraviolet chamber must be capable of installation in the system so that it remains full under all conditions.
 - f. The ultraviolet unit must be complete with appropriate brackets or feet for ease of installation.

D. ULTRAVIOLET LAMP

1. Ultraviolet lamp shall be medium pressure high intensity.
2. Lamp shall be designed to emit continuous Ultraviolet wavelengths in the range of 200nm to 400nm.
3. Lamp must remain unaffected by temperature variance of 0 degrees to 200 degrees Fahrenheit.
4. The lamp unit must provide a dose not less than 60 mj/cm² at the end of the lamp life and this must be based on the full recirculating flowrate, not on a side stream treatment.

E. AUTOMATIC WIPER SYSTEM

1. An automatic cleaning system shall be provided for cleaning of quartz sleeve and Ultraviolet monitor probe.
2. The system shall travel the entire length of the quartz sleeve twice per cleaning cycle.
3. Wiper rings shall be provided to ensure thorough quartz tube cleaning and quartz tube protection.
4. Wiper cycle shall be user selectable and adjustable within a range of 15 minutes to 24 hours
5. At a minimum the Automatic Wiper system shall have the following characteristics:
 - a. Wiper interval shall be operator selectable with optional override switch.
 - b. Wiper faults are to be indicated on the control system display.
 - c. Wiper System to utilize "Intelligent Operation" for automatic start-up commissioning.
 - 1) Records wiper position at chamber ends. Position must be fixed and not dependent on a timed interval or component striking end of chamber.
 - 2) Establish a travel run without setting limit adjustments to ensure system integrity and longevity.

F. ULTRAVIOLET CONTROL SYSTEM

1. Systems shall be epoxy coated NEMA 12 rated cabinet.
2. Three levels of operation shall be provided to meet the needs of the operator and pool environment:
 - a. Simple Control (start, stop and reset)
 - b. Full Parameter Display
 - c. Customized Operator Configuration.
3. Modes of operation shall be password protected to secure system critical setup functions.
4. Control system shall have clearly identifiable start, stop, and reset control buttons (suitable for gloved operation) with Running and Fault LCD indicators.
5. LCD screen shall display a minimum of the following:
 - a. Ultraviolet dose (derived from flow and intensity inputs)
 - b. Ultraviolet intensity (as a % and mw/cm²)
 - c. Lamp Current
 - d. Flow rate (accepts signal from optional flow meter – displayed as gallons per minute)
 - e. Chamber temperature (displayed as deg. F)
 - f. Operation hour meter

- g. System spares listing
- h. Lamp fault
- i. low Ultraviolet & temperature alarm
- j. Ground fault trip
- k. Wiper fault

All alarm functions shall have simple text message display to assist in fault finding.

- 6. Control system shall have a minimum of the following system interface control:
 - a. Remote operation
 - b. Process interrupt features (from valves, flow meters)
 - c. Low UV dose (configurable to shut down or alarm only)
 - d. Flow meter input
 - e. Auto-Restrike
 - f. Half to full power Ultraviolet setting with 24 hour/7 day settable timer.
- 7. Control system shall have built in data-logging capabilities to record the following information:
 - a. Ultraviolet intensity required
 - b. Ultraviolet intensity measured
 - c. Lamp current
 - d. Chamber temperature
 - e. Flow rate (if flow meter is connected)
 - f. Time and date stamp
 - g. All alarms generated.

PART 3 EXECUTION

A. SYSTEM STARTUP

- 1. Install in accordance with contract documents and manufacturer's instructions.
- 2. Commissioning
 - a. Ultraviolet Chamber and Control Panel shall be commissioned by a qualified factory trained technician to institute the five year warranty.
 - b. Final electrical and control cabling will be connected from the Spectra control cabinet to the Ultraviolet disinfection chamber during the commissioning process.
 - c. Daily operation and simple maintenance instructions shall be provided during the commissioning process.

B. MAINTENANCE

- 1. Contractor shall include a 1 year maintenance agreement with a manufacture certified technician.

2. The maintenance agreement shall include training on regular maintenance items for the staff.

END OF SECTION 132000

SECTION 13 3123 PRE-ENGINEERED SHADE STRUCTURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. The shade structure contractor shall be responsible for the design, engineering, fabrication, supply and installation of all the work specified herein. The intent of this specification is to have only one contractor responsible for all the above functions.

1.3 SUBMITTALS

1.3.1 With Bid Submittals:

- A. Provide proof of installed reference sites with structures for similar scope of project and installation that are engineered to current IBC specifications. Include in reference a list of structure dimensions with install dates and project locations.
- B. Provide a minimum of 13 fabric samples to demonstrate fabric color range and powder coat color selections. Also provide a letter of authorization from fabric manufacture for use of fabric.

1.3.2 Award of Contract Submittals:

- A. Provide wet sealed structural engineering drawings and calculations.
- B. Provide fabric samples and powder coat colors for final order selection.

1.4 QUALITY ASSURANCE

Fabrication and erection are limited to firms with proven experience in design and construction of fabric shade structures and such firms shall meet the following minimum requirements. No substitutions shall be allowed for the following:

- A. A single contractor should design, engineer, manufacture and erect the fabric shade structures.
- B. All bidders shall have at least 15 years experience in the design, engineering, manufacture, and installation of structures, engineered to IBC requirements with similar scope and a successful construction record of in-service performance.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for shade structures shown on the Drawings in relation to the property survey and existing structures and verify locations by field measurements prior to construction.

1.6 WARRANTY

1. The successful bidder shall provide a 12 month warranty on all labor and materials.
2. A supplemental warranty from the manufacturer shall be provided for a minimum period of 10 years (pro-rated) on fabric and 10 years on the structural integrity of the steel from date of substantial completion.
3. The warranty shall not deprive the Owner of other rights the Owner may have under the 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 GENERAL

- A. Pre-Engineered Package: The package shall include the following structures

1. Structures in base bid per the drawings:

Contact: Angel Rich
USA Shade & Fabric Structures, Inc.
DFW International Commerce Park
2580 Esters Blvd, Suite 100
DFW Airport, TX 75261
M 954-649-6757
www.usa-shade.com

- B. Design criteria:

1. All shade structures are engineered and designed to meet the current Building Code, with a minimum of 90 mph wind load, Exposure C. A live load of 5 lb/sf² and a snow load of 15 lb/sf². All shade structures shall be engineered with a zero wind pass through (sieve rate) on the fabric.

- C. Steel:

1. All steel members of the shade structure shall be designed in strict accordance with the requirements of the “American Institute of Steel Construction” (AISC) Specifications and the “American Iron and Steel Institute” (AISI) Specifications for Cold Formed Members.
2. All connections shall have a maximum internal sleeving tolerance of .0625 inches using high tensile strength steel sections with a minimum sleeve length of 6 inches.
3. All non-hollow structural steel members shall comply with ASTM A-36. All hollow structural steel members shall be cold formed, high strength steel and comply with ASTM A-500, Grade C. All steel plates shall comply with ASTM A-572, Grade 50. All galvanized steel tubing shall be triple coated for rust protection using an in-line electro-plating coat process. All galvanized steel tubing shall be internally coated with zinc and organic coatings to prevent corrosion.

D. Bolts:

1. All hardware shall be stainless steel.
2. All structural field connections of the shade structure shall be designed and made with high strength bolted connections using ASTM A-354, Grade B or SAE J249, Grade 8.
3. All stainless-steel bolts shall comply with ASTM F-593, Alloy Group 1 or 2. All bolt fittings shall include rubber washer for water tight seal at joints. All nuts shall comply with ASTM F-594, Alloy Group 1 or 2.

E. Welding:

1. All shop welded connections of the shade structure shall be designed and performed in strict accordance with the requirements of the "American Welding Society" (AWS) Specifications. Structural welds shall be made in compliance with the requirements of the "Prequalified" welded joints where applicable and by certified welders. No onsite or field welding shall be permitted.
2. All full penetration welds shall be continuously inspected by an independent inspection agency and shall be tested to the requirement of the current Building Code.

F. Powder coating:

1. All steel within 15' of the edge of pool shall be hot-dip galvanized.
2. Galvanized steel tubing preparation prior to powder coating shall be executed in accordance to solvent cleaning SSPC-SP1. Solvent such as water, mineral spirits, xylol, toluol, which are to be used to remove foreign matter from the surface. A mechanical method prior to solvent cleaning prior to surface preparation shall be executed according to Power Tool Cleaning SSPC-SP3 and utilizing wire brushes abrasive wheels and needle gun, etc.
3. Carbon structural steel tubing preparation prior to powder coating shall be executed in accordance to commercial blast cleaning SSPC-SP6 or NACE #3. A commercial blast cleaned surface, when viewed with out magnification, shall be free of all visible oil, grease, dirt, mill scale, rust, coating, oxides, corrosion, products and other foreign material.
4. Powder coating shall be sufficiently applied, with a minimum 3 mils thickness and cured at the recommended temperature to provide proper adhesion and stability to meet salt spray and adhesion tests as defined by the American Society of Testing Materials.
5. Powder used in the powder coat process shall have the following characteristics:
 - a. Specific Gravity: 1.68 +/- 0.05.
 - b. Theoretical coverage: 114 +/- 4ft²/lb/mil
 - c. Mass loss during cure: <1%
 - d. Maximum storage temperature: 75°F

G. Tension Cable: Steel cable is determined based on calculated engineering load.

1. A minimum of 3/8" (nominal) galvanized 7x19 strand cable shall be used.

H. Fabric Roof Systems:

1. UV Shade Fabric:
 - a. UV shade fabric is made of UV stabilized Shadesure® cloth manufactured by Multi Knit Ltd and made of a UV stabilized high-density polyethylene that weighs 195g per meter.
 - b. Mesh shall be rachel knitted with monofilament and tape yarn filler to ensure that material will not unravel if cut. Panels to be 10ft wide.
 - c. Fire Testing: Fabric shall conform and pass the ASTM E84 testing standard.

2. Fabric Properties:

Life Expectancy	A minimum of 8 years continuous exposure to the sun
Fading	Minimum fading after 5 years (3 Years for Rd)
Fabric Mass	2.43-2.58 oz/sqft (190-200 gsm)
Fabric Width	9.8425 ft (3 m)
Roll Length	164.04 ft (50 m)
Roll Dimensions	62.99" X 16.5354" (160 cm x 42 cm)
Roll Weight	± 66 lb (± 30 kg)
Minimum Temperature	-13° F (-25° C)
Maximum Temperature	+ 176° F (80° C)

3. Shade and UV Factors:

Shade protection and UV screen protection factors shall be as follows:

<u>Color</u>	<u>UV Block %</u>	<u>Shade %</u>
White	85%	50%
Desert Sand or Beige	95%	75%
Arizona	93%	81%
Terracotta	88%	82%
Yellow	94%	70%
Red	88%	78%
Forest Green	95%	89%
Turquoise	92%	83%
Laguna Blue	93%	90%
Royal Blue	94%	90%
Navy Blue	94%	90%
Silver	93%	88%
Black	96%	95%

4. Stitching & Thread:
 - a. All sewing threads are to be double stitched.
 - b. Thread shall be GORE Tenara Sewing Thread manufactured from 100% expanded PTFE; mildew resistant exterior approved thread. Thread shall meet or exceed the following:
 - c. Flexible temperature range

- d. Very low shrinkage factor
- e. Extremely high strength, durable in outdoor climates
- f. Resists flex and abrasion of fabric
- g. Unaffected by cleaning agents; acid rain, mildew, salt water and rot resistant, unaffected by most industrial pollutants.
- h. Treated for prolonged exposure to the sun.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installations of shade structures shall be performed by a bonded contractor with experience in tension fabric structures.
- B. The contractor installing the structure shall comply with manufactures instructions for assembly, installation, and erection per approved drawings.
- C. Concrete:
 - 1. Concrete work shall be executed in accordance with the latest edition of American Concrete Institute ACI 318.
 - 2. Concrete specifications shall comply in accordance with details as per plans, shall be as follows:
 - a. 28 Days Strength $F'_c = 3000$ psi
 - b. Aggregate: HR
 - c. Slump: 3 – 5
 - d. Portland Cement shall conform to C-150
 - e. Aggregate shall conform to ASTM C-33
 - 3. All reinforcement shall conform to ASTM A-615 grade 60.
 - 4. Reinforcing steel shall be detailed, fabricated, and placed in accordance with the latest ACI Detailing Manual and Manual of Standard Practice.
 - 5. Whenever daily ambient temperatures are below 80 degrees Fahrenheit, the contractor may have mix accelerators and hot water added at the batch plant (See Table 1).
 - 6. The contractor shall not pour any concrete when daily ambient temperature is below 55 degrees Fahrenheit.

TABLE 1

Temperature Range	% Accelerator	Type Accelerator
75-80 degrees	1%	High Early (non calcium)
70-75 degrees	2%	High Early (non calcium)
Below 70 degrees	3%	High Early (non calcium)

- D. Foundations:
 - 1. Foundations for the proposed structures shall be delegated design by the shade structure manufacture.

2. If Anchor Bolts are used, they shall be Hot Dipped Galvanized.
3. Footings shall be placed in accordance with and conform to manufactures engineered specifications and drawings.

END OF SECTION 13 3123

SECTION 221313 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nonpressure-type transition couplings.
 - 2. Pressure-type pipe couplings.
 - 3. Expansion joints and deflection fittings.
 - 4. Cleanouts.

1.2 RELATED DOCUMENTS

- A. Reference city details and specifications for sanitary connections.
- B. See SECTION 312000 "Earth Moving" for excavation, trenching and backfilling specified.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For connection details.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings:
 - 1. Show system piping in profile. Draw profiles to horizontal scale of not less than 1-inch equals 50 feet and to vertical scale of not less than 1-inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- B. Product Certificates: For each type of pipe and fitting.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping:
 - 1. Pipe: ASTM D3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D3034, PVC with bell ends.

3. Gaskets: ASTM F477, elastomeric seals.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 1. For Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.
 2. For Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
 1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Ring-Type, Flexible Couplings:
 1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
- E. Nonpressure-Type, Rigid Couplings:
 1. Description: ASTM C1461, sleeve-type, reducing- or transition-type mechanical coupling; molded from ASTM C1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3 CLEANOUTS

- A. Cast-Iron Cleanouts:
 1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 2. Top-Loading Classification(s): Light Duty, Medium Duty, and Heavy Duty.
 3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A74, Service class, cast-iron soil pipe and fittings.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details to indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- E. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install piping with 36-inch minimum cover.
 - 4. Install PVC Type PSM sewer piping according to ASTM D2321 and ASTM F1668.
- F. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Join PVC Type PSM sewer piping according to ASTM D2321 and ASTM D3034 for elastomeric-seal joints or ASTM D3034 for elastomeric-gasket joints.
 - 2. Join dissimilar pipe materials with nonpressure-type, flexible or rigid couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Unshielded flexible or rigid couplings for pipes of same or slightly different OD.
 - b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.

- c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.5 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.6 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains.
- B. Make connections to existing piping.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.7 IDENTIFICATION

- A. Comply with requirements in Section 312000 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 - 1. Use warning tape or detectable warning tape over ferrous piping.

2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.8 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 6. Manholes: Perform hydraulic test according to ASTM C969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 221313

SECTION 310513 - SOILS FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Subsoil materials.
 - 2. Topsoil materials.
- B. Related Sections:
 - 1. Section 310516 - Aggregates for Earthwork.
 - 2. Section 312323 - Fill.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.3 SUBMITTALS

- A. Materials Source: Submit name of imported materials source.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with NYSDOT Standard Specifications (latest revision).

PART 2 - PRODUCTS

2.1 SUBSOIL MATERIALS

- A. Subsoil Type S2:
 - 1. Excavated and re-used material and imported borrow.
 - 2. Graded.
 - 3. Free of lumps larger than 3inches, rocks larger than 2inches, and debris.
 - 4. Conforming to ASTM D2487 Group Symbol CL, OL.

2.2 TOPSOIL MATERIALS

- A. Topsoil Type S4:
 - 1. Excavated and reused material.
 - 2. Graded.
 - 3. Free of roots, rocks larger than 2 inch, subsoil, debris, large weeds and foreign matter.
 - a. Screening: Single screened.
 - 4. Conforming to ASTM D2487 Group Symbol OH, PT.
- B. Topsoil Type S5:
 - 1. Imported borrow.
 - 2. Friable loam.
 - 3. Reasonably free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
 - a. Screening: Double screened.
 - 4. Acidity range (pH) of 5.5 to 7.5.
 - 5. Containing minimum of 4 percent and maximum of 25 percent inorganic matter.
 - 6. Conforming to ASTM D2487 Group Symbol OH, PT.
 - 7. Limit decaying matter to 6 percent of total content by volume.

2.3 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing and Inspection Services Testing and analysis of soil material.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698 or ASTM D1557.
- C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698 or ASTM D1557.
- D. When tests indicate materials do not meet specified requirements, change material and retest.
- E. Furnish materials of each type from same source throughout the Work.

PART 3 - EXECUTION – NOT USED

END OF SECTION 310513

SECTION 310516 - AGGREGATES FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Coarse aggregate materials.
 - 2. Fine aggregate materials.
- B. Related Sections:
 - 1. Section 310513 - Soils for Earthwork: Fill and grading materials.
 - 2. Section 312323 – Select Granular Materials

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
 - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 5. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.3 SUBMITTALS

- A. Materials Source: Submit name of imported materials suppliers.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with NYSDOT Standard Specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bedding and Pipe Encasement.

1. NYSDOT No. 1 Crushed Stone – bedding for PVC, DIP, and PCCP watermain. Thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	1-inch
90 - 100	½ -inch
0 – 15	¼ -inch

2. NYSDOT No. 2A Crushed Stone – bedding for DIP and PCCP watermain. Shall be a No. 1 and No. 2 blend, thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	1 ½ -inch
93 - 100	1-inch
27 - 58	½ -inch
0 – 8	¼ -inch

3. NYSDOT Concrete Sand – bedding for copper and polyethylene tubing. Washed, fine aggregate sand shall conform to the requirements of NYSDOT Item No. 703.07, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	¾ -inch
90 - 100	No. 4
75 - 100	No. 8
50 - 85	No. 16
25 - 60	No. 30
10 - 30	No. 50
1 - 10	No. 100
0 - 3	No. 200

4. Slag or gravel will not be allowed.

B. Select Backfill

1. NYSDOT Subbase Type 2 Crusher Run Stone. Material shall conform to the requirements of NYSDOT Item No. 304.12, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	2 -inch
25 - 60	¼ -inch
5 - 40	No. 40
0 - 10	No. 200

2. Slag or gravel will not be allowed.

C. Select Structural Fill

1. Type A5: NYSDOT select structural fill for use in backfilling around structures. Structural fill shall conform to requirements of NYSDOT material designation section 733-14 and have the following gradation by weight.

<u>% Passing</u>	<u>Sieve</u>
100	4 -inch
0 - 70	No. 40
0 - 15	No. 200

D. Peagravel

1. NYSDOT Type 1A Screened Gravel for the annular space between the carrier pipe and the casing pipe. Screened gravel shall conform to the requirements of NYSDOT Item No. 703.0203 and have the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	½ -inch
90 - 100	¼ -inch
0 - 15	⅛ -inch

- E. Follow NYSDOT Standard Specifications if gradation data varies from those listed above.
- F. Recycled concrete or asphalt pavement shall not be allowed.
- G. Slag of any type shall not be allowed.

2.2 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing and inspection services.
- B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698, ASTM D1557, ASTM D4318, ASTM C136.
- C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698, ASTM D1557, ASTM D4318, ASTM C136.
- D. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 - EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site at locations designated by Owner.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- E. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION 310516

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing site utilities.
7. Temporary erosion- and sedimentation-control measures.

B. Related Sections:

1. Section 017300 "Execution" for field engineering and surveying.
2. Section 312000 "Earth Moving"

1.2 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 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 Owner or authorities having jurisdiction.

- B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

- D. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
 1. Obtain approved borrow soil material from off-site sources.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. It is the sole responsibility of the Contractor to submit all documentation to obtain the site permit(s) required by the authorities having jurisdiction prior to site work.
- B. It is the sole responsibility of the Contractor to inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control drawings and requirements of authorities having jurisdiction.
- D. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- E. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. General: Protect trees and plants remaining on-site.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 2. Use only hand methods for grubbing within protection zones.
- 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 depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. 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.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, and plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

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.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

E. 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 Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Rock Excavation

1. Rock excavation consists of the excavation of boulders more than one (1) cubic yard in volume and rock in ledge formations which cannot be excavated except by drilling or use of a Ramhoe, jackhammer or other similar device.

2. All other materials, however hard, stiff and compact, including soft and disintegrated rock, which can be removed without the aid of a Ramhoe, jackhammer or other similar device, shall be classified and paid for as earth.
- G. Fill: Soil materials used to raise existing grades.
- H. 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.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. 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.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
- B. Do not commence earth moving operations until plant-protection measures specified in other sections are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, 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.
 2. CL and SC may be suitable, these soils shall meet the specifications outlined by the geotechnical engineer, testing required prior to approval.

- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 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 D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve or compacted satisfactory soil placed in 8 inch li ft. compacted to 100% of maximum dry density.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches 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 to comply with local practice or requirements of authorities having jurisdiction.

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.

3.2 EXCAVATION, GENERAL

- A. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Excavated materials may include rock, soil materials, and obstructions. Over excavation for areas with unsuitable or uncontrolled fill are to be removed. Anticipate removal

of at least 24" of additional material. 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, or amend soils per the geotechnical engineer directions.
 2. Moisture content of subgrade and fill is to be maintained per the geotechnical engineer.
- B. Due to the nature of the clayey soils, the soil is susceptible to construction traffic. Traffic on exposed subgrades should be minimized or additional over excavation and replacement of soils will be required at no cost to the owner.
- C. In structural areas, the contractor is required to compact subgrade soils as well as required fill, and maintain the materials in a compacted state throughout the work operations.
- D. Excavation shall be carried to the lines, grades and slopes shown on the construction drawings or as directed by the Engineer. Excavation operations shall be conducted so that material outside of the limits is not disturbed. Widening of cuts or varying the slopes according to the material excavated may be permitted by the Engineer.
- E. The Contractor shall be responsible to remove from the site any excavated unsuitable materials or other material as may be directed by the Engineer. Excavated material shall not be deposited outside the limits of construction, either temporarily or permanently, without written authorization from the property owner. Such authorization shall be in a form satisfactory to the Engineer and shall protect City against claims or actions of the owner with respect to the presence of such materials or excavations.
- F. Rock and boulders shall be excavated to the bottom limits shown on the drawings between lateral limits one foot (1') outside the shoulders or front face of the curbs. Rock shall be excavated and finished to a uniform slope, parallel to the prescribed slope lines. All pieces of rock outside the slope surfaces as excavated which have been loosened or may become loose, in the opinion of the Engineer, on account of the Contractor's operations, shall be removed.
- G. Boulders extending beyond the prescribed limits of excavation may be removed entirely. Any space created by rock excavation outside the prescribed bottom limits of excavation shall be backfilled with approved material and compacted to a density of not less than 95% of maximum density. Care shall be taken that undrained pockets shall not be left in the surface of the rock.
- H. Unsuitable or unstable material encountered at the prescribed bottom limits of excavation shall be removed and replaced in accordance with the section of these Technical Specifications.
- I. Rock shall be removed by jackhammer or other such methods as approved by the Engineer. Excavation beyond the specified lines and grades shall be corrected by filling the resulting voids with approved, compacted earthfill, Portland cement concrete, or other approved material as directed by the Engineer. Concrete that will be permanently covered shall contain not less than five bags of cement per cubic yard. The concrete shall be placed and cured as specified by the Engineer. Before correcting an over excavation condition, the Contractor shall review the planned corrective action with the Engineer and obtain approval of the corrective measures.

3.3 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.
 - 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. Due to the clayey nature of soils, it is expected that some over excavation will be required during the following periods of wet or freezing weather conditions. This shall be included in contractor's expense.
 - 3. Any foundation subgrade soils which become disturbed will be over excavated and replaced with lean concrete or clean three-quarter inch crushed stone at the expense of the contractor.
 - 4. It should be expected that the pool floor slab subgrades are to be over excavated to allow for placement of a thin layer of stone, so that a uniform condition is present below the floor slabs.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- 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: As indicated.
- 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. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.
 - 2. Utility trenches excavated in areas with uncontrolled fill are to have this material removed to the desired depths indicated for the utility and the requirements of this specification.

3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the pool and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.
- C. Soils on site should be at optimum moisture content throughout project and contractor shall maintain moisture content per geotechnical engineer.

3.7 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 Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. 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.

3.9 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 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in other sections.
- 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 other sections.
- E. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. 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 engineered fill.
 3. Under pool, use engineered fill.
 4. Under footings and foundations, use engineered fill.

3.11 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.
 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.

3.12 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.

3.13 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. Shape subbase course and base course to required crown elevations and cross-slope grades.

2. 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.
3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 100 percent of maximum dry unit weight according to ASTM D 698 and ASTM D 1557.

3.14 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. 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.
 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 100 percent of maximum dry unit weight according to ASTM D 698.

3.15 PLACING OF TOPSOIL

- A. Topsoil Cleaning
 1. The Contractor shall clean the topsoil in place by any approved means that will remove rocks (1" or greater at its largest dimension), and other undesirable material from the topsoil layer.

3.16 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements set forth by the geotechnical engineer.
- C. 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.

3.17 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.

- 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.
- D. Where rutting from construction activities occur, ruts to be filled and compacted per geotechnical engineer requirements.
- E. Protect subgrade from heavy equipment tire loading. Contractor to fix per geotechnical engineer recommendations.

3.18 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.

END OF SECTION 312000

SECTION 312316 – EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Soil densification.
 - 2. Excavating for building foundations.
 - 3. Excavating for paving, roads, and parking areas.
 - 4. Excavating for slabs-on-grade.
 - 5. Excavating for site structures.
 - 6. Excavating for landscaping.
- B. Related Sections:
 - 1. Section 310513 - Soils for Earthwork: Stockpiling excavated materials.
 - 2. Section 310516 - Aggregates for Earthwork: Stockpiling excavated materials.

1.2 REFERENCES

- A. Local utility standards when working within 24 inches of utility lines.

1.3 SUBMITTALS

- A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- B. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with NYSDOT Standard Specifications.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

- A. Call Dig Safely New York at 1-800-962-8962 not less than five working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Protect utilities indicated to remain from damage.

- D. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.2 EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavation work.
- B. Excavate subsoil to accommodate building foundations, slabs-on-grade paving site structures, and construction operations.
- C. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 312323.
- D. Slope and/or shore banks as per minimum statutory/regulatory requirements for a safe work site.
- E. Do not interfere with 45 degree bearing splay of foundations.
- F. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- G. Trim excavation. Remove loose matter.
- H. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. Remove larger material as specified in Section 312323.
- I. Notify Engineer of unexpected subsurface conditions.
- J. Correct areas over excavated as directed by Engineer.
- K. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.
- L. Repair or replace items indicated to remain damaged by excavation.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements.
- B. Perform inspection of excavation and controlled fill operations in accordance with applicable code.
- C. Obtain visual inspection of bearing surfaces by qualified geotechnical firm before installing subsequent work.

3.4 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION 312316

SECTION 312323 - SELECT GRANULAR MATERIALS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Specified
 - 1. Select granular materials shall be used in bedding, pipe encasement, or backfill and as specified or as directed by the ENGINEER.
- B. Related Work Specified Elsewhere
 - 1. Section 312000 – Earth Moving

1.2 QUALITY ASSURANCE

- A. Reference Standards
 - 1. NYSDOT Standards, latest revision

1.3 SUBMITTALS

- A. The CONTRACTOR shall furnish representative samples, sieve analysis and certification of specification compliance for the select granular materials to the ENGINEER and advise on the location of the source.
- B. The CONTRACTOR shall submit copies of proposed materials, methods and operations of backfilling and compaction to the ENGINEER for review prior to the start of work. A list of equipment to be used in CONTRACTOR'S Methods and Operations must be included.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Bedding and Pipe Encasement
 - 1. NYSDOT No. 1 Crushed Stone or Crushed Gravel – bedding for PVC, DIP, and PCCP watermain and SICPP Storm Piping.
Thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Standard Specification Sections 703-01 and 703-02, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	1-inch
90 - 100	1/2-inch
0 - 15	1/4-inch
 - 2. NYSDOT No. 2A Crushed Stone or Crushed Gravel – bedding for DIP and PCCP watermain manholes and drainage structures.

Shall be a No. 1 and No. 2 blend, thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Standard

Specification Sections 703-01 and 703-02, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	1-1/2-inch
93-100	1-inch
27-58	1/2-inch
0-8	1/4-inch

3. NYSDOT Concrete Sand – bedding for copper and polyethylene tubing.
Washed, fine aggregate sand shall conform to the requirements of NYSDOT Standard Specification Section 703-07, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	3/8-inch
90 - 100	No. 4
75 - 100	No. 8
50 - 85	No. 16
25 - 60	No. 30
10 - 30	No. 50
1 - 10	No. 100
0 - 3	No. 200

B. Select Backfill

1. NYSDOT Subbase Type 2 Crusher Run Stone or Crusher Run Gravel.
Material shall conform to the requirements of NYSDOT Standard Specification Section 703-02, having the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	2-inch
25 - 60	1/4-inch
5 - 40	No. 40
0 - 10	No. 200

C. Peagravel

1. NYSDOT Type 1A Screened Gravel for the annular space between the carrier pipe and the casing pipe.
Screened gravel shall conform to the requirements of NYSDOT Standard Specifications Sections 703-01 and 703-02 and have the following gradation by weight:

<u>% Passing</u>	<u>Sieve</u>
100	1/2-inch
90 - 100	1/4-inch
0 - 15	1/8-inch

- D. Follow NYSDOT Standard Specifications if gradation data varies from those listed above.
- E. Recycled concrete or asphalt pavement shall not be allowed.
- F. Slag of any type shall not be allowed.

- G. Flowable Fill shall comply with NYSDOT Flowable Fill Type 733-0102 – Controlled Low Strength Material (No Fly Ash).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General
 - 1. Select granular material as specified or directed for watermain bedding or encasement shall be placed in accordance with Section 312000 – Earth Moving.
 - 2. Select backfill where specified or directed shall be placed in accordance Section 312000 – Earth Moving.
 - 3. Flowable Fill (Controlled Low Strength Material) shall only be used where defined on the contract drawings and approved for use by the ENGINEER and OWNER.

3.2 DISPOSAL OF DISPLACED MATERIALS

- A. Materials displaced through the use of the above materials shall be wasted or disposed of by the CONTRACTOR and the cost of such disposal shall be included in the appropriate bid item.

END OF SECTION 312323

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Asphalt materials.
 - 2. Aggregate materials.
 - 3. Aggregate subbase.
 - 4. Asphalt paving base course, binder course, and wearing course.
 - 5. Asphalt paving overlay for existing paving.
- B. Related Requirement:
 - 1. Section 310516 - Aggregates for Earthwork: Product requirements for aggregate for placement by this section.
 - 2. Section 312213 - Rough Grading: Preparation of site for paving and base.
 - 3. Section 312323 - Fill: Compacted subbase for paving.
 - 4. Section 321123 - Aggregate Base Courses: Compacted subbase for paving.

1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
 - 2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
 - 3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
 - 4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
 - 5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
 - 7. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
 - 8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.
- B. Asphalt Institute:
 - 1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
 - 2. AI MS-19 - Basic Asphalt Emulsion Manual.
 - 3. AI SP-2 - Superpave Mix Design.
- C. ASTM International:
 - 1. ASTM C1371-2004a - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
 - 2. ASTM C1549-2004 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 - 3. ASTM D242 - Standard Specification for Mineral Filler For Bituminous Paving Mixtures.

4. ASTM D692 - Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
5. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
6. ASTM D977 - Standard Specification for Emulsified Asphalt.
7. ASTM D1073 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
8. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
9. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type).
10. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
11. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
12. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
13. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
14. ASTM D3515 - Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
15. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
16. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.
17. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
18. ASTM E408-1971(1996)e1 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
19. ASTM E903-1996 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
20. ASTM E1918-1997 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
21. ASTM E1980-2001 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 1. Submit product information for asphalt and aggregate materials.
 2. Submit mix design with laboratory test results supporting design.
- C. Manufacturer's Certificate: Certify products meet or exceed NYSDOT Standard Specifications, current edition.

1.4 QUALITY ASSURANCE

- A. Mixing Plant: Conform to NYSDOT Standard Specifications, current edition.
- B. Mixing Plant: Certified by NYSDOT.

- C. Obtain materials from same source throughout.
- D. Perform Work in accordance with NYSDOT Standard Specifications current edition.

1.5 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this section with minimum five years documented experience.

1.6 AMBIENT CONDITIONS

- A. Section 015000 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Do not place asphalt mixture between November 1 and April 14. Asphalt placed outside this timeframe must provide a limited warranty against defects in such work.
- C. Do not place asphalt mixture when ambient air or base surface temperature is less than 40 degrees F for lift sections 3-inches or greater, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

- A. Reclaimed or recycled material can be included as per NYSDOT Standard Specifications, current edition.

2.2 ASPHALT PAVING

- A. Performance/Design Criteria:
 - 1. Asphalt paving section shall be as the following per contract documents:
 - a. Stone Base Course Type 2: 12-inches, NYSDOT Item No. 304.12 (Select Backfill per 310516).
 - b. Asphalt 37.5 F9 Base Course HMA, 80 Series Compaction: 4-inches, NYSDOT Item No. 402.378903.
 - c. Asphalt 19 F9 Binder Course HMA, 70 Series Compaction: 2-inches, NYSDOT Item No. 402.197903.
 - d. Asphalt 9.5 F2 Top Course HMA with Polymer-Modified Performance Graded Binder, 70 Series Compaction: 1-1/2-inches, NYSDOT Item No. 402.097203.

B. Asphalt Materials:

1. Unless otherwise specified herein, all bituminous macadam materials and work shall conform to the applicable requirements of the NYSDOT Standard Specifications, current edition.
2. The materials shall include but not limited to:
 - a. Asphalt binder
 - b. Asphalt cement
 - c. Aggregates
 - d. Tack coat
 - e. Emulsions

C. Top Course: Performance Graded (PG) Binder and Mix Design Level:

1. PG Binder

- a. Use a polymer modified Performance Graded (PG) Binder PG 64V-22 during the production of Superpave Hot Mix Asphalt (HMA) mixtures for this project. The PG Binder shall meet the requirements of AASHTO M320, Standard Specifications for Performance Graded Asphalt Binder and Elastic Recovery requirements as shown in the table below:
- b. Test of the rolling thin oven (RFTO) Binder Sample
- c.

Test	Requirements
Elastic Recovery using ASTM D6084-04, Testing Procedure A, at 25 degrees C	60% minimum

- d. Use of polyphosphoric acid (PPA) to modify the PG binder properties is prohibited. This prohibition also applies to the use of PPA as a cross-linking agent for polymer modifications.

2. Mix Design

- a. The mixture designs must be developed in accordance with the criteria specified in the Superpave HMA items that are appropriate for an "Estimated Traffic" level of greater than 0.3 but less than 30.0 "Million 80 kN ESALs. Under no circumstances shall the PG Binder content in the HMA be less than 5.8% for a 9.5 design, 5.2% for a 12.5 design, 4.5% for a 19.0 design, 4.2% for a 25.0 design or 3.7% for a 37.5 design.
- b. Caution: The PG binder for this project will likely be modified using polymer additives to meet the requirements stated above. Handling of the HMA shall be discussed at the preconstruction meeting.
- c. The Contractor should be aware that this is a performance-related specification in which the Contractor is responsible for compaction of the pavement within a specified density range. The Contractor must be prepared to select, operate, and control the paving and compaction equipment, to monitor the results, and to make necessary adjustments (without direction from the Engineer) to achieve the specified density results.
- d. Note: Polymer additives to be used on all Top Courses.

2.3 MIXES

- A. Mix shall adhere to Hot Mix Asphalt (HMA) Pavement Requirements per NYSDOT Standard Specifications Sections 400 and 700 per current standards unless otherwise modified herein.

2.4 ACCESSORIES

- A. Geotextile Stabilization Fabric: NYSDOT Item 207.24 and as per materials Section 737-01E.

2.5 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Submit proposed mix design for review prior to beginning of Work.
- C. Test samples in accordance with NYSDOT Standard Specifications Section 400.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
- C. Verify compacted soil subbase is dry and ready to support paving and imposed loads.
 - 1. Remove any unsuitable subgrade materials or soft subbase and replace with compacted fill as specified in Section 312323.
- D. Verify gradients and elevations of base are correct.
- E. Verify gutter drainage grilles and manhole frames and are installed in correct position and elevation.

3.2 PREPARATION

- A. Prepare subbase in accordance with NYSDOT Standard Specifications, current edition.

3.3 INSTALLATION

- A. The Contractor shall construct pavement in the locations shown and to the grade and compacted depth pavement indicated.
- B. The bottom two courses shall be NYSDOT Item No. 304.12, uniformly graded, crushed stone, each compacted to a total 6 inches in depth. The depth of loose stone, in all cases, shall be gauged by the use of cubical blocks of suitable size. The spreading of any layer or course of broken stone, or filler shall be done from suitable spreader equipment of

from piles dumped along the road as directed by the Engineer. No segregation of large or fine particles will be allowed, but the stone as spread shall be well graded with no pockets of fine material. After the bottom course of stone has been laid loose, it shall be thoroughly rolled with an approved roller weighing not less than ten (10) tons.

- C. This rolling must begin at the sides and continue toward the center and shall continue until there is no movement of the course ahead of the roller. After the course is thoroughly compacted, No. 1 stone and screenings or sand, or a mixture of these, shall be uniformly spread, either by hand labor or by an approved mechanical device, upon the surface and swept in by means of a gang-dragged broom of an approved type and rolled dry. After rolling, the course shall be tested with a line 40 feet in length and any depression over 1/2 inch in depth shall be satisfactorily eliminated. After the completion of the rolling, no hauling other than that necessary for bringing material for the next course shall be allowed over the rolled material. It is the intention to bind this course with the small stone, but no surplus or filler will be allowed on this course. This course shall not be laid in excess of 500 linear feet without being rolled and thoroughly filled so as to render it waterproof and thereby prevent the softening up of the subgrade.
- D. If the subgrade material shall become churned up into, or mixed with the bottom course through any reason whatsoever, the Contractor shall at his own expense remove such mixture of subgrade material and broken stone, or gravel, and replace it with clean broken stone, or gravel, of the proper size and shall roll or otherwise compact the material so as to produce a uniform, firm and even bottom course.
- E. If hand spreading is used, all filler shall be delivered and piled alongside the road before the course is placed.
- F. Over this prepared base course, construct a 7-1/2 inch compacted depth three-course, asphalt concrete, per Section 321216-2.2.
- G. After the roadway areas are completed, the Contractor shall string lines along the edges of the pavement and shall trim the edges as required by the Engineer to give a neat edge appearance to the road construction.
- H. Slope all roadway areas as shown on the Drawings to catch basins so that there are no low spots where water will collect.
- I. In general the new pavement shall be graded to drain as shown on the Drawings. Where new paving work meets existing paving, care shall be taken to provide a neat and smooth transition in a neat and workmanlike manner.

3.4 TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- C. Scheduled Compacted Thickness: Within 1/4 inch.
- D. Variation from Indicated Elevation: Within 1/2 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Requirements for inspecting, testing.
- B. Material tickets: Copies of tickets for materials placed must be provided to engineer/inspector.
- C. Asphalt Paving Mix Temperature: Measure temperature at time of placement.
- D. Asphalt Paving Thickness: Measure thickness at time of placement.

3.6 PROTECTION

- A. Section 017000 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from mechanical injury or until surface temperature is less than 140 degrees F.

3.7 SCHEDULES

- A. Refer to drawing details for subbase thicknesses.

END OF SECTION

SECTION 321300 - SITE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
 - 1. Exterior slabs on grade and sidewalks.
 - 2. Control, expansion and contraction joint devices.
 - 3. Equipment pads.
 - 4. Light pole base.
 - 5. Thrust blocks.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
 - 3. ACI 305 - Hot Weather Concreting.
 - 4. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 5. ACI 308.1 - Standard Specification for Curing Concrete.
 - 6. ACI 318 - Building Code Requirements for Structural Concrete.
 - 7. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures.
- B. ASTM International:
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 3. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 4. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 5. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 - 6. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - 7. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 - 8. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - 9. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

10. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
11. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
12. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
13. ASTM/AASHTO C595/M240 - Standard Specification for Blended Hydraulic Cements.
14. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
15. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
16. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
17. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
18. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
19. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
20. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
21. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
22. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
23. ASTM C1218/C1218M - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
24. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
25. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
26. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
27. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
28. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
29. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
30. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
31. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
32. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 SUBMITTALS

- A. Product Data: Submit data on joint devices, attachment accessories, and admixtures.

- B. Design Data:
 - 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air entrained concrete work.
 - 2. Identify mix ingredients and proportions, including admixtures.
 - 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
- C. Samples:
 - 1. Submit two 9 x 12 inch long samples of expansion/contraction joint and control joint.
 - 2. Submit samples of materials as specified and as otherwise may be requested by the Engineer, including names, sources and descriptions as required.
- D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.
- E. Laboratory Test Reports: Submit two copies of laboratory test reports for concrete materials and mix design tests. The Engineer's review will be for general information only. Production of concrete to comply with specified requirements is the Contractor's responsibility.
- F. Delivery ticket: Furnish copies of delivery tickets for each load of concrete delivered to the site. Provide items of information as specified.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.5 PRE-CONCRETE CONFERENCE

- A. At least 35 days prior to start of concrete construction the Contractor shall hold a meeting to review the detailed requirements of the concrete design mixes and to determine the procedures for producing proper concrete construction.
- B. The contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the Contractor's superintendent, Laboratory responsible for the concrete design mix, Laboratory responsible for field quality control, concrete subcontractor, Ready-mix concrete producer, Admixture manufacturer(s), and Concrete pumping contractor.
- C. Minutes of the meeting shall be recorded, typed and printed by the contractor and distributed by him to all parties concerned within 5 days of the meeting. One copy of the minutes shall also be transmitted to the Owner's representative, Resident Engineer, and Consultant Engineer for information purposes.

- D. The minutes shall include a statement by the admixture manufacturer(s) indicating that the proposed mix design and placing techniques can produce the concrete quality required by these specifications.
- E. The Consultant Engineer will be present at the conference. The Contractor shall notify the Consultant Engineer at least 10 days prior to the scheduled date of the conference.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 318 and ACI 350.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.
- E. Installer of concrete flatwork to be ACI Flatwork Finisher Certified.
- F. Concrete Testing Service
 - 1. The Contractor shall employ a testing laboratory experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes.
 - 2. Approval of a testing laboratory shall be made by the Engineer.
 - 3. Materials and installed work may require testing and retesting, as directed by the Engineer, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times. Tests, not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.
- G. Test for Concrete Materials
 - 1. For normal weight concrete, test aggregates by the methods of sampling and testing of ASTM C 33.
 - 2. For Portland cement, conform to AASHTO M240.
 - 3. For Type E-1(K) shrinkage-compensating concrete, conform to ASTM C845-87.
 - 4. Submit written reports to the Engineer for each material sampled and tested, prior to the start of work. Provide the project identification name and number, date of report, name of contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

1.8 COORDINATION

- A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: AASHTO M240:
 - 1. Use only one brand of cement for each required type throughout the project, unless otherwise accepted by the Engineer.
- B. Normal Weight Aggregates: ASTM C33.
 - 1. Coarse Aggregate Maximum Size: In accordance with ACI 318.
 - 2. Provide aggregates from one source of supply to ensure uniformity in color, size and shape.
 - 3. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite or ochre which can cause stains on exposed concrete surfaces.
- C. Water: ACI 318; potable, without deleterious amounts of chloride ions.

2.2 ADMIXTURES

- A. Manufacturers:
 - 1. BASF Construction Chemical.
 - 2. Euclid Chemical Co.
 - 3. Grace Construction Products.
 - 4. Sika Corporation.
 - 5. Substitutions: Permitted.
- B. Air Entrainment: ASTM C260.
- C. Chemical: ASTM C494/C494M.
- D. Plasticizing: ASTM C1017/C1017M.

2.3 ACCESSORIES

- A. Bonding Agent:
 - 1. Manufacturers:
 - a. Euclid Chemical Company.
 - b. Sika Corporation.
 - c. W.R. Meadows, Inc.
 - d. Or Equal.
- B. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

1. Manufacturers:
 - a. Euclid Chemical Co.
 - b. L&M Construction Chemical.
 - c. QUIKRETE.
 - d. Sika Corporation.
 - e. Or Equal.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Waterstops
 1. Flat dumbbell type waterstops at construction joints and other joints where no movement is expected, unless otherwise shown; web thickness not less than 3/8" for widths 9" and over.
 2. At expansion joints provide 9"x 3/8" dumbbell type with 3/4" diameter minimum center bulb.
 3. Provide either rubber or PVC waterstops at contractor's option, with rubber units complying with Corps of Engineers CRD-C513 and PVC units complying with CRD-C572.
 4. Manufacturers offering products to comply with requirements include the following: Electrovert, Inc.; W.R. Meadows, Inc.; Weatherguard Prod. Corp.; Gates Rubber Co.; and Servicised Products/W.R. Grace & Co., or equal.
- B. Expansion Joints
 1. Joint Filler Type C: ASTM D1752; Premolded sponge rubber.
 2. A resilient, closed-cell, cross-linked ethylene vinyl acetate material may also be used.
 3. Products offered by manufacturers to comply with the requirements include the following: Evazote 50 by E-poxy Industries, Inc., similar by Tremco, W. R. Grace & Co., or equal.

2.5 CONCRETE MIX

- A. Select proportions for concrete in accordance with ACI 318 trial mixtures.
- B. Provide concrete to the following criteria, or as otherwise specified:

Material and Property	Measurement
Compressive Strength (28 day)	5,000 psi
Cement Type	AASHTO M240
Water-Cement Ratio (maximum)	0.40 percent by weight
Air Content	6.5 percent plus or minus 1.5 percent
Fly Ash Content:	0 percent of cementitious materials by weight, maximum
Silica Fume Content:	0 percent of cementitious materials by weight, maximum
Slag	0 percent of cementitious materials by weight, maximum
Slump	Minimum 3 inch, maximum 4 inch

- C. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Architect/Engineer.
 - 1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements.
 - 2. Do not use calcium chloride nor admixtures containing calcium chloride.
 - 3. Use set retarding admixtures during hot weather.
 - 4. Add air entrainment admixture to concrete mix for work exposed to freezing and thawing or deicing chemicals.
 - 5. For concrete exposed to deicing chemicals, limit fly ash, pozzolans, silica fume, and slag content as required by applicable code.
- D. Average Compressive Strength Reduction: Permitted in accordance with ACI 318.
- E. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M.
- F. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

2.6 PROPORTIONING AND DESIGN OF MIXES

- A. Design mixes shall be in compliance with ACI 301 Chapter 3.
- B. Prepare design mixes for each type of concrete. Use an independent testing facility selected by the Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
- C. Proportion mixes by laboratory trial batch method, using material to be employed on the project for each class of concrete required, complying with ACI 211.1 for normal weight and report to the Engineer the following data:
 - 1. Complete identification of aggregate source of supply.
 - 2. Tests of aggregates for compliance with specified requirements.
 - 3. Scale weight of each aggregate.
 - 4. Brand, type of cement.
 - 5. Brand, type and amount of each admixture.
 - 6. Amounts of water used in trial mixes.
 - 7. Proportions of each material per cubic yard.
 - 8. Gross weight and yield per cubic yard of trial mixtures.
 - 9. Measured slump.
 - 10. Measured air content.
 - 11. Theoretical yield and plastic unit weight.
 - 12. Mix temperature.
 - 13. Water-cement ratio.
 - 14. Compressive strength for 7 and 28 days.Compressive strength developed at 7 days and 28 days, from not less than three (3) test cylinders cast for each 7 and 28 day test, and for each design mix.
- D. Reports
 - 1. Submit written reports to the Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Engineer.

- E. Mix Designs
1. All mix designs shall be proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318-89. Submit mix designs on each class of concrete for review.
 2. If trial batches are used, the mix design shall be prepared by an independent testing laboratory and shall achieve an average compressive strength 1200 psi higher than the specified strength. This over-design shall be increased to 1400 psi when concrete strengths over 5000 are used.
 3. The proposed mix designs shall be accompanied by complete standard deviation analysis or trial mixture test data.
- F. Adjustments to Concrete Mixes
1. Mix design (w/c ratio) adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to the Owner and as accepted by the Engineer. Laboratory test data for review mix designs and strength results must be submitted to and accepted by the Engineer before using in the work.

2.7 CONCRETE STRENGTH

- A. There shall be two classes of concrete, 5000 psi at 28 days with maximum water-cement ratio of 0.40 and 2500 psi at 28 days with maximum water- cement ratio of 0.67.
- B. The 2500 psi concrete is intended principally for pipe cradle and encasement or for backfill of unauthorized excavation. All other concrete, including all thrust blocks, shall be 5000 psi.
- C. Concrete using strictly Portland cement as per AASHTO M240 exposed to de-icing salts or aggressive chemical exposure shall have a maximum w/c ratio of 0.40. This shall include concrete such as, but not limited to, slabs on grades, interior and exterior; foundation walls where any portion is above grade and can be in contact with chlorides or chloride solution.
- D. Minimum cement content (unless noted otherwise):

A.S.T.M. C-33 Coarse Aggregate No.	Lb. per Cu. Yd.
467 (1 1/2 inch maximum)	600
57 (1 inch maximum)	610
67 (3/4 inch maximum)	635
(1/2 inch maximum)	680

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 318 and ACI 350.
- B. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.
- D. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- E. Install construction joint devices in coordination with pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- F. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- G. Install joint covers in longest practical length, when adjacent construction activity is complete.
- H. Deposit concrete at final position. Prevent segregation of mix.
- I. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- J. Consolidate concrete.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- L. Place concrete continuously between predetermined expansion, control, and construction joints.

3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
- B. Finish concrete floor surfaces in accordance with ACI 318.

- C. Steel trowel surfaces which are indicated to be exposed.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
 - 1. Protect concrete footings from freezing for minimum seven days.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete as specified in Section 033900.

3.6 JOINTS

- A. Construction Joints
 - 1. Locate and install construction joints, which are not shown on the Drawings, so as not to impair strength and appearance of the structure, as acceptable to the Engineer. Locate construction joints on shop drawings if required but not shown, as follows:
 - a. In walls, at not more than 40 feet in any horizontal direction; at top of footings; at top of slabs on ground; at top and bottom of door and window openings or as required to conform to architectural details as directed by the Engineer; and at the underside of the deepest beam or girder framing into wall.
 - b. In columns or piers, at the top of footing; at the top of slabs on ground; and at the underside of the deepest beam or girder framing into the column or pier.
 - c. In slabs on grade maximum joint spacing shall be 36 times slab thickness, unless otherwise accepted by the Engineer, or indicated on the Drawings. Conform to slab placement diagrams or pattern lay out for placement where shown.
 - 2. Provide keyways at least 1-1/2" deep in all construction joints in walls, slabs, and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.
 - a. Place construction joints perpendicular to the main reinforcements. Continue all reinforcement across construction joints.
- B. Expansion Joints
 - 1. Expansion joints shall be located as shown on the Plans, and/or as directed by the Engineer.
 - 2. Expansion joints shall be provided with flexible water stops at locations shown on the contract plans, details and sections and at location determined necessary by the Engineer.
 - 3. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors bonded on only one side of joints) shall not extend continuously through any expansion joint.

- C. Waterstops
 - 1. Provide waterstops in all construction joints or as shown on the Drawings, unless otherwise directed by the Engineer. Install waterstops to form a continuous diaphragm in each joint. Make provisions to support and protect waterstops during the progress of the work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions. Protect waterstop material from damage where it protrudes from any joint.
 - 2. The Drawings may not indicate waterstops in expansion joints; however, all expansion joints shall be provided with waterstops.
- D. Isolation Joints in Slabs on Ground
 - 1. Provide isolation joints in slabs on ground at all points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Field inspection and testing will be performed by Contractor's testing laboratory in accordance with New York State Building Code.
- C. Provide free access to Work and cooperate with subcontracted firm.
- D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- E. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- F. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, field cured.
 - 3. Sample concrete and make one set of five cylinders for every 75 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
 - 4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - 5. Make one additional cylinder during cold weather concreting, and field cure.
- G. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.
 - 2. Air Content Test Method: ASTM C173/C173M.

3. Temperature Test Method: ASTM C1064/C1064M. Test hourly when air temperature is 40°F or below, or when 80°F or above; and each time a set of compression test specimens is made.
 4. Measure slump and temperature for each compressive strength concrete sample.
 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
 6. A plastic unit weight MUST be taken whenever samples are made for compressive strength test or air content.
- H. Cylinder Compressive Strength Testing:
1. Test Method: ASTM C39/C39M.
 2. Test Acceptance: In accordance with ACI 318.
 3. Test Frequency:
 - a. One set of five (5) standard cylinder for each 50 cubic yards or fraction thereof, of each concrete class placed in any one day or for each 5,000 square feet of surface area placed.
 - b. When the frequency of testing will provide less than five strength tests for a given class of concrete, conduct testing from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.
 4. Test one cylinder at 7 days.
 5. Test three cylinders at 28 days.
 6. Retain one cylinder for 56 days for testing when requested by Architect/Engineer.
 7. Dispose remaining cylinders when testing is not required.
- I. Core Compressive Strength Testing:
1. Sampling and Testing Procedures: ASTM C42/C42M.
 2. Test Acceptance: In accordance with ACI 318.
 3. Drill three cores for each failed strength test from concrete represented by failed strength test.
- J. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.
- K. Report test results in writing to the Engineer, the ready mix producer and the Contractor on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day and 28-day tests, air content, actual slump and concrete temperature.

3.8 CONCRETE EVALUATIONS

- A. Evaluation of Quality Control Tests
 - 1. The concrete quality control testing as specified in Part I will be evaluated by the following criteria:
 - a. Do not use concrete delivered to the final point of placement that has slump or total air content outside the specified values.
- B. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the average of each set of three consecutive compressive strength tests results equal or exceed the 28-day design compressive strength of the type or class of concrete; and, no individual strength test falls below the required compressive strength by more than 500 psi.
 - 1. Strength tests of specimens cured under field conditions may be required by the Engineer to check the adequacy of curing and protecting of the concrete placed. Mold these specimens at the same time and from the same samples as the laboratory cured specimens, as directed by the Engineer.
 - 2. Provide improved means and procedures for protecting concrete when the 28-day compressive strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders.
 - 3. When laboratory-cured cylinder strengths are appreciably higher than the minimum required compressive strength by more than 500 psi additional means for protecting the concrete may not be necessary, even though the 85% criterion is not met.
 - 4. If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.
 - 5. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to additional testing as herein specified.
- C. Formed Concrete Dimensional Tolerances
 - 1. Formed concrete having any dimension smaller or greater than required, and outside the specified tolerance limits, will be considered deficient in strength and subject to additional testing as herein specified.
 - 2. Formed concrete having any dimension greater than required will be rejected if the appearance or function of the structure is adversely affected, or if the larger dimensions interfere with other construction. Repair, or remove and replace rejected concrete as required to meet the construction conditions. When permitted, accomplish the removal of excessive material in a manner to maintain the strength of the section without affecting function and appearance.
- D. Strength of Concrete Structures
 - 1. The strength of the concrete structure in-place will be considered potentially deficient if it fails to comply with any of the requirements that control the strength of structure, including the following conditions:
 - a. Failure to meet compressive strength tests requirements.
 - b. Concrete that differs from the required dimensions or location in such a manner to reduce strength.

- c. Concrete subjected to damaging mechanical disturbances; particularly load stresses, heavy shock, and excessive vibration.
 - d. Poor workmanship and quality control likely to result in deficient strength.
 - E. Testing Concrete Structure for Strength
 - 1. When there is evidence that the strength of the concrete structure in-place does not meet specification requirements, the concrete testing service shall take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:
 - a. Take at least three representative cores from each member or area of suspect strength, from locations directed by the Engineer.
 - b. Test cores in a saturated-surface-dry condition per ACI 318 if the concrete will be wet during the use of the completed structure.
 - c. Test cores in an air-dry condition per ACI 318 if the concrete will be dry at all times during use of the completed structure.
 - 2. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85% and no single core is less than 75% of the 28-day required compressive strength.
 - 3. Report test results in writing to the Engineer on the same day that tests are made. Include in test reports the project identification name and number, date, name of Contractor, name of concrete testing service, location of test core in the structure, type or class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plane of the concrete as placed, and the moisture condition of the core at time of testing.
 - 4. Fill core holes solid with non-shrink, non-metallic expanding mortar and finish to match adjacent concrete surfaces.
 - 5. Conduct static load test and evaluations complying with ACI 318 if the results of the core tests are unsatisfactory, or if core tests are impracticable to obtain, as directed by the Engineer.
 - 6. Correct all concrete work that is found structurally inadequate by core tests or by results of static load tests, as directed by the Engineer.
 - F. Repair of Defective Areas
- B.
 - 1. With prior approval of the Engineer, as to method and procedure, all repairs of defective areas shall conform to ACI 301, Chapter 9, except that the specified bonding compound must be used.

3.9 PATCHING

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
- C. Patch imperfections as directed by Engineer.

3.10 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by Architect/Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION 321300

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Chain-link fences.
2. Swing gates.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of fence and gate assembly.
1. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Sample warranty.

1.5 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7:
 - 1. Design Wind Load: As indicated on Drawings.
 - a. Minimum Post Size: Determine according to ASTM F1043 for post spacing not to exceed 10 feet (3 m) for Material Group IA, ASTM F1043, Schedule 40 steel pipe.

2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
 - 1. Fabric Height: 96 inches (2438 mm).
 - 2. Steel Wire for Fabric: Wire diameter of 0.192 inch (4.88 mm).
 - a. Mesh Size: 1 inch (25 mm)
 - b. Polymer-Coated Fabric: ASTM F668, Class 2a over aluminum-coated steel wire.
 - 1) Color: Black, according to ASTM F934.
 - 3. Selvage: Knuckled at both selvages.

2.3 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F1043 or ASTM F1083 based on the following:
 - 1. Fence Height: 96 inches (2438 mm).
 - 2. Light-Industrial-Strength Material: Group IC-L, round steel pipe, electric-resistance-welded pipe.
 - a. Line Post: 2.875 inches (73 mm) in diameter.
 - b. End, Corner, and Pull Posts: 2.875 inches (73 mm).
 - 3. Horizontal Framework Members: Intermediate, top, and bottom rails according to ASTM F1043.
 - 4. Brace Rails: ASTM F1043.

2.4 TENSION WIRE (NOT USED)

2.5 SWING GATES

- A. General: ASTM F900 for gate posts and single swing gate types.
 - 1. Gate Leaf Width: 36 inches (914 mm).
 - 2. Framework Member Sizes and Strength: Based on gate fabric height of more than 72 inches (1830 mm).
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: ASTM F1043 and ASTM F1083; manufacturer's standard protective coating and finish.
 - 2. Gate Posts: Round tubular steel.
 - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: assembled with corner fittings.
- D. Hardware:
 - 1. Hinges: 180-degree outward swing.
 - 2. Panic Exit Hardware: Surface mounted weather resistant bar with 24-inch tall mounting plate with keyed cylinder.

2.6 FITTINGS

- A. Provide fittings according to ASTM F626.

2.7 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. 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 in writing by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Exposed Concrete: Extend 2 inches (50 mm) above grade; shape and smooth to shed water.
 - b. Posts Set into Sleeves in Concrete: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
 - c. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches (127 mm) deep and 3/4 inch (20 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more. For runs exceeding 500 feet (152 m), space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at 96 inches (2440 mm) o.c.
- F. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1-inch (25-mm)] [2-inch (50-mm) bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

3.4 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of 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.
- B. Lubricate hardware and other moving parts.

END OF SECTION 323113

SECTION 323119 - ORNAMENTAL METAL FENCE SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the ornamental aluminum fence system defined herein.

1.3 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a total ornamental aluminum fence system including all components (i.e., pickets, rails, posts, gates and hardware) as shown in the contract documents.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES

- A. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- C. ASTM D523 - Test Method for Specular Gloss.
- D. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- E. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- F. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- G. ASTM D2794 - Test Method for Resistance of Organic Coatings to The Effects of Rapid Deformation (Impact).
- H. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

1.6 SUBMITTAL

- A. The manufacturer's literature shall be submitted prior to installation.
- B. Shop Drawings: Provide drawings including fence layout, post locations, gate locations and typical installation details.

1.7 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

PART 2 – MATERIALS

2.1 PRODUCTS

- A. Basis of design for the ornamental aluminum fence system is the Ameristar, 3 rail Echelon Plus, or Equal.
Provide the basis of design, or an equal system from an acceptable manufacturer. Acceptable manufacturers include:
- a. Ameristar Fence Products
 - b. Alum-Guard, Inc.
 - c. Carfaro, Inc.
- B. Basis of design for the ornamental steel fence system is the Ameristar, 3 rail Montage Plus-Majestic or Equal.
Provide the basis of design, or an equal system from an acceptable manufacturer. Acceptable manufacturers include:
- d. Ameristar Fence Products
 - e. Alum-Guard, Inc.
 - f. Carfaro, Inc.

2.2 MATERIAL (ALUMINUM 6'-0" PERIMETER FENCE)

- A. Height of fence panels shall be 6'-0" for site perimeter fence aluminum, and 4'-0" for interior fence, as shown on the contract drawings. Gates shall be provided as shown on the contract drawings.
- B. Aluminum material for fence framework (i.e., tubular pickets, rails and posts) shall conform to the requirements of ASTM B221. The aluminum extrusions for posts and rails (outer channel) shall be Alloy and Temper Designation 6005-T5. The aluminum extrusions for pickets and rail inner slide channels shall be Alloy and Temper Designation 6063-T5.
- C. The manufactured framework shall be subjected to the manufacturer's thermal stratification coating process (high-temperature, in-line, multi-stage) including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.

TABLE 1

Quality Characteristics	ASTM Method	Test	Performance Requirements
Adhesion	D3359 – Method B		Adhesion (retention of coating) over 90% of test area (tape and knife test).
Corrosion Resistance	B117 & D1654		Corrosion resistance over 1,000 hours (scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794		Impact resistance over 60 inch lb. (forward impact using 0.625" ball).
Weathering Resistance	D822, D2244, D523 (60 Degree Method)		Weathering resistance over 1,000 hours (failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

- D. Material for fence pickets shall be 3/4" square x 0.045" thick extruded tubing. The cross-sectional shape of the rails shall conform to the Ameristar ForeRunner design or equal with outside cross-

section dimensions of 1.4375" x 1.250" x 0.110" side wall. The top wall of the outer channel of the rail shall be 0.090" thick; the side walls shall be 0.075" thick for superior vertical load strength. The inner slide channel of the rail shall be 0.060" thick. Picket holes in the rail shall be spaced 4.6875" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. Posts shall be a minimum of 2-1/2" square with a perimeter wall thickness of 0.060" and an interior reinforcing web. Cast aluminum post caps shall be affixed to all posts. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections.

- E. All fasteners shall be stainless steel. Aluminum brackets shall be used to attach rails to posts.
- F. Aluminum castings shall be used for all rings, post caps, finials, and miscellaneous adornments.

2.3 MATERIAL (STEEL 8'-0" FENCE ADJACENT TO BUILDING)

- A. Height of fence panels shall be 8'-0" for steel fence adjacent to the building.
- B. Steel material for fence framework (i.e., tubular pickets, rails and posts) shall conform to the requirements of ASTM A653.
- C. The manufactured framework shall be subjected to the manufacturer's thermal stratification coating process (high-temperature, in-line, multi-stage) including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.

TABLE 1

Quality Characteristics	ASTM Method	Test	Performance Requirements
Adhesion	D3359 – Method B		Adhesion (retention of coating) over 90% of test area (tape and knife test).
Corrosion Resistance	B117 & D1654		Corrosion resistance over 1,500 hours (scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794		Impact resistance over 60 inch lb. (forward impact using 0.625" ball).
Weathering Resistance	D822, D2244, D523 (60 Degree Method)		Weathering resistance over 1,000 hours (failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

- D. Material for fence pickets shall be 3/4" square steel 17 Ga. tubing. The cross-sectional shape of the rails shall conform to the Ameristar ForeRunner design or equal with outside cross-section dimensions of 1.5" x 14 Ga.. The top wall of the outer channel of the rail shall be 0.055" thick; the side walls shall be 0.075" thick for superior vertical load strength. The inner slide channel of the rail shall be 0.070" thick. Picket holes in the rail shall be spaced 4.6875" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. Posts shall be a minimum of 3" square with a perimeter wall of 12ga.. Cast steel post caps shall be affixed to all posts. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections.
- E. All fasteners shall be stainless steel. Steel brackets shall be used to attach rails to posts.
- F. Steel castings shall be used for all rings, post caps, finials, and miscellaneous adornments.

2.4 FABRICATION

- A. Pickets, rails and posts shall be pre-cut to specified lengths. Fence rails shall be pre-punched to accept pickets.
- B. The rail inner slide shall be fully inserted into the rail outer channel to form the raceway for the internal retaining rod. Grommets shall be inserted into the pre-punched holes in the rails, and pickets shall be inserted through the grommets so that pre-drilled picket holes align with the internal raceway of the two-part rails. The use of the manufacturer's template is required. Retaining rods shall be inserted into each rail so that they pass through the pre-drilled holes in each picket, thus completing the panel assembly.
- C. Completed panels:
 - a. Aluminum panels shall be capable of supporting a 200 lb. load (applied at midspan) without permanent deformation. Panels shall be biasable to a 25% change in grade.
 - b. Steel panels shall be capable of supporting a 400 lb. load (applied at midspan) without permanent deformation. Panels shall be bias able to a 25% change in grade.
- D. Gates shall be fabricated using rail material to match the fence panels and 1.75" square gate ends. Gate ends shall be 0.125" thick; gate pickets shall be 0.080" thick. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

PART 3 - EXECUTION

3.1 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 INSTALLATION

- A. Fence posts shall be set 95" on center, plus or minus 1/2". Gate posts shall be spaced according to the gate openings specified in the construction plans. The "Earth Moving" and "Concrete" sections of this specification shall govern post base material requirements. Fence panels shall be attached to posts using mechanically fastened panel brackets supplied by the manufacturer.

3.3 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION 323119

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding (Areas outside of pool).
2. Sodding (Areas in and around pool fence).

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Certification of grass seed.

1. Certification of each seed mixture for turfgrass sod.

B. Product certificates.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

1.5 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
1. Seeded Turf: 60 days from date of planting completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
 2. Sodded Turf: 30 days from date of planting completion.

PART 2 - PRODUCTS

2.1 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: State-certified seed of grass species suitable for the climate.

2.2 TURFGRASS SOD

- A. Turfgrass Sod: Certified including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted. Sod grass species must be compatible with seed species for coloration and grass blade characteristics.

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
 - 2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
- G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
- H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.
- B. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
- C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZERS

- A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of [1] [4] percent nitrogen and 10 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
- D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.6 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. 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.
 - 1. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

2. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Reduce elevation of planting soil to allow for soil thickness of sod.
- B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
 3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

- A. 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. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft..
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas unless covered by erosion control blanket, by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

3.3 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade

or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
 2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.4 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.

3.5 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
1. Satisfactory Seeded Turf: 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. and bare spots not exceeding 5 by 5 inches.
 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

END OF SECTION 329200

SECTION 330130 - SEWER AND MANHOLE TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing Manholes:
 - a. Vacuum Test.
 - b. Exfiltration Test.
 - 2. Testing Gravity Sewer Piping:
 - a. Low-pressure Air Test.
 - b. Infiltration Test.
 - 3. Hydrostatic Testing Pressure Piping.
 - 4. Deflection Testing Plastic Piping.
- B. Related Sections:
 - 1. Section 330561 – Concrete Manholes.
 - 2. Section 333113 - Sanitary Utility Sewerage Piping.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
 - 2. ASTM D2122 - Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

1.3 SUBMITTALS

- A. Submit the following prior to start of testing:
 - 1. Testing procedures.
 - 2. List of test equipment.
 - 3. Testing sequence schedule.
 - 4. Provisions for disposal of flushing and test water.
 - 5. Certification of test gauge calibration.
 - 6. Deflection mandrel drawings and calculations.
- B. Test Reports: Indicate results of manhole and piping tests.

PART 2 - PRODUCTS

2.1 VACUUM TESTING EQUIPMENT

- A. Vacuum pump.
- B. Vacuum line.
- C. Vacuum tester base with compression band seal and outlet port.

- D. Shut-off valve.
- E. Stop watch.
- F. Plugs.
- G. Vacuum gauge, calibrated to 0.1 inch Hg

2.2 AIR TEST EQUIPMENT

- A. Air compressor.
- B. Air supply line.
- C. Shut-off valves.
- D. Pressure regulator.
- E. Pressure relief valve.
- F. Stop watch.
- G. Plugs.
- H. Pressure gauge, calibrated to 0.1 psi.

2.3 INFILTRATION TEST EQUIPMENT

- A. Weirs.

2.4 HYDROSTATIC TEST EQUIPMENT

- A. Hydro pump.
- B. Pressure hose.
- C. Water meter.
- D. Test connections.
- E. Pressure relief valve.
- F. Pressure gauge, calibrated to 0.1 psi.

2.5 DEFLECTION TEST EQUIPMENT

- A. Go, No-Go mandrels.
- B. Pull/retrieval ropes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify manholes and piping are ready for testing.
- B. Verify trenches are backfilled.
- C. Verify pressure piping concrete reaction support blocking or mechanical restraint system is installed.

3.2 PIPING PREPARATION

- A. Lamping:
 - 1. Lamp gravity piping after flushing and cleaning.
 - 2. Perform lamping operation by shining light at one end of each pipe section between manholes; observe light at other end; reject pipe not installed with uniform line and grade; remove and reinstall rejected pipe sections; re-clean and lamp until pipe section achieves uniform line and grade.
- B. Plug outlets, wye-branches and laterals; brace plugs to resist test pressures.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements
- B. Testing Gravity Sewer Piping:
 - 1. Low-pressure Air Test:
 - a. Test each section of gravity sewer piping between manholes.
 - b. Introduce air pressure slowly to approximately 4 psig.
 - 1) Determine ground water elevation above spring line of pipe for every foot of ground water above spring line of pipe, increase starting air test pressure by 0.43 psig; do not increase pressure above 10 psig.
 - c. Allow pressure to stabilize for at least five minutes. Adjust pressure to 3.5 psig or increased test pressure as determined above when ground water is present. Start test.

d. Test:

- 1) Determine test duration for sewer section with single pipe size from the following table. Do not make allowance for laterals.

Nominal Pipe Size, inches	Minimum Test Time, min/ 100 feet
3	0.2
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	4.2
30	4.8
33	5.4
36	6.0

- 2) Record drop in pressure during test period; when air pressure has dropped more than 1.0 psig during test period, piping has failed; when 1.0 psig air pressure drop has not occurred during test period, discontinue test and piping is accepted.
- 3) When piping fails, determine source of air leakage, make corrections and retest; test section in incremental stages until leaks are isolated; after leaks are repaired, retest entire section between manholes.

2. Test pipe larger than 36 inches diameter with exfiltration test not exceeding 100 gallons for each inch of pipe diameter for each mile per day for each section under test. Perform test with minimum positive head of 2 feet.

3. Infiltration Test:

- a. Use only when gravity piping is submerged in ground water minimum of 4 feet above crown of pipe for entire length being tested.
- b. Maximum Allowable Infiltration: 100 gallons per inch of pipe diameter for each mile per day for section under test, include allowances for leakage from manholes. Perform test with minimum positive head of 2 feet.

C. Pressure test system in accordance with AWWA C600 and the following:

- Hydrostatically test each portion of pressure piping, including valved section, at 1.5 times working pressure of piping based on elevation of lowest point in piping corrected to elevation of test gauge.
- Conduct hydrostatic test for at least two-hour duration.
- Fill section to be tested with water slowly, expel air from piping at high points. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. Raise pressure to specified test pressure.
- Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.

5. Correct visible deficiencies and continue testing at same test pressure for additional 2 hours to determine leakage rate. Maintain pressure within plus or minus 5.0 psig of test pressure. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.

6. Compute maximum allowable leakage by the following formula:

$L = (SD\sqrt{P})/C$
L = testing allowance, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during hydrostatic test, in psig
C = 148,000
When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

7. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

D. Deflection Testing of Plastic Sewer Pipe:

1. Perform vertical ring deflection testing on PVC and ABS sewer piping, after backfilling has been in place for at least 30 days but not longer than 12 months.
2. Allowable maximum deflection for installed plastic sewer pipe limited to 5 percent of original vertical internal diameter.
3. Perform deflection testing using properly sized rigid ball or 'Go, No-Go' mandrel.
4. Furnish rigid ball or mandrel with diameter not less than 95 percent of base or average inside diameter of pipe as determined by ASTM standard to which pipe is manufactured. Measure pipe in compliance with ASTM D2122.
5. Perform test without mechanical pulling devices.
6. Locate, excavate, replace and retest pipe exceeding allowable deflection.

E. Testing Manholes:

1. General: Test using air whenever possible prior to backfilling to assist in locating leaks. Make joint repairs on both outside and inside of joint to ensure permanent seal. Test manholes with manhole frame set in place.
2. Vacuum test in accordance with ASTM C1244 and as follows:
 - a. Plug pipe openings; securely brace plugs and pipe.
 - b. Inflate compression band to effect seal between vacuum base and structure; connect vacuum pump to outlet port with valve open; draw vacuum to 10 inches of Hg; close valve; start test.
 - c. Test:
 - 1) Determine test duration for manhole from the following table:

Manhole Diameter	Test Period
4 feet	60 seconds
5 feet	75 seconds
6 feet	90 seconds

- 2) Record vacuum drop during test period; when vacuum drop is greater than 1 inch of Hg during test period, repair and retest manhole; when vacuum drop of 1 inch of Hg does not occur during test period, discontinue test and accept manhole.
- 3) When vacuum test fails to meet 1 inch Hg drop in specified time after repair, repair and retest manhole.

END OF SECTION 330130

SECTION 330500 - COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Piping joining materials.
 - 2. Dielectric fittings.
 - 3. Sleeves.
 - 4. Identification devices.
 - 5. Grout.
 - 6. Piping system common requirements.
 - 7. Equipment installation common requirements.
 - 8. Concrete bases.
 - 9. Metal supports and anchorages.

1.2 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Dielectric fittings.
 - 2. Identification devices.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

- B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Solvent Cements for Joining Plastic Piping:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.
- H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 DIELECTRIC FITTINGS

- A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
 - 1. 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:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Hart Industries, International, Inc.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Plumbing Products Group; Wilkins Div.
 - 3. Description: Factory fabricated, union, NPS 2 and smaller.
 - a. Pressure Rating: 250 psig at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.
- C. Dielectric Flanges:
 - 1. 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:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Water Technologies, Inc.
 - 3. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.
 - a. Pressure Rating: 175 psig minimum.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric Couplings:

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Calpico, Inc.
 - b. Lochinvar Corporation.
3. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.
 - a. Pressure Rating: 300 psig at 225 deg F.
 - b. End Connections: Threaded.

E. Dielectric Nipples:

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Perfection Corporation.
 - b. Precision Plumbing Products, Inc.
 - c. Victaulic Company.
3. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
 - a. Pressure Rating: 300 psig at 225 deg F.
 - b. End Connections: Threaded or grooved.

2.3 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

- G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.4 IDENTIFICATION DEVICES

- A. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 - 2. Location: Accessible and visible.
- B. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- C. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
- D. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
- E. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
- F. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - 1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.
- G. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
 - 1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
 - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
- H. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
 - 1. Material: 0.032-inch- thick, polished brass or aluminum.
 - 2. Material: 0.0375-inch- thick stainless steel.
 - 3. Material: 3/32-inch- thick plastic laminate with 2 black surfaces and a white inner layer.
 - 4. Material: Valve manufacturer's standard solid plastic.
 - 5. Size: 1-1/2 inches in diameter, unless otherwise indicated.
 - 6. Shape: As indicated for each piping system.
- I. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

- J. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - 1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
 - 2. Thickness: 1/8 inch, unless otherwise indicated.
 - 3. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
 - 4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.
- K. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
 - 1. Green: Cooling equipment and components.
 - 2. Yellow: Heating equipment and components.
 - 3. Brown: Energy reclamation equipment and components.
 - 4. Blue: Equipment and components that do not meet criteria above.
 - 5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
 - 6. Terminology: Match schedules as closely as possible. Include the following:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 - 7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

2.5 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 DIELECTRIC FITTING APPLICATIONS

- A. Dry Piping Systems: Connect piping of dissimilar metals with the following:
 - 1. NPS 2 and Smaller: Dielectric unions.

2. NPS 2-1/2 and Larger: Dielectric flanges.

B. Wet Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
2. NPS 2-1/2 and Larger: Dielectric nipples.

3.2 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Sleeves are not required for core-drilled holes.
- J. Permanent sleeves are not required for holes formed by removable PE sleeves.
- K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches above finished floor level.
 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - a. Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

- L. Verify final equipment locations for roughing-in.
- M. Refer to equipment specifications in other Sections for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
- I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.
- K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
 - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End PE Pipe and Fittings: Use butt fusion.
 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 3. Install dielectric fittings at connections of dissimilar metal pipes.

3.5 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

3.6 IDENTIFICATION

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
1. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
 2. Locate pipe markers on exposed piping according to the following:

- a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
 - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
 - d. At manholes and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
1. Lettering Size: Minimum 1/4 inch high for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.7 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 2. 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 base.
 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Section 033000 "Cast-in-Place Concrete."

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Section 055000 "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.

- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.9 GROUTING

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 330500

SECTION 330561 - CONCRETE MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Modular precast concrete manholes and structures with tongue-and-groove joints and transition to cover frame, covers, anchorage, and accessories.
 - 2. Bedding and backfill materials.
 - 3. Vertical adjustment of existing manholes and structures.
- B. Related Requirements:
 - 1. Section 033000 - Cast-in-Place Concrete: Concrete type for manhole invert, and structure foundation slab construction.
 - 2. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
 - 3. Section 310516 - Aggregates for Earthwork
 - 4. Section 312323 - Excavation, Backfill and Trenching
 - 5. Section 330130 - Sewer and Manhole Testing: Testing requirements for manholes. (Not-in-Contract)
 - 6. Section 333111 - Public Sanitary Sewerage Gravity Piping: Piping connections to manholes.

1.2 DEFINITIONS

- A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway Transportation Officials:
 - 1. AASHTO M91 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
 - 2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.
- B. American Concrete Institute:
 - 1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.
- C. ASTM International:
 - 1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
 - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
4. ASTM C55 - Standard Specification for Concrete Building Brick.
5. ASTM C361/C361M - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
6. ASTM C478/- Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
7. ASTM C497/- Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
8. ASTM C877/C877M - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
9. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
10. ASTM C923/C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
11. ASTM C990/C990M - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
12. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
13. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, dimensions, etc.
- B. Shop Drawings:
 1. Indicate structure locations and elevations.
 2. Indicate sizes and elevations of piping, conduit, penetrations, etc.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statement:
 1. Submit qualifications for manufacturer.
- H. Project Record Documents: Record actual locations of manholes (baseline station and offset and GPS coordinates) and connections, and record invert elevations.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Handling: Comply with precast concrete manufacturer instructions for unloading and moving precast manholes and drainage structures.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
 - 3. Repair property damaged from materials storage.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.7 AMBIENT CONDITIONS

- A. Cold Weather Requirements: Comply with ACI 530/530.1.

1.8 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.9 WARRANTY

- A. Furnish five-year manufacturer's warranty for concrete manholes.

PART 2 - PRODUCTS

2.1 CONCRETE MANHOLES

- A. Manufacturers:
 - 1. Kistner Concrete.
 - 2. Or approved equal.
- B. Manhole Sections:
 - 1. Materials:
 - a. Reinforced Precast Concrete: Comply with ASTM C478
 - 1) the manhole barrel walls shall be 5" thick for a 4' diameter manhole, 6" thick for a 5' diameter manhole, and 7" thick for a 6' diameter manhole.
 - b. Gaskets: Comply with ASTM C923.
 - 2. Joints:
 - a. Comply with ASTM C913.
 - b. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.

- C. Precast Bases:
 - 1. Material: Monolithic reinforced concrete complying with requirements for manhole barrels including gasket joints and approved joint compound.
 - 2. The bottom or floor of the monolithic precast base shall have a minimum thickness of 8", and shall project no less than 6" beyond the outside walls of the monolithic precast base to form a flange or annular footing intended to resist uplift.
 - 3. The lowest edges of holes or cutouts for line and branch sewers shall be no less than 6" above the inside surface of the floor or footing of the monolithic precast base. The highest edges of holes or cutouts for line and branch sewers shall be no less than 6" from joint surfaces as detailed on the Plans. After installation of the line and branch sewers, manhole channels or inverts shall be formed by using 4000 psi fill concrete (min.) as specified in Section 033000 of these specifications.
 - 4. At the points where line and branch sewers are connected to the monolithic precast bases or manhole barrels, the annular spaces between the pipes and holes shall be sealed with assemblies consisting of rubber gaskets or links mechanically compressed to form watertight barriers. Such sealing assemblies shall be:
 - a. Press-Seal PSX: Positive Seal consisting of rubber gasket and Type 304 stainless steel compression ring, manufactured by Press Seal Gasket Corp., 3414 Wells Street, Ft. Wayne, Indiana,
 - b. LINK-SEAL consisting of solid synthetic rubber links connected to each other with heavy, elongated washers, bolts and nuts, as manufactured by the Thunderline Corporation of Wayne, Michigan,
 - c. Or approved equal.
 - d. After installation, metal parts of the above assemblies that are accessible from inside the manholes shall be coated with compound as specified for manhole barrel joints.
 - 5. The edges of holes or cutouts in riser or barrel sections for line and branch sewers shall be no less than 6" from joint surfaces, as detailed on the Plans.
- D. Reinforcement:
 - 1. Comply with ASTM A185.
- E. Shaft and Eccentric Cone Top Sections:
 - 1. Sections: Reinforced precast or cast-in-place concrete.
 - 2. Joints:
 - a. Lipped male/female.
 - 3. Sleeved to receive pipe conduit and sections.
 - 4. Precast cones shall be a maximum height of 4' as shown on the Plans.
- F. Shape: Cylindrical.
- G. Clear Inside Dimensions:
 - 1. As indicated on Drawings.
- H. Design Depth:
 - 1. As indicated on Drawings.
- I. Clear Cover Opening:
 - 1. As indicated on Drawings.
- J. Pipe Entry: Furnish openings as required.

- K. Structure Joint Gaskets:
 - 1. Comply with ASTM C361/.
 - 2. The manhole barrel and cone joints shall be concrete with a confined "O" ring, neoprene gasket in accordance with the latest ASTM Specification C-443
 - 3. In addition to the neoprene gasket, each joint shall be buttered prior to assembly with an approved joint compound such as "DeWitt's No. 10," Duraseal 3101, Pioneer 301, or equal compound. The excess shall be removed from the inside and some excess shall be troweled on the outside. The inside joints shall be troweled full of "Preco-Patch," or equal.
- L. Factory Testing:
 - 1. Hydrostatic testing required for precast bases and manhole barrel sections and joints in accordance with ASTM C497 (latest edition).
 - 2. The hydrostatic factory test pressure shall be 13 psi.
 - 3. Factory hydrostatic tests shall be performed on linear footage of manhole barrel job lots as follows:
 - a. First test for jobs requiring from 8' to 100' of manholes.
 - b. Second test shall be performed on 101' to 300' lots.
 - c. Third test shall be performed on 301' to 600' lots.
 - d. Fourth test shall be performed on 601' to 1,000' lots.
 - e. Fifth test shall be performed on lots over 1,001'.

2.2 FRAMES AND COVERS

- A. Manufacturers:
 - 1. Syracuse Casting, Pattern 1032.
- B. Description:
 - 1. Material:
 - a. Cast iron.
 - b. Comply with ASTM A48/A48M, Class 30B.
 - 2. Lid:
 - a. Bearing Surface: Machined flat.
 - b. Configuration: Removable.
 - c. Size: As indicated on Plans.
 - d. Lettered and drilled with four ¾" diameter vent holes as shown on the Plans.
 - 3. Sizing: As indicated on Plans.

2.3 RISER RINGS

- A. Riser Rings:
 - 1. Thickness of 4 to 6 Inches:
 - a. Precast concrete.
 - b. Comply with ASTM C478.
 - c. Maximum of two rings allowed for a maximum of 12" of concrete adjusting rings for future grade adjustment.
 - 2. Joints shall be made with an approved cement mortar.
 - 3. Rubber Seal:
 - a. Cretex External Rubber chimney Seal or approved equal.
 - b. Band Widths: Comply with ASTM C877, Type III.

- c. Cone/Riser Ring Joint: Minimum 3-inch overlap.
- d. Frame/Riser Ring Joint: 2-inch overlap.
- e. Additional Bands: Overlap upper band by 2 inches.
- 4. Refer to Manhole Detail(s) on Contract Plans.

2.4 MATERIALS

- A. Bedding and Backfill:
 - 1. Bedding: As indicated on plans.
 - 2. Compacted Select Material as specified in Section 310516 - Aggregates for Earthwork.
 - 3. Soil Backfill from Above Pipe to Finish Grade:
 - a. Soil Type S2, as specified in Section 310513 - Soils for Earthwork.
 - b. Subsoil: No frozen earth, or foreign matter, or rocks more than 6 inches in diameter.

2.5 ACCESSORIES

- A. Joint Sealant: Comply with ASTM C990.
- B. Fasteners: Galvanized steel; ASTM F1554.
- C. Concrete: As specified in Section 033000 - Cast-in-Place Concrete.
- D. Grout: As specified in Section 036000 – Grouting.

2.6 FINISHES

- A. Bitumastic Exterior Manhole Coating:
 - 1. RC-30 Bitumen Black as manufactured by Midland Asphalt, 640 Young, Tonawanda, NY, 716-692-0730, or approved equal.
 - 2. Number of Coats: 2 minimum.
 - 3. Total DFT: 24-28 mils (12-14 mils per coat).
 - 4. Apply per manufacturer's instructions.
- B. Steel Galvanizing:
 - 1. Hot-dip galvanize after fabrication.
 - 2. Comply with ASTM A123/A123M.

2.7 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.
- B. Certificate of Compliance:
 - 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
 - 2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that items provided by other Sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location and are ready for roughing into Work.
- C. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- B. Coordinate placement of inlet and outlet pipe or duct sleeves as required by other Sections.
- C. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.
- D. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.
- B. Correct over-excavation as indicated on Plans.
- C. Remove large stones or other hard matter impeding consistent backfilling or compaction.
- D. Protect manhole from damage or displacement while backfilling operation is in progress.
- E. Excavating:
 - 1. As specified in Section 312000 - Excavation and in indicated locations and depths.
 - 2. Provide clearance around sidewalls of manhole or structure for construction operations and granular backfill.
 - 3. If ground water is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.
 - 4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as approved by Architect/Engineer.
- F. Base and Alignment:
 - 1. Install manholes supported at proper grade and alignment on support system as indicated on Drawings.
 - 2. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour as indicated on Drawings.

3. Form and place manhole or structure cylinders plumb and level, to correct dimensions and elevations.
- G. Attachments:
1. Cut and fit for pipe, conduit and sleeves.
 2. Set cover frames and covers level to correct elevations without tipping.
- H. Backfilling: As specified in Sections 310513 - Soils for Earthwork (Not-in-Contract), 310516 - Aggregates for Earthwork, and 312323 - Fill. Backfill around pipes at manholes shall be carefully tamped.
- I. Coating: Paint exterior with two coats of bituminous exterior coating at rate of 50 to 60 sq. ft/gal. for each coat.
- J. Precast Concrete Manholes:
1. Lift precast components at lifting points designated by manufacturer.
 2. When lowering manholes into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
 3. Assembly:
 - a. Assemble multisection manholes and structures by lowering each section into excavation.
 - b. Install rubber gasket joints and joint compound between precast sections according to manufacturer recommendations.
 - c. Lower, set level, and firmly position base section before placing additional sections.
 4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
 5. Maintain alignment between sections by using guide devices affixed to lower section.
 6. Joint sealing materials may be installed on Site or at manufacturer's plant.
 7. Verify that installed manholes meet required alignment and grade.
 8. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
 9. Where the sewer configuration is a single sewer aligned straight through the manhole, run pipe through the structure as indicated on Drawings. Pour the concrete benchwork and cut out top of the pipe as indicated on the Drawings.
 10. Where the pipe invert configuration is other than that stated in paragraph J.9, pour the concrete bench and shape the channel(s) as required, and as shown on the Drawings.
 11. Rotate cone/flat top sections to maximize location of the frame and cover outside of the concrete sidewalks.
- K. Poured-in-Place Bases:
1. The concrete for poured-in-place bases shall reach a 4000 psi minimum compressive strength at 28 days. A minimum of two (2) test cylinders shall be taken for the base pour. One cylinder shall be tested at 7 days and the other at 28 days. Two copies of the test reports shall be submitted to the Engineer within 5 days of testing, which will be done in accordance with the latest ASME Standards.

- L. Doghouse Manholes and Structures:
 - 1. Stake out location and burial depth of existing sewer line in area of proposed manhole or structure.
 - 2. Carefully excavate around existing sewer line to adequate depth for foundation slab installation.
 - 3. Protect existing pipe from damage.
 - 4. Cut out soft spots and replace with granular fill compacted to 95 percent maximum density.
 - 5. Bear firmly and fully on compacted crushed stone bedding.
 - 6. Install precast concrete or construct cast-in-place concrete manhole or structure around existing pipe according to applicable Paragraphs in this Section.
 - 7. Grout pipe entrances as specified in Section 036000 - Grouting.
 - 8. Block upstream flow at existing manhole or structure with expandable plug.
 - 9. Use hydraulic saw to cut existing pipe at manhole or structure entrance and exit and along pipe length at a point halfway up OD on each side of pipe.
 - 10. Bottom half of pipe is to remain as manhole flow channel.
 - 11. Saw cut to smooth finish with top half of pipe flush with interior of manhole or structure.
 - 12. Grout base of manhole or structure to achieve slope to manhole or structure channel as specified in Section 033000 - Cast-in-Place Concrete and trowel smooth.
- M. Sanitary Manhole Drop Connections:
 - 1. All drop connection(s) shall be constructed inside the manhole structure. Refer to Detail(s) on Contract Plans.
 - 2. Form channel from pipe drop to sweep into main channel at maximum angle of 30 degrees.

3.4 FIELD QUALITY CONTROL

- A. Testing:
 - 1. Cast-in-Place Concrete: As specified in Section 033000 - Cast-in-Place Concrete.
- B. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

END OF SECTION 330561

SECTION 333100 – DOMESTIC WATER/PRIVATE FIRE SERVICE MAINS

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 water-distribution piping and specialties from the source of potable as indicated on the plans.
 - 1. Water services.
 - 2. Fire-service mains.
 - 3. Combined water service and fire-service mains.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 31 Section "Earthwork for Utilities" for excavation and backfill required for service piping and structures.

1.3 DEFINITIONS

- A. Combined Water Service and Fire-Service Main: Exterior water piping for both domestic-water and fire-suppression piping.
- B. Fire-Service Main: Exterior fire-suppression-water piping.
- C. Fire-Suppression-Water Piping: Interior fire-suppression-water piping.
- D. Water-Distribution Piping: Interior domestic-water piping.
- E. Water Service: Exterior domestic-water piping.
- F. The following are industry abbreviations for plastic materials:
 - 1. PE: Polyethylene plastic.
 - 2. PP: Polypropylene plastic.
 - 3. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Piping specialties.
 - 2. Valves and accessories.
 - 3. Water meters and accessories.
 - 4. Backflow preventers and assemblies.

- 5. Fire hydrants.
- 6. Underground warning tape.
- B. Shop Drawings: For the following:
 - 1. Precast concrete vaults, including frames and covers, and ladders.
- C. Field Quality-Control Test Reports: From Contractor.
- D. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition include the following:
 - 1. Water meters.
 - 2. Valves.
 - 3. Backflow preventers.
 - 4. Fire hydrants.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of piping and specialties and are based on the specific system indicated.
- B. Regulatory Requirements:
 - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- F. NSF Compliance:
 - 1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.

- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

- 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:
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.

1.8 COORDINATION:

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, Class 52 with mechanical-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.
 - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, Class 52 with push-on-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.
 - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.

2.4 JOINING MATERIALS

- A. Transition Couplings:
 - 1. Underground Piping, NPS 2 and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
 - 2. Aboveground (or Vault) Piping: Pipe fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.5 CORROSION-PROTECTION ENCASEMENT FOR PIPING

- A. Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch minimum thickness, tube or sheet.

2.6 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves:
 - 1. Manufacturer[s] subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco
 - b. Grinnell Corporation; Mueller Co.; Water Products Div. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - c. McWane, Inc.; Kennedy Valve Div.

2. Nonrising-Stem, Resilient-Seated Gate Valves: AWWA C509, gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - a. Minimum Working Pressure: 200 psig.
 - b. End Connections: Mechanical joint.
 - c. Interior Coating: Complying with AWWA C550.
3. OS&Y, Rising-Stem, Resilient-Seated Gate Valves: AWWA C509, cast-iron or ductile-iron body and bonnet, outside screw and yoke; with bronze or gray or ductile-iron gate, resilient seats, and bronze stem.
 - a. Minimum Working Pressure: 200 psig.
 - b. End Connections: Flanged.
4. OS&Y, Rising-Stem Gate Valves: UL 262, FM-approved bronze body and bonnet, outside screw and yoke, and bronze stem.
 - a. Minimum Working Pressure: 175 psig.
 - b. End Connections: Threaded.

2.7 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-Sleeve Assemblies: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.
 1. Manufacturers:
 - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary. East Jordan Iron Works, Inc.
 - b. Grinnell Corporation; Mueller Co.; Water Products Div. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - c. McWane, Inc.; Kennedy Valve Div. McWane, Inc.; M & H Valve Company Div. United States Pipe and Foundry Company.
 2. Tapping Sleeve: Cast- or ductile-iron or stainless steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
 3. Valve: AWWA, cast-iron, nonrising-stem, resilient seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over valve, and approximately 5-inch diameter barrel.
 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

2.8 CHECK VALVES

A. AWWA Check Valves:

1. Manufacturers:
 - a. Conbraco.
 - b. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa). McWane, Inc.; Kennedy Valve Div.
 - c. McWane, Inc.; M & H Valve Company Div. Watts Industries, Inc.; Water Products Div.
2. Check Valves: AWWA C508, swing-check type with 175-psig working-pressure rating and resilient seat. Include interior coating according to AWWA C550 and ends to match piping.

2.9 DETECTOR CHECK VALVES

A. Manufacturers:

1. Ames Co., Inc. (Ductile Iron only)
Conbraco
2. Grinnell Corporation; Mueller Co.; Hersey Meters. McWane, Inc.; Kennedy Valve Div.
3. Watts Industries, Inc.; Water Products Div.

B. Detector Check Valves: UL 312, galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends; designed for 175-psig working pressure. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.

1. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.

C. Detector Check Valves: UL 312, FM-approved detector check, iron body, corrosion-resistant clapper ring and seat ring material, 175-psig working pressure, flanged ends, with connections for bypass and installation of water meter.

2.10 WATER METERS

A. Per City of North Tonawanda requirements.

2.11 BACKFLOW PREVENTERS

- A. Manufacturers:
 - a. Ames Co., Inc. (Ductile Iron Only) Claval Co.
 - b. Conbraco Industries, Inc.
 - c. Grinnell Corporation; Mueller Co.; Hersey Meters. Watts Industries, Inc.; Water Products Div.
 - d. Zurn Industries, Inc.; Wilkins Div.
- B. General: ASSE standard, backflow preventers.
 - 1. Working Pressure: 150 psig minimum, unless otherwise indicated.
 - 2. NPS 2 and Smaller: Bronze body with threaded ends.
 - 3. NPS 2-1/2 and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.
 - a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.
 - 4. Interior Components: Corrosion-resistant materials.
 - 5. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.
 - 6. Strainer: On inlet, if indicated.
- C. Double-Check-Valve Backflow Prevention Assemblies: AWWA C510, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and two positive-seating check valves.
 - 1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.
- D. Double-Check-Valve Backflow Prevention Assemblies: UL 312, FM approved; with two UL 312, FM-approved, iron-body, 175-psig working-pressure, flanged-end check valves and two UL 262, FM-approved, iron-body, outside screw and yoke, flanged, 175-psig working-pressure gate valves.
 - 1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

2.12 CONCRETE VAULTS

- A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
- B. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
- C. Manhole: ASTM A 536, Grade 60-40-18, ductile-iron, 36-inch minimum-diameter traffic frame and cover.

2.13 FREESTANDING FIRE HYDRANTS

- A. Wet-Barrel Fire Hydrants: AWWA C503, one NPS 4-1/2 and two NPS 2-1/2 outlets, NPS 6 threaded or flanged inlet, and base section with NPS 6 mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have 150-psig minimum working-pressure design.
 - 1. Manufacturers:
 - a. Grinnell Corporation; Mueller Co.; Water Products Div. Jones, James Company.
 - b. McWane, Inc.; Clow Valve Co. Div. (Corona). McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - 2. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
 - 3. Operating and Cap Nuts: Pentagon, 1-1/2 inches point to flat.
 - 4. Direction of Opening: Open hydrant valves by turning operating nut to left or counterclockwise.
 - 5. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

2.14 IDENTIFICATION

- A. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION – WATER LINE BURIED BELOW".

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Division 31 Section "Earthwork for Utilities" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
- C. Do not use flanges, unions, or keyed couplings for underground piping.
- D. Flanges, unions, keyed couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground Water-Service Piping: Use any of the following piping materials for each size range:
 - 1. NPS 3 to NPS 15: Ductile-iron, Class 52 with push-on-joint pipe, push-on-joint fittings, and gasketed. .

2. NPS 3 to NPS 15: Ductile-iron, Class 52 with mechanical-joint pipe and mechanical-joint fittings.
- F. Aboveground (and Vault) Water-Service Piping: Use the following piping materials for each size range:
 1. NPS 2-1/2 to NPS 8: Ductile-iron pipe, Class 52 with grooved ends; ductile-iron, grooved-end fittings; ductile-iron keyed couplings; and grooved joints.
- G. Underground Fire-Service-Main Piping: Use the following:
 1. NPS 3 to NPS 15: Ductile-iron, Class 52 with push-on-joint pipe, push-on-joint fittings, and gasketed. .
 2. NPS 3 to NPS 15: Ductile-iron, Class 52 with mechanical-joint pipe and mechanical-joint fittings.
- H. Aboveground (and Vault) Fire-Service-Main Piping: Ductile-iron pipe, Class 52 with grooved ends; ductile-iron, grooved-end fittings; ductile-iron keyed couplings; and grooved joints.
- I. Underground Combined Water-Service and Fire-Service-Main Piping: Use the following:
 1. NPS 3 to NPS 15: Ductile-iron, Class 52 with push-on-joint pipe, push-on-joint fittings, and gasketed. .
 2. NPS 3 to NPS 15: Ductile-iron, Class 52 with mechanical-joint pipe and mechanical-joint fittings.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FM, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient seated gate valves with valve box.
 2. Use the following for valves in vaults and aboveground:
 - a. Gate Valves, NPS 3 and Larger: AWWA, C500 cast iron, OS&Y double disc, bronze disc and seat rings.
 3. Detector Check Valves: Use for water-service piping in vaults and aboveground to detect unauthorized use of water.

3.4 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
 1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.

2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with keyed couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.

3.5 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- C. Comply with NFPA 24 for fire-service-main piping materials and installation.
 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- E. Bury piping with depth of cover over top at least 54 inches, with top at least 12 inches below level of maximum frost penetration.
- F. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.6 ANCHORAGE INSTALLATION:

- A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 2. Fire-Service-Main Piping: According to NFPA 24.
- B. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. UL/FM Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

- C. Detector Check Valves: Install in vault or aboveground.

3.8 DETECTOR CHECK VALVE INSTALLATION

- A. Install detector check valves for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
- B. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

3.9 WATER-METER INSTALLATION

- A. Install water meters, piping, and specialties according to utility company's written requirements.

3.10 BACKFLOW-PREVENTER INSTALLATION:

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers with relief drain in vault or other space subject to flooding.
- C. Do not install bypass piping around backflow preventers.
- D. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.11 VAULT INSTALLATION

- A. Install precast concrete vaults according to ASTM C 891.

3.12 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
- C. AWWA-Type Fire Hydrants: Comply with AWWA M17.
- D. UL/FM-Type Fire Hydrants: Comply with NFPA 24.

3.13 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) or 50 psi (3.5 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure without loss for 2 hours.
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.14 IDENTIFICATION

- A. Install acid-and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches 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.
- B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel.

3.15 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 - 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or as described below:
- B. At the time of construction place calcium hypochlorite granules in the pipeline at the upstream end of the first section of pipe, at each branch main and at 500 foot intervals in accordance with Table 1 of AWWA C601.

TABLE 1
Ounces of Calcium Hypochlorite Granules
To be Place at Beginning of Main
And at Each 500-ft interval

Pipe Diameter In.	Calcium Hypochlorite Granules Oz.
4	0.5
6	1.0
8	2.0
12	4.0
16 and larger	8.0

- C. After the water line or portion thereof is complete and pressure tested, carefully and thoroughly flush the lines with potable water.
- D. Upon completion of the flushing operation, sterilize the lines using chlorine solution feed machine or other approved equipment to place a hypochlorite solution into the water line and service lines as far as the curb stops. Introduce sufficient chlorine into the lines to produce a chlorine residual

of not less than 25 mg/1. Retain this residual in the lines for not less than 24 hours. At the end of the holding period remove the chlorinated water, thoroughly flush the lines and fill with potable water from the distribution system.

- E. Collect and test water samples from the newly sterilized lines in accordance with the latest edition of standard methods of Examination of Water and Wastewater, for three days for any evidence of contamination.
- F. In the event that the tests show the need for rechlorination, repeat the sterilization procedure as often as may be necessary until satisfactory results are obtained. No additional charge will be approved for rechlorination requirements.
- G. Prepare reports of purging and disinfecting activities.

END OF SECTION 333100

SECTION 333111 - PUBLIC SANITARY SEWERAGE GRAVITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sanitary sewerage piping.
 - 2. Connection to existing manholes.
 - 3. Wye branches and tees.
 - 4. Sanitary laterals.
 - 5. Pipe zone and cover materials.
- B. Related Requirements:
 - 1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches. (Not-in-Contract)
 - 2. Section 310516 - Aggregates for Earthwork
 - 3. Section 312316 –Excavation
 - 4. Section 312323 – Select Granular Materials
 - 5. Section 312333 – Excavation, Backfill and Trenching
 - 6. Section 330130.10 - Mandrel Testing: Deflection testing of plastic sewerage piping.
 - 7. Section 330561 - Concrete Manholes

1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
 - 2. ASTM A123/.
 - 3. ASTM C443/C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 - 4. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 - 5. ASTM C923/C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
 - 6. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³).
 - 7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³).
 - 8. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 9. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 10. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

11. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.3 COORDINATION

- A. Section 013000 - Administrative Requirements: Requirements for coordination.
- B. Notify affected utility companies at least 72 hours prior to construction.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer catalog cuts and other information indicating proposed materials, accessories, details, and construction information.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Test and Evaluation Reports: Submit reports indicating field tests made and results obtained.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record in-place invert elevations and actual locations of pipe alignments and off-sets, wye locations (baseline station and GPS coordinates), location of connection to existing service lateral (baseline station and offset, and GPS coordinates), and manholes (baseline station and offset, and GPS coordinates).
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform Work, as a minimum, according to requirements and standards set forth in the Contract Documents.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum ten years' experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Storage:
 1. Store materials according to manufacturer instructions.
- C. Protection:
 1. Protect materials when set/stored on-site.
 2. Block/band individual and stockpiled pipe lengths to prevent moving.
 3. Provide additional protection according to manufacturer instructions.

1.9 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements and elevations prior to fabrication.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

A. General

1. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61.
2. All polyvinyl chloride pipe, fittings, and accessories must be new materials in first-class condition. Used or recycled materials will not be allowed, regardless of condition.

B. Plastic Pipe:

1. Material: PVC.
 - a. All pipe shall be made from quality PVC resin, compounded to provide physical and mechanical properties that equal or exceed cell class 12454-B or 12364-C compounds, as defined in ASTM D-1784.
2. Comply with ASTM D3034, SDR-35.
3. Inside Nominal Diameter: As indicated on drawings.
4. End Connections: Bell-and-spigot style, with rubber-ring-sealed gasket joint.
5. Fittings: PVC.
 - a. Fittings shall be manufactured to the minimum standards as the pipe, ASTM D-3034 and ASTM F-1336.
 - b. PVC material compounds shall be 12454-B, 12454-C or 13343-C in compliance with ASTM D-1784.
6. Joints:
 - a. Elastomeric gaskets.
 - b. Comply with ASTM F477.
7. The pipe shall be colored green for in-ground identification as sewer pipe.
8. The pipe shall be clearly marked with nominal pipe size, cell classification, SDR number, PVC Sewer Pipe and ASTM Designation.

2.2 MANHOLES

- A. As specified in Section 330561 - Concrete Manholes.

2.3 FLEXIBLE COUPLINGS

A. Manufacturers:

1. Fernco Inc.
2. Substitutions: Not Permitted.

2.4 FLEXIBLE PIPE BOOTS FOR MANHOLE PIPE ENTRANCES

A. Manufacturers:

1. Press-Seal Corporation, A-Lok Products, or approved equal.

- B. Flexible Pipe Boot: ASTM C923, ethylene propylene rubber (EPDM), stainless steel clamp and stainless steel hardware.

2.5 CONCRETE ENCASEMENT AND CRADLES

- A. Concrete:
 - 1. As specified in Section 033000 - Cast-in-Place Concrete.
 - 2. Strength: 4,000 psi at 28 days.
 - 3. Finish: Rough troweled.

2.6 MATERIALS

- A. Pipe Zone and Cover:
 - 1. Pipe Zone: As specified in Section 310516.
 - 2. Cover: As specified in Section 310516.
 - 3. Soil Backfill from Above Pipe to Finish Grade:
 - a. For untraveled areas, as specified in Section 310513 - Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter. (Not-in-Contract)
 - b. For travelled areas, as specified in Section 310516 – Aggregates for Earthwork.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut and excavation base is ready to receive Work of this Section.
- B. Verify that excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

- A. Correct over-excavation with coarse aggregate or lean concrete.
- B. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities, and appurtenances.
- D. Utilities:
 - 1. Maintain profiles of utilities.
 - 2. Coordinate with other utilities to eliminate interference.
 - 3. Notify Engineer if crossing conflicts occur.

3.3 INSTALLATION

- A. Bedding:
 - 1. Excavate pipe trench in accordance with Section 312333.
 - 2. Excavate to lines and grades shown on Drawings.
 - 3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.

4. Provide sheeting and shoring in accordance with Section 312333.
5. Placement:
 - a. Place bedding material at trench bottom.
 - b. Level materials in continuous layer not exceeding 6-inch compacted depth.
 - c. Compact to 95 percent of maximum density.
- B. Piping:
 1. Install pipe, fittings, and accessories according to ASTM D2321 and seal joints watertight.
 2. Lay pipe to slope gradients or invert elevations noted on drawings.
 3. Begin at downstream end of system and progress upstream.
 4. Assemble and handle pipe in accordance with manufacturer's instructions except as modified on the Drawings or by Engineer.
 5. Keep pipe and fittings clean until work is completed and accepted by Engineer. Cap open ends during periods of work stoppage.
 6. Lay bell and spigot pipe with bells upstream.
 7. Polyethylene Pipe Encasement: AWWA C105.
 8. Install ribbon tape continuous over top of pipe, above pipe line; coordinate with Section 312323 and 312333.
- C. Manholes: As specified in Section 330561 - Concrete Manholes.
- D. Connections to Existing Manholes:
 1. Drilling:
 - a. Core drill existing manhole to clean opening.
 - b. Use of pneumatic hammers, chipping guns, and sledge hammers are not permitted.
 2. Install watertight neoprene gasket and seal with nonshrink concrete grout.
 3. Encasement:
 - a. Remove and replace concrete base/invert as required to complete this work.
 - b. Use epoxy binder between new and existing concrete.
 4. Prevent construction debris from entering existing sewer line when making connection.
- E. Wye Branches and Tees:
 1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
 2. Use standard fittings of same material and joint type as sewer main.
 3. Maintain minimum 5-foot separation distance between wye connection and manhole.
 4. Use insertion type connection, Fernco Quik Seal, Inserta Tee, or approved equal with stainless-steel clamps for taps into existing piping.
 5. Install as per requirements and instructions of manufacturer.
 6. Lay out holes with template, and cut holes with mechanical cutter.
 7. Records:
 - a. The location of wye branches, tee branches and riser pipes along with laterals shall be measured from the last downstream manhole and in addition, shall be located on a sketch by the use of at least two ties to the corners of the house or GPS coordinates. Such records shall identify the house and laterals by house number; the records shall be kept by the

Contractor with three copies delivered to the Engineer within one day after installation. Each record of a wye branch, tee branch, riser pipe or house lateral shall be on a separate sheet. This information shall be transferred to the as-built tracings by the Contractor.

- F. Sanitary Laterals:
 - 1. Construct laterals from wye/tee branch to right-of-way and reconnect to existing lateral as detailed on drawings.
 - 2. Where depth of main pipeline warrants, construct riser-type laterals from wye/tee branch.
 - 3. Laterals shall be 6 inch diameter, at depths of cover matching existing conditions.
- G. Backfilling:
 - 1. Backfill around sides and to top of pipe with pipe zone material, and granular cover fill in minimum lifts of 6 inches.
 - 2. Tamp fill in place, and compact to 95 percent of maximum density.
 - 3. Place and compact material to avoid damage to pipe and prevent pipe misalignment.
 - 4. Maintain optimum moisture content of bedding material as required to attain specified compaction density.

3.4 SANITARY SEWER TESTING REQUIREMENTS

- A. Requirements
 - 1. After backfilling and prior to the final acceptance of the project, the Contractor will be required to perform the following four tests on all sewers built under this project:
 - a. Air Tests
 - b. Infiltration or Exfiltration
 - c. Deflection Test (8" Diameter)
 - 2. No more than 1,000 linear feet of installed sewer shall be allowed to remain untested.
 - 3. The Contractor's testing procedures shall be completed in accordance with OSHA Standards for confined space entry. The Contractor will be required to provide and operate all equipment necessary for full compliance with his operation. Equipment such as gas detectors, safety harnesses, ventilating blowers, respirators etc. shall be provided by the Contractor.
- B. Air Tests (Required for all diameters up to and including 36") 10 State Standards Section, 33.94
 - 1. This test shall be performed no earlier than 14 calendar days after the trenches are backfilled.
 - 2. The procedure for air testing shall be as specified herein. The minimum allowable time for the test pressure to decrease from 3.5 psi to 3.0 psi shall be not less than as called for in the following table:

Minimum Acceptance Times* For Length Shown (min:sec)

Pipe Diameter	Up to 100'	100 - 200'	200 - 300'	300 - 400'
6"	2:50	2:50	2:50	2:51
8"	3:47	3:47	3:48	5:04
12"	5:40	5:42	8:33	11:24
15"	7:05	8:54	13:21	17:48
18"	8:30	12:49	19:14	25:38
21"	9:55	17:27	26:11	34:54
24"	11:24	22:48	34:11	45:35
27"	14:25	28:51	43:16	57:42
30"	17:48	35:37	53:25	71:13
33"	21:33	43:56	64:38	86:10
36"	25:39	51:17	76:55	102:34

*Inspector will extend time to the next full minute during the test.

3. Pipe lines in sizes up to 36 inches in diameter can be air tested from manhole to manhole for distances not to exceed 400 feet.
4. In wet trenches where pumping to lower water table is impractical, approved 4" diameter, solid PVC drainpipe (with approved cap) shall be placed at each manhole to extend from a point 6 inches below the lowest invert to the top of the ground. Embed the pipe a minimum of 12" into clean #1 stone. Ground water elevations will be measured at each manhole in order to calculate the groundwater pressure acting on the pipe exterior. The initial air test pressure shall be increased as necessary to overcome the calculated groundwater pressure.
5. The testing procedures outlined shall be strictly adhered to.
6. All testing equipment shall be supplied by the Contractor and be in good working condition. Some of the major equipment required for air tests is:
 - a. Stop watch graduated in tenths of a second.
 - b. Compressor of 50 to 100 psi capacity.
 - c. Bulkheads for pipe.
 - d. Approximately 100 feet of 3/8" diameter air hose.
 - e. Pressure gauge – 0 to 5 psi graduates in 1/16th of a pound increments.
 - f. Three 3/8 inch diameter check valves.

C. Infiltration Tests (Applicable Only if Ground Water is Two Feet Above the Top of the Pipe)

1. This test shall be performed no earlier than 14 calendar days after the trenches are backfilled.
2. Infiltration tests for all sewers constructed under this project shall not exceed 100 gallons per inch diameter per mile of sewer, per 24 hours. Each individual run of sewer (from one manhole to the next manhole if greater than 100 feet) shall comply with the allowable rate of infiltration. All equipment for the tests shall be furnished by the Contractor and be in good working condition.
3. The allowable rate of infiltration given in gallons per mile is not to be construed as a commitment on the part of the District to accept an entire line, where overall infiltration is less than the allowable, while one or more runs contribute excessive infiltration.

4. The infiltration test is intended to measure the water tightness of a sewer as related to the infiltration of ground water and is only applicable if the water table level is 2 feet or higher above the top of the pipe for the entire length of the test section.
 - a. Approved 4" diameter solid PVC drain pipe (with an approved cap) shall be placed at each manhole to extend from a point 6 inches below the lowest invert to the top of the ground. Embed the pipe a minimum of 12" into clean #1 stone. Ground water elevations will be measured at each manhole so that the ground water level can be correlated with the infiltration measurements.
 - b. Before conducting the tests, the water table should be allowed to stabilize at its normal level and verified that it is 2 feet above the top of the pipe during the test period. The test is usually conducted between adjacent manholes with the upstream end of the sewer bulkheaded in a suitable manner to isolate the test section. All service laterals, stubs and fittings should be properly plugged or capped at the connections to the test pipe section to prevent the entrance of ground water at these locations.
 - c. A V-notch weir or other suitable measuring device should be installed in the inlet pipe of the downstream manhole. Infiltrating water is then allowed to build up and level off behind the weir until a steady, uniform flow occurs over the weir. Leakage is determined by direct reading from graduations on the weir consecutively for five (5) days and converting the flow quantity to gallons per unit length of pipe per unit of time.
 - d. An important factor in applying the test criteria is to properly correlate the variable water head over the length of the sewer being tested to the high ground water level. A minimum of 2 feet of water over the pipe is required at the upper manhole before the infiltration test will be allowed.

D. Exfiltration Tests

1. This test shall be performed no earlier than 14 days after the trenches are backfilled.
2. The exfiltration test for all diameter sewers shall be as described below. Although actual infiltration will normally be less than that indicated by the water exfiltration test, the test does not provide a positive means of subjecting the completed sewer system to an actual pressure test. Since sanitary sewers are not designed or expected to operate as a pressure system, care must be exercised in conducting the test and correlating the results with the allowable exfiltration limits.
 - a. The test is usually conducted between adjacent manholes. Prior to the test, all service laterals, stubs and fittings within the test section should be plugged or capped and adequately braced or blocked to withstand the water pressure resulting from the test.
 - b. If manholes are to be included in the test, the inlet pipe to each manhole should be bulkheaded and the test section filled with water through the upstream manhole. To allow air to escape from the sewer, the flow should be at a steady rate until the water level in the upstream manhole provides an average pressure of 5 psi (11.6' head) at the center point of the test section or the upstream manhole is filled. If necessary, provisions should be made to bleed off entrapped air during the filling of the test section.
 - c. Once the test section is filled, the water should be allowed to stand for an adequate period of time (one day minimum) to allow for water absorption by the pipe and manhole. After water absorption has stabilized, the water level in the upstream manhole is brought up to the proper test level and

this level established by measuring down from the manhole rim or other convenient datum point. After 24 hours, the water elevation should be measured from the same reference point and the loss of water during the test period calculated, or the water can be restored to the level existing at the beginning of the test, and the amount added used to determine the leakage.

- d. To exclude both manholes from the test, it is necessary to bulkhead the outlet pipe of the upstream manhole. Provision must be made in the bulkhead for filling the pipe and expelling trapped air.
 - e. The water level at the upstream manhole shall be computed and varies above the top of the pipe. Since the sewer is installed on a grade, the test section downstream will most likely be subjected to a greater pressure. Therefore, the test pressure head at the upstream manhole should be adjusted such that the maximum pressure on the pipe being tested is no greater than 10 psi, (23 feet of head).
3. When a sewer run between two consecutive manholes or chambers is found to exfiltrate at a rate above the allowable, inspection by television or other cameras may be made by the Contractor during wat weather, so that the defective section of sewer can located and repaired. Each individual run of sewer (from one manhole to the next manhole) shall comply with the allowable rate of infiltration of 100 gallons per inch diameter per mile of sewer per 24 hours.

E. Deflection Test

- 1. This test shall be performed no earlier than 30 calendar days after the trenches are backfilled.
- 2. All flexible (PVC) sewers 8" diameter or larger constructed under the project shall be internally checked with a five percent (5%) deflection "go-no-go pig" or Mandrel to determine if the pipes are deflecting excessively. Any section of pipe unable to pass the deflection test "pig test" shall be removed and replaced at the Contractor's expense.
- 3. Deflection testing mandrels or pig shall be pulled through the pipe by hand operated winch. Power winches or drives are not permitted.

3.5 SEPARATION OF SEWERS AND WATER MAINS

A. General

- 1. According to the recommended Standards for Wastewater Facilities, most recent Edition, also referred to as 10 States Standards, Section 38 "Protection of Water Supplies", the following general restrictions apply to the design and construction of sanitary sewers, force mains, and manhole structures:
 - a. Cross-connection is prohibited.
 - b. Minimum horizontal separation, set by State, County, and Local Regulatory Agencies, of sanitary collection/conveyance facilities, and public water supply wells and waterworks facilities are required. In case(s) involving application of this standard, soil condition data is also required to be documented.
 - c. Horizontal and vertical separation of 10 LF and 18-inches respectively are the general standards.
 - d. Sewer manholes/structures shall not be constructed with a water main running through or contact of the main and structure.

- e. Without relief and approval of the governing agency, the work must be installed according to these standards.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 – Quality Requirements: Requirements for inspecting and testing.
- B. Deflection Test: Test in accordance with Section 330130.10.
- C. Request inspection prior to and immediately after placing bedding.
- D. Compaction Testing: In accordance with ASTM D1557.
- E. When tests indicate Work does not meet specified requirements, remove work, replace and retest.
- F. Frequency of Compaction Tests: As directed by Engineer.

3.7 PROTECTION

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
- B. Cap or bulkhead open ends of piping during periods of Work stoppage.

END OF SECTION 333111

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Cleanouts.
3. Area Drains.

1.2 RELATED DOCUMENTS

- A. Reference city details and specifications for storm utility connections.
- B. See Civil Engineering drawings for pipe, fittings, and area drain materials, installation requirements.
- C. See SECTION 312000 "Earth Moving" for excavation, trenching, and backfilling specified.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
1. Storm Manholes: Include plans, elevations, sections, details, frames, and covers.
 2. Catch basins. Include plans, elevations, sections, details, frames, covers, and grates.

1.4 SUBMITTALS

- A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. See Civil Engineers drawings for pipe and fittings materials, installation requirements.

2.2 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty, and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.3 AREA DRAINS

- ### A. Area Drains: See Civil Engineers drawings for area drain materials and installation requirements.

PART 3 - EXECUTION

3.1 EARTHWORK

- #### A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- #### A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- #### B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- #### C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- #### D. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- #### E. Install gravity-flow, nonpressure drainage piping according to the following:
1. Install piping pitched down in direction of flow.
 2. Install piping restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 3. Install piping with 36-inch minimum cover.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the Civil Engineers drawings.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 AREA DRAIN INSTALLATION

- A. Set frames and grates to elevations indicated.

3.6 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains.
- B. Make connections to existing piping and storm manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to storm manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, storm manhole, or structure

wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping, storm manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
 5. Connection to any existing piping and storm manholes shall be approved by the municipality.

3.8 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 1. Use warning tape or detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.9 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 334100

SECTION 334600 - SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Perforated-wall pipe and fittings.
2. Geotextile filter fabrics.

1.2 ACTION SUBMITTALS

A. Product Data: For geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Perforated PE Pipe and Fittings: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

2.2 SOIL MATERIALS

- A. Soil materials are specified in Section 312000 "Earth Moving."

2.3 WATERPROOFING FELTS

- A. Material: Comply with ASTM D 226, Type I, asphalt-saturated organic felt.

2.4 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
- B. Structure Type: Nonwoven, needle-punched continuous filament.
1. Survivability: AASHTO M 288 Class 2.
 2. Styles: Flat and sock.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
- H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- I. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- J. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.3 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
 - 1. Foundation Subdrainage: Install piping level and with a minimum cover of 36 inches unless otherwise indicated.

2. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.
 3. Lay perforated pipe with perforations down.
 4. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install thermoplastic piping according to ASTM D 2321.

3.4 PIPE JOINT CONSTRUCTION

- A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.
- B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.5 BACKWATER VALVE INSTALLATION

- A. Comply with requirements for backwater valves specified in Section 334100 "Storm Utility Drainage Piping."
- B. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.
- C. Install horizontal backwater valves in piping in manholes or pits where indicated.

3.6 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 334100 "Storm Utility Drainage Piping."
- B. Cleanouts for Foundation and Retaining-Wall Subdrainage:
1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 2. In vehicular-traffic areas, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches deep. Set top of cleanout flush with grade.
 3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, deep. Set top of cleanout 1 inch above grade.
 4. Comply with requirements for concrete specified in Section 033000 "Cast-in-Place Concrete."

3.7 CONNECTIONS

- A. Comply with requirements for piping specified in Section 334100 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to solid-wall-piping storm drainage system.
- C. See civil engineering Drawings for storm service connections.

3.8 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
 - 2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.
- B. Drain piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.9 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600

SECTION 337183 - PIPING SPECIALTIES AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Specified
 - 1. CONTRACTOR shall provide all labor, materials, equipment, tools, services, and incidentals necessary to furnish and install piping specialties and accessories as shown, specified and required. Included, but not limited to the following: couplings, repair clamps, joint clamps, service saddles, service fittings, water meter fittings, tile set, corporation stops, curb stops, and curb boxes.
- B. Related Work Specified Elsewhere
 - 1. Section 312323 - Select Granular Materials
 - 2. Section 312333 - Excavation, Backfill and Trenching
 - 3. Section 330110.58 - Testing and Disinfection
 - 4. Section 330505 – Buried Piping Installation

1.2 QUALITY ASSURANCE

- A. Manufacturer's Qualifications
 - 1. Manufacturer shall have a minimum of 5 years of experience in the production of substantially similar types of piping specialties specified and shall show evidence of satisfactory service in at least 5 installations.
 - 2. Parts Interchangeability: It is the intent of these specifications that all materials furnished herein shall be compatible with similar materials of other manufacturers.
- B. Reference Standards
 - 1. AWWA C104, Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water
 - 2. AWWA C115, American National Standard for Flanged Ductile-Iron Pipe with Ductile-Iron Pressure Pipe and Fittings
 - 3. AWWA C301, Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
 - 4. AWWA C600, Standard for Installation of Ductile-Iron Watermains and Their Appurtenances
 - 5. AWWA C605, Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
 - 6. AWWA C651, Standard for Disinfecting Watermains
 - 7. AWWA C800, Underground Service Line Valves and Fittings
 - 8. AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch Through 12-inch for Water Distribution
 - 9. ASTM A536, Standard Specification for Ductile Iron Castings
 - 10. ASTM B92, Specification for Standard Size Seamless Copper Pipe
 - 11. ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings
 - 12. ASTM D2000, Standard Classification System for Rubber Products in Automotive Applications
 - 13. NSF/ANSI Standard 61

14. Underwriter's Laboratories (UL)
15. International Organization for Standardization (ISO)
16. Factory Mutual Research Corporation
17. 1996 Safe Drinking Water Act

1.3 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
 1. Manufacturer's literature, illustrations, specifications, detailed drawings, data and descriptive literature on all piping specialties.
 2. Deviations from Drawings and Specifications.
 3. Engineering data including dimensions, materials, size and weight.
 4. Fabrication, assembly, installation and wiring diagrams.
- B. Operation and Maintenance Data: Submit complete manuals including:
 1. Copies of all Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information.
- C. Certificates:
 1. Where specified or otherwise required by ENGINEER, submit test certificates.
 2. The CONTRACTOR shall submit certificates of compliance with the applicable referenced standards.
 3. Submit certificate of compliance with NSF/ANSI Standard 61 for all products under this section, including interior coatings, by an independent, authorized laboratory.
- D. Delivery Tickets:
 1. Furnish delivery tickets indicating the manufacturer, accessory type and class, identifying that the equipment was new and from a manufacturer that has been submitted and approved.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. During delivery and handling, all materials shall be braced and protected from any distortion or damage; any such distortion or damage shall be basis for rejection of the materials.
- B. Handle all materials very carefully. Materials which are cracked, dented or otherwise damaged will not be accepted.
- C. The materials shall be inspected before and after unloading. Materials that are found to be cracked, gouged, chipped, dented or otherwise damaged will not be accepted.
- D. Interiors of pipe, fittings and accessories shall be kept free from dirt and foreign matter.
- E. Store piping specialties and accessories on heavy wood blocking or platforms as necessary so they are not in contact with the ground.
- F. Pipe, fittings, and specials shall be unloaded as necessary opposite to or as close to the place where they are to be used as is practical to avoid unnecessary handling.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General

1. All products, including interior coatings shall be suitable for use in a potable water system.
2. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61.
3. All piping specialties and accessories must be new materials in first-class condition. Used or recycled materials will not be allowed, regardless of condition.

B. Couplings

1. Sleeve Type, Flexible Couplings:
 - a. Material: Steel, with epoxy coated sleeve.
 - b. Gasket: Manufacturer's standard best quality for the service intended.
 - c. Bolts and Nuts: Buried or submerged couplings shall be provided with Type 304 stainless steel or fluorocarbon coated bolts and nuts.
 - d. Couplings shall be designed for a working pressure and field hydrostatic test pressure as identified in Section 330505, Buried Piping Installation.
 - e. Harnessing:
 - 1) Harness couplings to restrain pressure piping. Couplings shall be designed for a working pressure and field hydrostatic test pressure as identified in Section 330505, Buried Piping Installation.
 - 2) Adjacent flanges shall be tied with bolts of corrosion resistant alloy steel. Provide flange mounted stretcher bolt plates and lugs as required and to be designed by coupling manufacturer, unless otherwise approved.
 - 3) Conform to dimensions, size, spacing and materials for lugs, bolts, washers and nuts as recommended by manufacturer and approved by ENGINEER for the pipe size, wall thickness and test pressure required. However, the following minimum bolting shall be provided if not specifically stated by the ENGINEER.

Pipe Diameter (In.)	Minimum Number of Bolts	Bolt Diameter (In.)	At (Degrees)
4	2	$\frac{5}{8}$	180
6-8	2	$\frac{3}{4}$	180
10-12	2	$\frac{7}{8}$	180
14-20	4	1	90
24-48	4	$1\frac{1}{2}$	90

- f. Remove pipe stop unless otherwise shown or specified.
- g. Couplings 16-inches to 24-inches shall be furnished as long laying lengths of 16-inches. Couplings over 24-inches shall be furnished as 10-inch lengths.
- h. Manufacturer:
 - 1) Dresser Industries, Style 138, for sizes up to 12-inches,

- 2) Dresser Industries, Style 38, for sizes over 12-inches,
 - 3) Smith-Blair, Type 411, (or type 441 where specified),
 - 4) Or approved equal.
 2. Hymax Coupling:
 - a. Material: Center sleeve shall be fabricated of high strength carbon steel tubing. Compression end rings to be either one bolt or two fabricated of carbon steel.
 - b. Gasket: Two layered gaskets of which the inner ring is removable to expand the range of the coupling. Material shall be EPDM according to NSF61.
 - c. Bolts and Nuts: Buried or submerged couplings shall be provided with type 304 stainless steel. Bolts to be coated with an anti-seize coating to prevent galling.
 - d. Coating: Interior and exterior shall be provided with NFS-61 approved fusion bonded epoxy coating.
 - e. Harnessing: as specified herein.
 - f. To be used only when approved by ENGINEER.
 - g. Manufacturer:
 - 1) Dresser Industries Style 262 for sizes up to 12-inches,
 - 2) Or approved equal.
- C. Flanged Coupling Adapter
 1. The body shall be ductile iron conforming to ASTM A536. The bolt circle, bolt size, and spacing shall conform to AWWA C115 flange drilling.
 2. The follower gland shall be ASTM A536 ductile iron.
 3. Gaskets and "O" rings shall be grade 30 standard.
 4. Nuts and bolts shall be fluorocarbon coated or Type 304 stainless steel, high strength, low alloy.
 5. Provide fusion bonded epoxy coating on the gasket ring and shop prime enamel on the body.
 6. Flange coupling adapter shall not be provided with anchor studs, which are not allowed.
 7. Flange coupling adapter shall be suitable for use on ductile or cast iron pipe to the outside diameter specified.
 8. Flange coupling adapters shall be restrained as shown, specified, or required.
 9. Manufacturer:
 - a. Smith-Blair, Style 912,
 - b. Dresser, Style 128,
 - c. Ford FFCA,
 - d. Hymax 2100,
 - e. Or approved equal.
 - f. Restrained Flanged Adapter
 10. Restraint shall be accomplished by use of a gland that incorporates wedges that increase their resistance to pull out as pressure or external forces increase.
 11. The restrained flange adapter shall be comprised of two rings made of ductile iron conforming to ASTM A536.
 12. The restraining ring shall be suitable for flanges conforming to AWWA C115 flange drilling.
 13. Nuts and bolts shall be fluorocarbon coated or Type 304 stainless steel, high strength, low alloy.

14. Torque limiting twist off nuts shall be used to insure the proper actuation of the wedges. When the nut is sheared off, a standard hex head shall remain.
 15. Provide fusion bonded epoxy coating on the gasket ring and shop primer on the body.
 16. Restrained flange adapter shall be suitable for use on ductile iron pipe.
 17. Manufacturer:
 - a. EBAA Iron, Series 2100 Megaflange,
 - b. Or approved equal.
- D. Repair Clamps
1. Repair clamps shall be full circle, 18-8 type 304 stainless steel single band provided in minimum length of 12-inches unless otherwise specified. Bands are to be single section for sizes to 12 inches and double sections for sizes over 12 inches.
 2. Nuts and bolts shall be Type 304 stainless steel or fluorocarbon coated.
 3. Ductile iron lugs shall be field removable.
 4. Repair clamps with a separate keeper bar will not be accepted nor repair clamps with two bolts on a 7.5 inch full circle clamp.
 5. Grade 60 gasket.
 6. When ordered, provide tapped repair clamps with stainless steel outlet taps for corporation stops in CC (AWWA) thread.
 7. Manufacturer:
 - a. Smith-Blair, Style 226, for sizes to 12 inches,
 - b. Smith-Blair, Style 227, for sizes over 12 inches,
 - c. Smith-Blair, 238 and 239 for tapped clamps,
 - d. Dresser, Style 360,
 - e. Ford, Style F1, for sizes to 12 inches,
 - f. Ford, Style F2, for sizes over 12 inches,
 - g. Or approved equal.
- E. Joint Clamps
1. Joint clamps shall be furnished to permanently stop or prevent leaks through the jointing materials of bell and spigot joints.
 2. Clamp shall be fully adjustable to provide a close fit on the bell and spigot and shall be designed to be installed on pipes without interruption of water service.
 3. Manufacturers standard rubber gasket shall shut the leak off when compressed by the spigot ring drawn up, in turn, by bolts connected to a bell ring.
 4. Manufacturer:
 - a. Smith-Blair, Style #274,
 - b. Dresser, Style 160,
 - c. Or approved equal.
- F. Valve Boxes
1. Valves installed in the ground shall be equipped with an adjustable screw type valve box, minimum 1 foot adjustment.
 2. The valve box shall have a barrel with a base to fit the valve on which it is to be installed.
 3. Valve boxes for gate valves shall be three piece screw type, 5-1/4" shaft with No. 6 base and a valve box cover.
 4. Valve boxes for butterfly valves shall be two piece screw type, 5-1/4" shaft, with integrated base and a valve box cover.

5. Valve boxes shall be high quality cast-iron castings suitable for HS-20 loadings.
 6. All valve box parts must be compatible and interchangeable with Buffalo Pipe and Foundry Corp. valve boxes.
 7. Valve box covers shall be marked "water" and shall fit properly in the barrel without movement.
 8. Manufacturer:
 - a. Bibby-LaPerle, (Figure V619 for gate, V652 for butterfly valves),
 - b. Bass & Hays, BH39605,
 - c. Tyler Union - a division of McWane, Inc. (6860 for gate, 6850 for butterfly valves),
 - d. Sigma
- G. Insulation
1. Materials
 - a. Watermain, valves, water service piping and fittings and other appurtenances installed where depth of bury is less than 54 inches (4 feet, 6 inches) or where shown on the drawings, shall be fully wrapped with a closed cell polystyrene insulation.

2.2 PAINTING

- A. Shop Painting
1. Clean and prime coat ferrous metal surfaces.
 2. All interior wetted ferrous surfaces of valves and appurtenances except finished or bearing surfaces shall be shop-painted with an approved epoxy paint system certified to NSF/ANSI Standard 61 for potable water and applied in accordance with the paint system manufacturer's recommendations.
 3. Coat machined, polished and non-ferrous surfaces including gears, bearing surfaces and similar unpainted surfaces with corrosion prevention compound listed in NSF/ANSI Standard 61 and applied in accordance with the manufacturer's recommendations. Maintain coating during storage and until equipment begins operation.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install piping specialties and accessories as shown on the Drawings and in accordance with the applicable requirements of Section 330505, Buried Piping Installation.

END OF SECTION 337183