PROJECT MANUAL

Including Bid Documents & Contract Documents for Construction of

REPUBLIC PARKS
AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SAPP DESIGN ARCHITECTS

SAPP DESIGN ASSOCIATES ARCHITECTS, INC.
3750 SOUTH FREMONT AVENUE
SPRINGFIELD, MISSOURI 65804
PHONE: (417) 877-9600
FAX: (417) 877-9696

January 18, 2023

SDA PROJECT NO. 21-1013 **SET NO._____**

SECTION 00002 - PROJECT DIRECTORY

Owner:	City of Republic 711 E. Miller Rd. Republic, MO 65738
Owner's Representatives:	Jared Keeling, Asst. City Administrator and Parks & Recreation Director
Architect:	Sapp Design Associates Architects, Inc. 3750 South Fremont Avenue Springfield, Missouri 65804 417-877-9600 Contact: Kristi Beattie, AIA, NCARB Ashley Everett, AAIA
Structural Engineer:	J&M Engineering 3045 S. Kansas Expressway Springfield, Missouri 65807 417-708-9315 Contact: Ben Jennings, P.E.
MEP Engineer:	Interpres Building Solutions 1201 S. Campbell Ave. Springfield, Missouri 65807 417-631-4895 Contact: Tanner Dowling, P.E.
Aquatics Consultant:	Aquatic Design Consultants 33400 Cold Water Rd. Louisburg, KS, 66053 913-937-0025 Contact: Kevin McElyea, P.E.
Landscape Architect:	SWT Design 7722 Big Bend Blvd. St. Louis, MO 63119 314-644-5700 Contact: Scott Runde, PLA, AICP, ASLA
Civil Engineer:	Olsson, Inc 550 St. Louis Street Springfield, Missouri 65806 417-890-8802 Contact: Ricky Haase, P.E.

END OF PROJECT DIRECTORY

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000004 - REGISTRANTS

The personal seal of the registered Architect of Record or each shown Engineer shall be the legal equivalent of his signature whenever and wherever used, and the owner of the seal shall authenticate this sheet and the specification sections pertaining to this sheet. Responsibility shall be disclaimed for all other plans, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part or parts of this project.

Those sections each discipline is responsible for shall be as listed alongside seal of same.

SEAL

Ricky Gene Haase, Civil Engineer
MO # PE-2019017828

CIVIL ENGINEER OF RECORD
Olsson, Inc.
550 St. Louis St.
Springfield, Missouri 65806
417-890-8802
Missouri State Certificate of Authority #001592

Sections: 311000, 312000, 321216, 321313, 321373, 331100, 334100.

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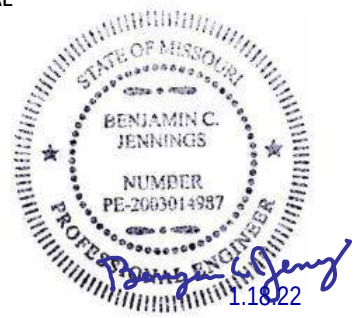

Ben Jennings, Structural Engineer
MO# E-2003014987

STRUCTURAL ENGINEER OF RECORD
J&M Engineering (MO CofA: 2011011004)
3045 S Kansas Expressway
Springfield, MO 65807
417-708-9315
Missouri State Certificate of Authority # 2004004242

Sections: 033000, 042200 ,051200, 051210

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

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SEAL

Tanner Dowling, P.E.
MO # PE-2013008868

MEP ENGINEER OF RECORD
Interpres Building Solutions
1201 S. Campbell Ave.
Springfield, Missouri 65807
417-631-4895
Missouri State Certificate of Authority # 2013013378

All of Divisions 22, 23, & 26

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SEAL

1-18-2023

Scott E. Runde, Landscape Architect
MO # LA-201403230

LANDSCAPE ARCHITECT OF RECORD
SWT Design
7722 Big Bend Blvd.
St. Louis, Missouri 63119
314-644-5700 #
Missouri State Certificate of Authority #2006002904

Sections: 133123, 323113, 323223, 328400, 329113, 329200, 329300.

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SEAL

Kevin M. McElyea, PE Engineer
MO # E-2000147814

Kevin M. McElyea, **ENGINEER OF RECORD**
Aquatic Design Consultants, Inc.
33400 Cold Water Rd.
Louisberg, KS, 66053
913-937-0025
Missouri State Certificate of Authority #E-2000147814

Sections: 10537, 131500, 131510

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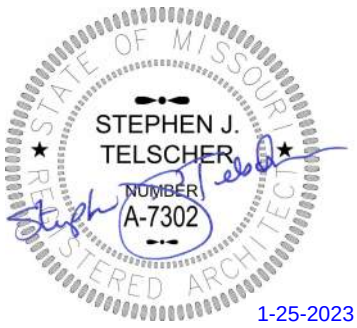
SEAL



Stephen J. Telscher, Architect
MO # A-7302

ARCHITECT OF RECORD
Sapp Design Associates, Architects
3750 S. Fremont, Springfield, MO 65804
417-877-9600
Missouri State Certificate of Authority # 000607

Sections: 024119, 042612, 042613, 051210, 061053, 061600, 071113, 072100, 072726, 074113, 074213, 076200, 079200, 081113, 087100, 088000, 095113, 099000, 102800.

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SECTION 000007 – NOTICE TO BIDDERS

Sealed bids for the Republic Aquatic Center Expansion are requested as follows:

The project consists of construction of a Lazy River at the Republic Aquatic Center, which will include a new Pool House with a filter room. The work consists of, but is not limited to, selective demolition of trees, site work, new construction for lazy river and pool house, concrete, standing seam metal roof, unit masonry and masonry veneer, aluminum framed storefront, electrical, mechanical, plumbing, and landscaping. The project is located at 711 E. Miller Rd., Republic, Missouri 65738 in **Greene County**, Missouri. Missouri Prevailing Wage Rates will apply to the work.

Sealed bids shall mailed or delivered to Assistant City Admin. & Parks and Recreation Director, Mr. Jared Keeling**, at Fire Station 1, 701 US-60, Republic, MO 65738** OR may be hand-delivered to Mr. Keeling at the bid opening meeting no later than **March 7th, 2023 at 2:00 p.m.**; bids will be opened and tabulated in a public bid opening to be held on that date and time **at Fire Station 1,** at the address above. Bidders shall submit a bid in conformance with the Instructions to Bidders in the Project Manual.

The Contractor's company shall have been in business for at least five (5) consecutive years under the current name and ownership and shall be financially sound and solvent. The Company shall have successfully completed projects of similar size and scope. Submission of AIA Form 305, Contractor's Statement of Qualifications shall be submitted to the Architect **no later than 5:00 pm, on February 17th, 2023**, see Section 000500.

To assist in determining whether or not the Pool Contractor's skill and experience satisfies the pre-qualification requirements, any Pool Contractor wanting to be pre-qualified to bid the pool portion of the project to General Contractors shall fully complete the Pool Contractor's Pre-Qualification form, see Section 000510. Pool Contractor Pre-Qualification Information Form and Swimming Pool References must be submitted to the Architect **no later than 5:00pm, on February 17, 2023.** Pool Contractors approved by this process will be confirmed by addendum prior to bid. Only Pool Contractors approved by addendum shall be allowed to bid the project to the General Contractors.

Digital Plans and Specifications for the project will be available for non-refundable purchase after **February 2nd, 2023**, from Engineers Reprographics; 417-869-2222; www.erdigital.com Printed plans and specifications will not be available except through non-refundable purchase. Postage and handling for printed and mailed sets must be arranged and paid for by the receiver. Questions regarding online viewing and purchasing digital or printed plans and specs should be directed to Engineers Reprographics, 1600 E. St. Louis Street, Springfield, Missouri, 65802; 417-869-2222. Questions regarding the Project should be directed to Sapp Design Associates Architects, 3750 S. Fremont Ave., Springfield, Missouri, 65804, 417-877-9600.

Bid Bond: Each bid proposal shall be accompanied by a 5% bid security in the form of a cashier's check, a certified check, or a bid bond executed by the bidder and Surety Company. See Instructions to Bidders for more information. Surety/Bonding Company must be acceptable to the Owner and be authorized to transact business in the State of Missouri.

The Owner reserves the right to accept or reject any or all bids and may waive any or all informalities in the bid process. The Owner's decision regarding the approval/denial of bids are based on various factors such as, but not limited to, quality, time constraints, and service. All decisions will be in the best interest of the City and shall be final. No bids may be withdrawn for a period of Forty-five (45) days subsequent to the specified time for receipt of bids. Bidder and any subcontractors must follow and enforce all requirements of Missouri's Prevailing Wage Laws. The City of Republic, Missouri is an Equal Opportunity Employer and encourages bids from qualified small, minority-owned, and women-owned business enterprises.

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A Pre-Bid Conference is scheduled for **2:00pm on Thursday, February 13th, 2023, at the Republic Rec Center at 711 E. Miller Rd., Republic, MO** , with a tour of the site following the Conference. (Access to the Site will be limited to the day of the Pre-Bid Conference.) It is highly recommended that any Contractor submitting a bid be in attendance at the Pre-Bid Meeting due to the complexities of this project. Lack of attendance will be a consideration in evaluation of qualifications and bids and lack of attendance may be cause for rejection of bid. Due to the nature and scope of this work, each bidder shall fully inform him/herself prior to bidding as to existing conditions and limitations under which the Work is to be performed. No allowance will be made to a bidder because of lack of such examination or knowledge.

Summary of dates:

Pre-bid:	**Monday, February 13, 2023 @ 2:00pm – at the Republic Rec Center Community room**
Qualifications due:	**Friday, February 17, 2023**
Pool Qual. due:	**Friday, February 17, 2023**
Bid Opening:	**Tuesday, March 7, 2023 @2:00pm – at Fire Station 1, 701 US-60, Republic, MO**
Council approval:	**Tuesday, March 21, 2023 (TENTATIVE)**

END OF SECTION 000007

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
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SECTION 000100 – INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 THE WORK

A. The project consists of construction of a Lazy River at the Republic Aquatic Center, which will include a new Pool House with a filter room. The work consists of, but is not limited to, selective demolition of trees, site work, new construction for lazy river and pool house, concrete, standing seam metal roof, unit masonry and masonry veneer, aluminum framed storefront, electrical, mechanical, plumbing, and landscaping. The project is located at 711 E. Miller Rd., Republic, Missouri 65738 in Greene County, Missouri. Missouri Prevailing Wage Rates will apply to the work.

B. All work is indicated in the drawings and specifications. Laborers performing work at the site for this project must be paid no less than the prevailing wages, (including fringe benefits) as established in wage determinations issued by the Department of Labor and Industrial Relation of the State of Missouri. Bidder and any subcontractors must follow and enforce all requirements of Missouri's Prevailing Wage Laws.

C. See Section 000950 “Miscellaneous Provisions & Compliance with Laws.”

D. Bidders are required to carefully review description of work by Owner (Section 011000).

1.2 SECURING DOCUMENTS

A. Copies of the proposed Contract Documents may be obtained as follows:

1. Digital Plans and Specifications for the project will be available for non-refundable purchase after **February 2, 2023**, from Engineers Reprographics; 417-869-2222; www.erdigital.com.
2. Printed plans and specifications will not be available except through non-refundable purchase.
3. Postage and handling for printed and mailed sets must be arranged and paid for by the receiver.
4. Questions regarding online viewing and purchasing digital or printed plans and specs should be directed to Engineers Reprographics, 1600 E. St. Louis Street, Springfield, Missouri, 65802; 417-869-2222.
5. Questions regarding the Project should be directed to Sapp Design Associates Architects, 3750 S. Fremont Ave., Springfield, Missouri, 65804, 417-877-9600.

1.3 BID FORM

A. In order to receive consideration, make bids in strict accordance with the following:

1. Make bids upon the forms provided herein, properly signed and with all items filled out. Do not change the wording of the bid form, and do not add words to the bid form. Unauthorized conditions, limitations, or provisions attached to the bid will be cause for rejection of the bid. If alterations by erasure or cross-out are made for any reason, explain over such erasure or cross-out with a signed statement from the bidder.
2. No telegraphic or facsimile bid or modification of a bid will be considered. No bids or corrections to bids received after the time fixed for receiving them will be considered. Late bids will be returned to the bidder unopened.
3. Address bids to the Owner and deliver to the address given in the Notice to Bidders on or before the day and hour set for opening the bids. Enclose each bid in a sealed envelope bearing the title of the Work, the name of the bidder, and the date and hour of the bid opening. Submit only the original signed copy of the bid. It is the sole responsibility of the bidder to see that his bid is received on time.
    a. See Article 19 “Preparation of Proposals.”

1.4 EXAMINATION OF DOCUMENTS AND SITE OF WORK

A. Before submitting a bid, each bidder shall examine the Drawings carefully, shall read the Specifications and all other proposed Contract Documents, and familiarize themselves with the site and existing conditions of the Work. Each bidder shall fully inform him/herself prior to bidding as to existing conditions and limitations under which the Work is to be performed and shall include in his/her bid a sum to cover the cost of items necessary to perform the Work as set forth in the proposed Contract Documents. No allowance will be made to a bidder because of lack of such examination or knowledge. The submission of a bid will be considered as conclusive evidence that the bidder has made such examination.

B. **Pre-Bid Conference**: Attendance by General Contractors at the Pre-Bid Conference as set in the Notice to Bidders is recommended for any Contractor submitting a bid for the work. Lack of attendance will be a consideration in evaluation of qualifications and bid and may be cause for rejection of bid.

C. **Notice:** Drawings are not set up specifically according to trade and each Contractor and Sub-Contractor or trade is required to review **all** the drawings as a whole and provide any misc. items, materials, work, etc. required to complete the work as shown on **all** the documents for the project the Contractor is submitting a bid on for a complete and operational system. This requirement applies to all trades. All work including but not limited to Structural, Mechanical, Electrical and Plumbing requirements and related work are indicated throughout the set of drawings and should be reviewed with **all** the drawings for overall scope of work.

1.5 QUALIFICATION REQUIREMENTS

A. All General Bidders are required to submit Contractor's Qualification Statements as set forth in Section 000500 of the Project Manual. Bidders Financial Statement is **only required upon request** of the Owner.

1.6 All General Bidders are required to submit Pool Contractor's Pre-Qualification form as set forth in Section 000510 of the Project Manual.

1.7 WITHDRAWAL OF BIDS

A. A bidder may withdraw his bid, either personally or by written request, at any time prior to the scheduled time for opening bids.

B. No bidder may withdraw his bid for a period of thirty (30) calendar days after the date set for opening thereof, and bids shall be subject to acceptance by the Owner during this period.

1.8 AWARD OR REJECTION OF BIDS

A. **General**: The Contract, if awarded, will be awarded to the most responsible bidder who has proposed the best bid complying with the terms set forth herein and in the interest of the Owner, and subject to the Owner's right to reject any or all bids and to waive informality and irregularity in the bids and in the bidding. The Contract Sum may be determined by the sum of the base bid and any, all, or none of the bid alternates, in any order which the Owner may choose to add to the base bid. Owner reserves the right to show preference in selection of best bid criteria to more local and or regional firms in evaluation of bids.

B. **Right to Reject Proposals:** The Owner reserves the right to waive minor technicalities; to reject any or all bids and award to the remaining lowest, responsive, and responsible Bidder; or to resubmit Invitation for Bids to the same or other persons; whichever may be in the Owner's best interest.

C. **Bidders Qualifications:** Award of Contract will be made to a bidder who is experienced and qualified in similar size and types of projects, with a history of successful projects completed on time and with supportive references. A history of poor performance, poor quality workmanship, legal claims, dissatisfied referrals, and other anomalies may constitute grounds for disqualification and rejection of

bid. A bidder who is unable to demonstrate ability, and/or history to manage and complete the project, according to the Contract, may be disqualified and have their bid rejected.

1.9 EXECUTION OF AGREEMENT

A. The form of Agreement, which the successful bidder will be required to execute, is included in this Project Manual.

B. The Bidder to whom the Contract is awarded shall, within ten (10) calendar days after notice of award and receipt of Agreement forms from the Owner, sign and deliver required copies to the Owner.

C. At, or prior to, delivery of the signed Agreement, the bidder to whom the Contract is awarded shall submit to the Owner those Certificates of Insurance required by the Contract Documents and such Labor and Materials Payment Bonds and Performance Bond as are required by the Owner.

D. Bonds and Certificates of Insurance shall be approved by the Owner before the successful bidder may proceed with the Work. Failure to provide Bonds or Certificates of Insurance in a form satisfactory to the Owner shall subject the successful bidder to loss of time from the allowable construction period equal to the time of delay in furnishing the required material. Refusal of successful bidder to provide bonds or certificates of insurance that is satisfactory to the Owner shall be cause for disqualification from this project.

1.10 INTERPRETATION OF CONTRACT DOCUMENTS PRIOR TO BIDDING

A. If any person contemplating submitting a bid for construction of the Work is in doubt as to the true meaning of any part of the proposed Contract Documents, or finds discrepancies in, or omissions from, any part of the proposed Contract Documents, he must submit to the Architect a request for interpretation thereof not later than five days before bids will be opened. The person submitting the request shall be responsible for its prompt delivery.

B. Interpretation or correction of proposed Contract Documents will be made only by Addendum and will be mailed or delivered to each general contract bidder of record. The Owner will not be responsible for any other explanations or interpretations of the proposed Contract Documents. Bidders are not at liberty to assume that a discrepancy or conflict thereby voids or omits any item entirely from the Contract.

C. Discrepancies, conflicts, ambiguities, and errors, which may have more than one interpretation, require that the Architect make the interpretation per General Conditions of the contract. **Per Contract, the default position shall be the more restrictive and/or more costly interpretation,** unless a formal interpretation is rendered by the Architect, by addendum, or in writing, if occurrence is after bidding.

1.11 CONSTRUCTION TIME AND LIQUIDATED DAMAGES

A. Time: The Contract requires the project be Substantially Completed no later than date stated in Bid Form as time is of the essence.

1. In order to achieve completion date, the Bidder must anticipate and include any additional or special efforts which he may deem necessary to complete the work in the specified time.

B. Commencement: The date on which on-site construction begins shall be coordinated by the successful General Contractor with the Owner, based on lead times, critical path, and required completion date. (The project completion date shall be as noted on the bid form.) The Notice to Proceed will include the agreed upon construction start date. It is reasonably expected that a Contract will be awarded and signed within Ten (10) calendar days of bid opening, but no later than 21 days. At the Owner's discretion, failure of the Contractor to initiate a Contract within 10 days of the date of bid opening may constitute cause for rejection of bid and forfeiture of the bid bond (see paragraph 19 below).

C. Liquidated damages will be assessed at the rate of $**1,000.00** per day after specified Contract Completion date for each portion or phase of the work as an assessed value for real damages the Owner may incur

resulting from the work or specified portions of the work not being substantially complete by the date of Substantial Completion established in the Contract.

D. Weather Days: The Substantial Completion date includes an allowance for inclement weather, see Supplemental Conditions, and as stipulated in the bid form. (See Supplemental Conditions - Section 000800).

1.12 BONDS

A. Bid security in the amount stated in the Notice to Bidders must accompany each bid. The successful bidder's security will be retained until he has signed the Contract and has furnished the required Certificates of Insurance.

B. The Owner reserves the right to retain the security of all bidders until the successful bidder enters into the Contract or until 30 days after bid opening, whichever is sooner. Bid Securities will be returned as soon as practicable. (If the Bidder of Award fails to execute a contract for this project, the owner may retain his bid security as liquidated damages but not as a penalty).

C. Prior to signing the Contract, the Owner shall require the successful bidder to secure and post a Labor and Materials Payment Bond and a Performance Bond, each in the amount of 100% of the Contract Sum. Such bonds shall be issued by Surety acceptable by the Owner. Surety / Bonding Company must be authorized to transact business in the State of Missouri and be listed on the Treasury Department's most current list (Circular 570 as amended).

D. Labor and Materials Payment Bond shall contain a rider specifying the payment of wages in accordance with the Missouri Division of Labor Standards.

1.13 TAX EXEMPT

A. Sales Tax Exemption Procedure: Pursuant to the provisions of RSMo Section 144.062, the Owner will exercise their tax-exempt status and require that the Bid Amount NOT include sales tax on materials. Any materials the Contractor wishes to exempt sales tax from may be purchased by the Contractor/Sub-contractor by authorization from the Owner via a Project Exemption Certificate, which will be provided by the Owner. The Contractor does <u>not</u> have to submit separate pay-direct invoices. The Exemption Certificate became law in August of 1994 and is the preferred method. The Contractor and Sub-contractors are obligated to become familiar with the new accounting procedures, responsibilities, and tax law liabilities.

1.14 WAGE RATES

A. Prevailing Wage Rates: See Sections 009000.

1. This Project is subject to Missouri Prevailing Wage Laws, Rates and Procedures as applicable and required. The Project is located in **Greene County, Missouri**.

1.15 REVISED STATUTES AND REGULATIONS

A. Compliance with Missouri Revised State Laws and Regulations and Federal Laws are required, also see Section 000950 for additional Miscellaneous Provisions and Compliance with Laws.

1.16 ASBESTOS

A. No asbestos products are permitted and certification of same may be required upon request. See "Summary of Work" Section 011000.

1.17 GEOTECHNICAL REPORT

A. A geotechnical report is available. See Geotechnical Engineering Report, Section 018000.

1.18 MATERIALS AVAILABILITY

A. Prior to bidding, the Contractor shall confirm that all major materials, suppliers and subcontractors which may impact the critical path of the Construction Schedule are able to be delivered and/or provided such that the project schedule and substantial completion date are not adversely affected. The Contractor shall immediately notify the Architect of any such conflicts and adversities, prior to issuance of final addendum prior to bidding. The Contractor bears sole and full responsibility for compliance with terms of the contract for time and completion, (except as such terms may be modified by contract modification procedures upon timely notification by the Contractor).

1.19 SUB-CONTRACTOR LISTING

A. See Section 000430 for required submission of major sub-contractors.

1.20 PREPARATION OF PROPOSALS

A. Bidders shall submit a bid, per Instructions to Bidders in the Project Manual.

B. All proposals must be properly signed and sealed and submitted as set forth in the Notice to Bidders. Each Bidder shall specify in his proposal, in figures, the lump sum price or the unit price for each of the separate items listed in the proposal. The proposal shall not contain interlineations, alterations, or erasures except as noted in Paragraph below. The Bidder shall show the products of the respective unit prices and quantities in the amount column provided for that purpose. These extensions shall be totaled and in case of errors or discrepancies in extensions, the unit prices shall govern. All entries on the proposal form shall be in ink or typed. All errors in extensions or totals will be corrected by the Owner and such corrected extensions and totals will be used in comparing bids.

C. All proposals shall be submitted without modification or reservation on the proposal form with each space properly filled. Proposals not on this form will be rejected.

D. All proposals shall be accompanied by a bid bond, executed by the Bidder and a duly authorized surety company, certified check, or cashier's check made unconditionally payable to the **City of Republic,** in the amount as set forth in the official advertisement for bid. Failure of the Contractor to submit the full amount required shall be sufficient cause to reject his bid. The Bidder agrees that the proceeds of the cashier’s check, draft or bond shall become the property of the Owner if for any reason the Bidder withdraws his bid after closing or if on notification of award refuses or is unable to execute tendered contract, provide an acceptable performance and payment bond and provide evidence of required insurance coverage within ten (10) consecutive calendar days after such tender. It is further agreed that, if a contract is not awarded, or if a Contract is not initiated at no fault of the Contractor, within forty-five (45) days after the opening of bids, a Bidder may file a written notice with the Owner for the withdrawal of his bid, without forfeiture of the bid bond.

E. **Certification of Not-Excluded from Programs**: The Bidder shall submit with its bid the Certification that it has not been excluded from a federal, state, or local procurement or non-procurement programs. (See Bid Form.)

F. A Bidder may alter or correct a unit price, lump sum bid, or extension entered on the proposal form by crossing out the figure with ink and entering a new unit price, lump sum bid, or extension above or below in ink, and initialing the alteration or correction. If an alteration or correction of a unit price or lump sum bid is **not** initialed, the original unit price or lump sum bid will be assumed to be correct. All corrections must be made before any bids have been opened.

G. No Contractor shall stipulate in his proposal any conditions not contained in the specifications or standard proposal form contained in the contract documents.

H. A bid by an individual, including those doing business under a fictitious name, shall be signed by the individual, and his address shown.

I. A bid by a partnership, including those doing business under fictitious names, or corporations, shall be executed by at least one of the partners followed by the title "Partner," and the business address of the partnership shown. The true legal name and address of each partner shall also be shown.

J. A bid by a joint venture, including those doing business under fictitious names or corporations shall be executed by a duly authorized representative of each entity which is a party to the joint venture. The true legal name and address of each party to the joint venture shall also be shown.

K. A bid by a corporation, whether acting alone or as a joint venture, shall include the address and name of the corporation and shall be signed by a person authorized by its Board of Directors to bind the corporation, with his title shown.

L. The name and address of the Bidder shall be stated the same on all contract documents including the proposal, bid bond, contract, performance bond and insurance policies and certificates.

M. If the successful Bidder is doing business in the State of Missouri under a fictitious name, such Bidder shall furnish to Owner a certified copy of its registration of fictitious name issued by the Secretary of State, State of Missouri. No contract will be executed until such certificate is furnished by the Bidder. If the successful Bidder already has on file with the Owner such a certificate, an additional certificate will not be required.

N. **Certification of Non-Resident/Foreign Contractor:** If the Bidder is a foreign corporation or non-resident Contractor, the Bidder shall submit with its bid and agree to maintain during the life of this contract:

1. A certificate of authority to transact business in the State of Missouri from the Secretary of State, unless exempt pursuant to the provisions of Section 351.570 RSMo.
2. A certificate from the Missouri Director of Revenue evidencing compliance with transient employer financial assurance law, unless exempt pursuant to the provisions of Section 285.230 RSMo.

O. Bids are to be presented in sealed envelopes, which shall be plainly marked with name of project, bid date and bid time and delivered to the place specified in the Notice to Bidders. Bidders shall be responsible for actual delivery of proposals during business hours, and it shall not be sufficient to show that a proposal was dispatched in time to be received before scheduled closing time for receipt of bid.

1.21 NOTICE TO VENDORS and BIDDERS

A. See Section 000950 for Notice to Vendors and Bidders for *Required Affidavit for Contracts over $5,000.00* Within 14 days of award, the General Contractor shall provide a listing of all entities who will be providing services or labor on the project whose agreement is $5,000.00 or over. All listed entities shall comply with attached Notice to Vendors and Bidders.

END OF SECTION 000100

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000310 - BID FORM - REVISED

TO: Mr. Jared Keeling, Asst. City Admin and Parks & Recreation Director
City of Republic
Fire Station 1
701 US-60, Republic, MO 65738.
Republic, Missouri 65738

FROM:_____
(Name of Bidder)

_____
(Address of Bidder)

_____

FOR: **Republic Aquatic Center Expansion**
City of Republic
Republic, Missouri 65738

The undersigned, as Bidder, hereby declares that the only person, or persons interested in the bid as principal or principals, is or are, named herein and that no other person than therein mentioned has any interest in this bid or in the Contract to be entered into; that this bid is made without connection with any other person, company or parties, making a bid, and that it is in all respects fair and in good faith without collusion or fraud.

The Bidder further declares that he has examined the site of the work and informed himself fully in regard to **all** conditions pertaining to the place where the work is to be done and the scope of work required; that he has examined the Drawings and Specifications for the Work and Contractual Documents relative thereto and that he has satisfied himself relative to the Work to be performed.

The Bidder proposes and agrees, if this bid is accepted, to Contract with the Owner, furnishing thereby all services, labor, and material to complete the construction and described requirements of the Drawings, Specifications, and Contractual Documents.

Receipt of the following Addenda to the Contract Documents is acknowledged:

Addendum No.____, Dated_____;
Addendum No.____, Dated_____;
Addendum No.____, Dated_____;

Bidder has attached hereto included the notarized **"Certification of Bidders Non-Excluded from Federal or State Programs"**

List the Pre-qualified Pool Contractor to be utilized on this project:
General Contractors may only utilize Pool Contractors approved by formal addendum. Failure to list an approved Pool Contractor will result in disqualification of the entire bid.

NAME:_____
ADDRESS: _____
PHONE NUMBER: _____

(Fill in both options)

OPTION #1 - SUBSTANTIAL COMPLETION DATE OF MAY 12, 2024:

BASE BID PROPOSAL:

Bidder agrees to perform all related Work of the Plans and Specifications and as stated in "Scope of Services to be Performed" for the sum of:

(WRITTEN)_____

_____(NUMERIC) $_____.

OPTION #2 - SUBSTANTIAL COMPLETION DATE OF JUNE 16, 2024:

BASE BID PROPOSAL:

Bidder agrees to perform all related Work of the Plans and Specifications and as stated in "Scope of Services to be Performed" for the sum of:

(WRITTEN)_____

_____(NUMERIC) $_____.

BID ALTERNATES: (See section 012300)

Alternate No. 1: **DUAL WATERSLIDE**
DEDUCT:
(WRITTEN)_____

_____(NUMERIC) $_____.

Alternate No. 2: **UV CHAMBER**
DEDUCT:
(WRITTEN)_____

_____(NUMERIC) $_____.

Alternate No. 3: **CONCRETE TERRACE WITH SUNSHADE**
DEDUCT:
(WRITTEN)_____

_____(NUMERIC) $_____.

Alternate No. 4: **POOL HOUSE PERGOLA**
DEDUCT:
(WRITTEN)_____

_____(NUMERIC) $_____.

UNIT PRICES: (See Section 012200)

A. Unit Price No. 1: Site/Earthwork.

a. General excavation and **removal from site** of unclassified material or unsuitable materials. Cost for more or less than that shown on plans. Fill in one price only. $_____/cu.yd.

b. General excavation and **relocation on site** of unclassified material or unsuitable materials. Cost for more or less than that shown on plans. Re-spreading of soil will be required. Erosion control measures will be required. Fill in one price only. $_____/cu.yd.

c. Earth borrow; in place (non-structural) – (from site material) $_____/cu.yd.

d. Earth borrow; in place (non-structural) - (from off-site material) $_____cu.yd.

e. Compacted engineered fill or structural fill; in place - (from site material) $_____/cu.yd.

f. Compacted engineered fill or structural fill; in place - (from off-site material) $_____/cu.yd.

g. Compacted drainage fill, in place (clean ¾" crushed stone). $_____/cu.yd.

h. Compacted granular fill, in place (base rock and gravel). $_____/cu.yd.

i. Price for rock excavation:
   1) Mass Rock $_____/cu.yd.
   2) Footing & Trench Rock less than 10 feet below existing grade. $_____/cu.yd.
   3) Pit Rock $_____/cu.yd.

j. Compacted shot rock, in place (8"- unless otherwise approved by the geotechnical engineer). $_____/cu.yd.

k. Flowable fill, in place. $_____/cu.yd.

COMPLETION DATE: The bidder, if awarded the contract, hereby agrees to commence work under this Contract on or before a date to be specified in a written Notice to Proceed from the Owner and to establish Substantial Completion of all work no later than **May 12, 2024 or June 16, 2024 (to be determined by which Base Bid option is accepted).**
The bidder recognizes that liquidated damages at a rate of $1,000.00 per calendar day thereafter will be assessed for project completion time greater than stated above, except as may be modified per Contract Modification procedures.

CONDITIONS: The above bid shall include all labor, materials and/or services required to do the work as well as profit, overhead, bond premium, etc., to totally cover the finished work called for, all in accordance with the Drawings, Specifications, and other Contract Documents.

Bidder agrees that this proposal, including all alternates, shall remain valid and may not be withdrawn for a period of forty-five (45) calendar days after the scheduled closing time for receiving bids.

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

Bidder hereby acknowledges that the proposal includes all allowances as stipulated in Section 012100 Allowances.

Bidder hereby agrees to, acknowledges and warrants that this proposal fully complies with all conditions and requirements of the bid letting as set forth in the Instruction to Bidders, the Notice to Bidders, the Contract Document, and in accordance with state and local statutes for public bid procedures.

(SEAL - if by corporation)

Respectfully submitted,

_____

_____
Business Address

_____
Bidder License No.

Date: _____, 2023

By_____

Title_____

END OF SECTION 000310

BIDDER'S NOT EXCLUDED FROM FEDERAL OR STATE PROGRAMS

(This CERTIFICATION must be NOTORIZED)

THIS CERTIFICATION MUST BE COMPLETED BY THE BIDDER IF THE ANTICIPATED CONTRACT IS $100,000 OR MORE

The undersigned, an authorized representative of the BIDDER, hereby warrants, represents and certifies that the following statements are correct.

1. That the undersigned has the authority to execute this Certification on behalf of the BIDDER;

2. That the BIDDER has not been excluded from any Procurement and Non-procurement Programs with the United States government as identified by the U.S. General Service Administration Office of Acquisition Policy or from any other state or local governmental agency or department.

The undersigned understands that these representations go to the essence of the bid or proposal and of any resulting contract and that false statements with regard to or actions in violation of these representations, at any time during the bidding process or performance of any other resulting contract, may constitute grounds for disqualification of any bid/proposal or termination of any contract.

_____
Print Name and Title

_____
Signature

Subscribed and sworn to before me this _____day of _____2019.

_____
Notary Public

My Commission Expires:

_____

SECTION 000430 – SUBCONTRACTS AND SUBCONTRACTOR LISTING

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 SUBCONTRACTS

A. **General Contractor shall use standard AIA Form A401 for all subcontracts**. Failure to use such form, and/or use of any other format of subcontract, shall not relieve the Contractor of compliance with all requirements of the Contract with the Owner.

B. Subcontracts shall comply with Article 5 of the General Conditions.

1.3 SUBCONTRACTOR LISTING

A. Bidders are required to declare the major Subcontractors proposed for the Project.

1. Each general contractor submitting a bid on this project shall fill in the List of Subcontractors included in the Form of Bid and **submit this list to the Architect with the bid form.**
   a. One alternate subcontractor may be listed for any item, if the General Contractor has not made a final determination due to outcome of Bid Alternate selections, or if General Contractor has not determined qualifications of first listed subcontractor.
   b. Failure to submit a fully completed list by the time specified may constitute grounds for rejection of bid.
2. Prior to the award of the contract the Architect will notify the bidder in writing of substantial objection to any person or organization on the list submitted with the bid proposal. If the Owner or the Architect has a reasonable and substantial objection to any person or organization the Owner may: (1) require that the other named subcontractor be utilized instead, or (2) require the bidder to submit an acceptable substitute with the difference in cost, if any occasioned thereby. If the bidder submits an acceptable substitute with verifiable evidence of an increase in value by such substitutions, the owner may, at its discretion, (1) accept the original named subcontractor, (2) accept the increased bid price, (3) negotiate an alternative, and mutually agreed upon solution, or (4) disqualify the bidder and release the bid security.
3. Subcontractors and other persons and organizations proposed by the bidder must be used in the work for which they were proposed and shall not be changed except with the written approval of the Owner and Architect. The availability of another subcontractor at a lower cost to the General Contractor after bid opening shall not constitute good cause for such substitution.

1.4 LISTING

A. Please indicate the subcontractors listed below and submit to Architect no later than time specified in Section 1.3.

LIST OF SUBCONTRACTORS:

1. **Pool Subcontractor (must be pre-qualified)** _____

   Address/Phone_____

   _____

   Alternate Subcontractor **(must be pre-qualified)** _____

2. **Concrete Subcontractor**_____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

3. **Earthwork Subcontractor**_____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

4. **Asphalt Subcontractor**_____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

5. **Steel Subcontractor**_____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

6. **Wood Truss Supplier** _____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

   INSTALLERS (if other than above)

   Name & City_____

7. **Masonry Subcontractor**_____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

8. **Roofing Subcontractor**_____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

9. **Suspended Ceilings Subcontractor**_____

   Address/Phone_____

   _____

   Alternate Subcontractor_____

10. **Painting Subcontractor** _____

    Address/Phone_____

    _____

    Alternate Subcontractor_____

11. **Fabric Shade Structure Supplier**_____

    Address/Phone_____

    _____

    Alternate Subcontractor_____

    INSTALLERS (if other than above)

    Name & City_____

12. **Landscaping Subcontractor**_____

    Address/Phone_____

    _____

    Alternate Subcontractor_____

13. **Plumbing Subcontractor**_____

    Address/Phone_____

    _____

    Alternate Subcontractor_____

14. **HVAC Subcontractor** _____

    Address/Phone_____

    _____

    Alternate Subcontractor_____

15. **Electrical Subcontractor**_____

    Address/Phone_____

    _____

    Alternate Subcontractor_____

END OF SECTION 000430

SECTION 000500 – BIDDER'S STATEMENT OF QUALIFICATIONS

A. All bidders shall submit American Institute of Architect's Contractor's Qualifications Statement, AIA Document A305. Qualification statements must be submitted to the Architect no later than **5:00 pm, Friday, February 17, 2023**. This document is included at the end of this section. Failure to submit by time indicated may constitute grounds for rejection of bid.

B. Financial Statements are not required, except upon specific request of the Architect on behalf of the Owner. The Financial Statement therefore will not become a matter of public record and will be reviewed in strictest confidence.

C. Acceptance: Receipt of the Qualification Statement shall in no way constitute acceptance or approval, or acknowledgment that a Contractor is qualified.

END OF SECTION 000500

AIA® Document A305™ – 2020

Contractor's Qualification Statement

THE PARTIES SHOULD EXECUTE A SEPARATE CONFIDENTIALITY AGREEMENT IF THEY INTEND FOR ANY OF THE INFORMATION IN THIS A305-2020 TO BE HELD CONFIDENTIAL.

SUBMITTED BY:
(Organization name and address.)

SUBMITTED TO:
(Organization name and address.)

TYPE OF WORK TYPICALLY PERFORMED
(Indicate the type of work your organization typically performs, such as general contracting, construction manager as constructor services, HVAC contracting, electrical contracting, plumbing contracting, or other.)

THIS CONTRACTOR'S QUALIFICATION STATEMENT INCLUDES THE FOLLOWING:
(Check all that apply.)

[ ] Exhibit A – General Information
[ ] Exhibit B – Financial and Performance Information
[ ] Exhibit C – Project-Specific Information
[ ] Exhibit D – Past Project Experience
[ ] Exhibit E – Past Project Experience (Continued)

CONTRACTOR CERTIFICATION
The undersigned certifies under oath that the information provided in this Contractor's Qualification Statement is true and sufficiently complete so as not to be misleading.

_____ _____
Organization's Authorized Representative Signature **Date**

_____
Printed Name and Title

NOTARY
State of:
County of:
Signed and sworn to before me this day of

_____
Notary Signature

My commission expires:

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

AIA® Document A305™ – 2020 Exhibit A

General Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

§ A.1 ORGANIZATION
§ A.1.1 Name and Location
§ A.1.1.1 Identify the full legal name of your organization.

§ A.1.1.2 List all other names under which your organization currently does business and, for each name, identify jurisdictions in which it is registered to do business under that trade name.

§ A.1.1.3 List all prior names under which your organization has operated and, for each name, indicate the date range and jurisdiction in which it was used.

§ A.1.1.4 Identify the address of your organization's principal place of business and list all office locations out of which your organization conducts business. If your organization has multiple offices, you may attach an exhibit or refer to a website.

§ A.1.2 Legal Status
§ A.1.2.1 Identify the legal status under which your organization does business, such as sole proprietorship, partnership, corporation, limited liability corporation, joint venture, or other.

.1 If your organization is a corporation, identify the state in which it is incorporated, the date of incorporation, and its four highest-ranking corporate officers and their titles, as applicable.

.2 If your organization is a partnership, identify its partners and its date of organization.

.3 If your organization is individually owned, identify its owner and date of organization.

.4 If the form of your organization is other than those listed above, describe it and identify its individual leaders:

§ A.1.2.2 Does your organization own, in whole or in part, any other construction-related businesses? If so, identify and describe those businesses and specify percentage of ownership.

§ A.1.3 Other Information

§ A.1.3.1 How many years has your organization been in business?

§ A.1.3.2 How many full-time employees work for your organization?

§ A.1.3.3 List your North American Industry Classification System (NAICS) codes and titles. Specify which is your primary NAICS code.

§ A.1.3.4 Indicate whether your organization is certified as a governmentally recognized special business class, such as a minority business enterprise, woman business enterprise, service disabled veteran owned small business, woman owned small business, small business in a HUBZone, or a small disadvantaged business in the 8(a) Business Development Program. For each, identify the certifying authority and indicate jurisdictions to which such certification applies.

§ A.2 EXPERIENCE

§ A.2.1 Complete Exhibit D to describe up to four projects, either completed or in progress, that are representative of your organization's experience and capabilities.

§ A.2.2 State your organization's total dollar value of work currently under contract.

§ A.2.3 Of the amount stated in Section A.2.2, state the dollar value of work that remains to be completed:

§ A.2.4 State your organization's average annual dollar value of construction work performed during the last five years.

§ A.3 CAPABILITIES

§ A.3.1 List the categories of work that your organization typically self-performs.

§ A.3.2 Identify qualities, accreditations, services, skills, or personnel that you believe differentiate your organization from others.

§ A.3.3 Does your organization provide design collaboration or pre-construction services? If so, describe those services.

§ A.3.4 Does your organization use building information modeling (BIM)? If so, describe how your organization uses BIM and identify BIM software that your organization regularly uses.

§ A.3.5 Does your organization use a project management information system? If so, identify that system.

§ A.4 REFERENCES

§ A.4.1 Identify three client references:
(Insert name, organization, and contact information)

§ A.4.2 Identify three architect references:
(Insert name, organization, and contact information)

§ A.4.3 Identify one bank reference:
(Insert name, organization, and contact information)

§ A.4.4 Identify three subcontractor or other trade references:
(Insert name, organization, and contact information)

AIA® Document A305™ – 2020 Exhibit B

Financial and Performance Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

§ B.1 FINANCIAL

§ B.1.1 Federal tax identification number:

§ B.1.2 Attach financial statements for the last three years prepared in accordance with Generally Accepted Accounting Principles, including your organization's latest balance sheet and income statement. Also, indicate the name and contact information of the firm that prepared each financial statement.

§ B.1.3 Has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?

§ B.1.4 Identify your organization's preferred credit rating agency and identification information.
(Identify rating agency, such as Dun and Bradstreet or Equifax, and insert your organization's identification number or other method of searching your organization's credit rating with such agency.)

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS

§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

§ B.2.2 In the last five years has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 failed to complete work awarded to it?

.2 been terminated for any reason except for an owners' convenience?

.3 had any judgments, settlements, or awards pertaining to a construction project in which your organization was responsible for more than $75,000?

.4 filed any lawsuits or requested arbitration regarding a construction project?

§ B.2.3 In the last five years, has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management; or any of the individuals listed in Exhibit A Section 1.2:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 been convicted of, or indicted for, a business-related crime?

.2 had any business or professional license subjected to disciplinary action?

.3 been penalized or fined by a state or federal environmental agency?

AIA® Document A305™ – 2020 Exhibit C

Project Specific Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

PROJECT:
(Name and location or address.)

CONTRACTOR'S PROJECT OFFICE:
(Identify the office out of which the contractor proposes to perform the work for the Project.)

TYPE OF WORK SOUGHT
(Indicate the type of work you are seeking for this Project, such as general contracting, construction manager as constructor, design-build, HVAC subcontracting, electrical subcontracting, plumbing subcontracting, etc.)

CONFLICT OF INTEREST
Describe any conflict of interest your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A Section 1.2, may have regarding this Project.

§ C.1 PERFORMANCE OF THE WORK
§ C.1.1 When was the Contractor's Project Office established?

§ C.1.2 How many full-time field and office staff are respectively employed at the Contractor's Project Office?

§ C.1.3 List the business license and contractor license or registration numbers for the Contractor's Project Office that pertain to the Project.

§ C.1.4 Identify key personnel from your organization who will be meaningfully involved with work on this Project and indicate (1) their position on the Project team, (2) their office location, (3) their expertise and experience, and (4) projects similar to the Project on which they have worked.

§ C.1.5 Identify portions of work that you intend to self-perform on this Project.

§ C.1.6 To the extent known, list the subcontractors you intend to use for major portions of work on the Project.

§ C.2 EXPERIENCE RELATED TO THE PROJECT

§ C.2.1 Complete Exhibit D to describe up to four projects performed by the Contractor's Project Office, either completed or in progress, that are relevant to this Project, such as projects in a similar geographic area or of similar project type. If you have already completed Exhibit D, but want to provide further examples of projects that are relevant to this Project, you may complete Exhibit E.

§ C.2.2 State the total dollar value of work currently under contract at the Contractor's Project Office:

§ C.2.3 Of the amount stated in Section C.2.2, state the dollar value of work that remains to be completed:

§ C.2.4 State the average annual dollar value of construction work performed by the Contractor's Project Office during the last five years.

§ C.2.5 List the total number of projects the Contractor's Project Office has completed in the last five years and state the dollar value of the largest contract the Contractor's Project Office has completed during that time.

§ C.3 SAFETY PROGRAM AND RECORD

§ C.3.1 Does the Contractor's Project Office have a written safety program?

§ C.3.2 List all safety-related citations and penalties the Contractor's Project Office has received in the last three years.

§ C.3.3 Attach the Contractor's Project Office's OSHA 300a Summary of Work-Related Injuries and Illnesses form for the last three years.

§ C.3.4 Attach a copy of your insurance agent's verification letter for your organization's current workers' compensation experience modification rate and rates for the last three years.

§ C.4 INSURANCE

§ C.4.1 Attach current certificates of insurance for your commercial general liability policy, umbrella insurance policy, and professional liability insurance policy, if any. Identify deductibles or self-insured retentions for your commercial general liability policy.

§ C.4.2 If requested, will your organization be able to provide property insurance for the Project written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis?

§ C.4.3 Does your commercial general liability policy contain any exclusions or restrictions of coverage that are prohibited in AIA Document A101-2017, Exhibit A, Insurance A.3.2.2.2? If so, identify.

§ C.5 SURETY

§ C.5.1 If requested, will your organization be able to provide a performance and payment bond for this Project?

§ C.5.2 Surety company name:

§ C.5.3 Surety agent name and contact information:

§ C.5.4 Total bonding capacity:

§ C.5.5 Available bonding capacity as of the date of this qualification statement:

AIA® Document A305™ – 2020 Exhibit D

Contractor's Past Project Experience

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

AIA® Document A305™ – 2020 Exhibit E

Contractor's Past Project Experience, Continued

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

SECTION 000510 – POOL CONTRACTOR PRE-QUALIFICATION

Special and specific Pool Contractor qualifications are established for this project to assure quality of pool infrastructure construction. The purpose of such quality assurance for this project is to protect public health, safety, and welfare.

The Pool Contractor (the entity constructing the swimming pool structures, swimming pool plumbing, swimming pool mechanical equipment, and the swimming pool chemical systems) shall possess extensive commercial swimming pool construction skill and experience necessary to perform quality work as solely determined by the Owner. The experience of the Pool Contractor must be specific to the requirements of this project as detailed in the plans and specifications.

It is anticipated that General Contractors will bid this project in its entirety and use subcontractors for various portions of the work. If a subcontractor is utilized as the Pool Contractor then that subcontractor must be pre-qualified by this process and formally approved by the Owner through addendum. If the General Contractor performs the pool construction work then the General Contractor must be pre-qualified by this process and formally approved for the pool construction by the Owner through addendum.

To assist in determining whether or not the Pool Contractor's skill and experience satisfies the pre-qualification requirements, any Pool Contractor wanting to be pre-qualified to bid the pool portion of the project to General Contractors shall fully complete the following pages of the proposal form. Pool Contractor Pre-Qualification Information Form and Swimming Pool References must be submitted to the Architect by ***February 17, 2023.*** Pool Contractors approved by this process will be confirmed by addendum prior to bid. Only Pool Contractors approved by addendum shall be allowed to bid the project to the General Contractors.

General Contractors may only utilize Pool Contractors approved by formal addendum. Failure to list an approved Pool Contractor will result in disqualification of the entire bid.

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

Any Pool Contractor wanting to be considered for pre-qualification approval must submit the following signed forms to beattie@sdaarchitects.com by ***February 17, 2023.*** These forms must be completed by the Pool Contractor. These forms must be complete, truthful, and no alternate forms will be accepted. An addendum prior to the bid date will be issued stating the Pool Contractors that attain pre-qualification approval.

Pool Contractor Pre-Qualification Information Form

Name of Company: _____

Address: _____

_____

Contact Person: _____

Telephone number: _____

The Pool Contractor's Company must have been in the business of building commercial swimming pool construction for at least 5 years. How many years has your company been in the business of commercial swimming pool construction? _____

The Pool Contractor must perform at least 90% of the complete pool construction work (concrete, gunite/shotcrete, steel gutters, plumbing, mechanical, chemical, controls) using their own employees. What percentage of the complete pool construction work will be performed by direct employees of your company if you are selected to construct the pool portions of the Republic Aquatic Center Project? _____

How many full-time employees does your company maintain? _____

How many full-time employees does your company maintain for actual field construction work? _____

The Pool Contractor must be able to provide the General Contractor with a 100% payment and performance bond for the complete pool construction work. Is your company capable of providing such a bond to the General Contractor? ☐ Yes ☐ No

A letter from your company's AAA rated bonding agency stating your ability to provide such a bond specific to this project, tacking into account your current bond obligations, along with a letter from your company stating your willingness to provide said bond must be submitted along with these pre-qualification forms. For purposes of bond calculations you should estimate pool construction amount based on the plans and specifications of this job but in no case shall the calculation used be less than $5.0M. *General Contractors should note that bonding to the City must be 100% by the selected General Contractor.*

List, using the forms on the following pages, a minimum of five (5) commercial swimming pools. Each pool listed must be at least 5,000 square feet of water surface in size. For each swimming pool listed, detail any work performed by other companies. Specifically state the percentage of the complete pool construction work (concrete, gunite, steel, gutters, plumbing, mechanical, chemical, controls) using your own employees.

Pool Contractor must complete all forms on the following pages including the signature page at the end. These forms must be submitted to the Architect by ***February 17, 2023.*** Any Pool Contractors approved by this process will be confirmed by Addendum prior to bid.

Swimming Pool Reference Number 1

Name of Swimming Pool Facility: _____

Swimming Pool Location: _____

Date constructed: _____

Project construction cost: _____

Construction cost of work performed by your company: _____

Owner of facility: _____

Contact person at facility: _____

Facility contact person's address and telephone number: _____

_____

Size of swimming pool water surface: _____

Name of your construction superintendent on job: _____

Is this the construction superintendent proposed for the Republic Aquatic Center Project?
☐ Yes ☐ No

What percentage (based on pool construction dollars) of the complete pool construction work (concrete, gunite, steel, gutters, plumbing, mechanical, chemical, controls) was performed directly by full time employees of your company? _____

Detail any work performed by other companies on this swimming pool project: _____

_____

Swimming Pool Reference Number 2

Name of Swimming Pool Facility: _____

Swimming Pool Location: _____

Date constructed: _____

Project construction cost: _____

Construction cost of work performed by your company: _____

Owner of facility: _____

Contact person at facility: _____

Facility contact person's address and telephone number: _____

_____

Size of swimming pool water surface: _____

Name of your construction superintendent on job: _____

Is this the construction superintendent proposed for the Republic Aquatic Center Project?
☐ Yes ☐ No

What percentage (based on pool construction dollars) of the complete pool construction work (concrete, gunite, steel, gutters, plumbing, mechanical, chemical, controls) was performed directly by full time employees of your company? _____

Detail any work performed by other companies on this swimming pool project: _____

_____

Swimming Pool Reference Number 3

Name of Swimming Pool Facility: _____

Swimming Pool Location: _____

Date constructed: _____

Project construction cost: _____

Construction cost of work performed by your company: _____

Owner of facility: _____

Contact person at facility: _____

Facility contact person's address and telephone number: _____

_____

Name of your construction superintendent on job: _____

Is this the construction superintendent proposed for the Republic Aquatic Center Project?
☐ Yes ☐ No

What percentage (based on pool construction dollars) of the complete pool construction work (concrete, gunite, steel, gutters, plumbing, mechanical, chemical, controls) was performed directly by full time employees of your company? _____

Detail any work performed by other companies on this swimming pool project: _____

_____

Swimming Pool Reference Number 4

Name of Swimming Pool Facility: _____

Swimming Pool Location: _____

Date constructed: _____

Project construction cost: _____

Construction cost of work performed by your company: _____

Owner of facility: _____

Contact person at facility: _____

Facility contact person's address and telephone number: _____

_____

Size of swimming pool water surface: _____

Name of your construction superintendent on job: _____

Is this the construction superintendent proposed for the Republic Aquatic Center Project?
☐ Yes ☐ No

What percentage (based on pool construction dollars) of the complete pool construction work (concrete, gunite, steel, gutters, plumbing, mechanical, chemical, controls) was performed directly by full time employees of your company? _____

Detail any work performed by other companies on this swimming pool project: _____

_____

Swimming Pool Reference Number 5

Name of Swimming Pool Facility: _____

Swimming Pool Location: _____

Date constructed: _____

Project construction cost: _____

Construction cost of work performed by your company: _____

Owner of facility: _____

Contact person at facility: _____

Facility contact person's address and telephone number: _____

_____

Size of swimming pool water surface: _____

Name of your construction superintendent on job: _____

Is this the construction superintendent proposed for the Republic Aquatic Center Project?
☐ Yes ☐ No

What percentage (based on pool construction dollars) of the complete pool construction work (concrete, gunite, steel, gutters, plumbing, mechanical, chemical, controls) was performed directly by full time employees of your company? _____

Detail any work performed by other companies on this swimming pool project: _____

_____

What volume of commercial pool construction work, in dollars, has your company performed in the last 5 years? List only the value performed by your company, not the total value of the projects.

- 2023 to date _____
- 2022 _____
- 2021 _____
- 2020 _____
- 2019 _____
- 2018 _____

Have any of your customers ever used a performance or payment bond or other type of security to complete your work?

☐ Yes ☐ No

If yes, please explain _____

_____

Has your company ever been terminated from a swimming pool related job?

☐ Yes ☐ No

If yes, please explain _____

_____

Has your company ever been involved in a lawsuit involving swimming pool construction or payment to subcontractors or suppliers?

☐ Yes ☐ No

If yes, please explain _____

_____

Has your company ever been denied bonding for a project?

☐ Yes ☐ No

If yes, please explain _____

_____

List all municipal swimming pool construction projects that are ongoing or that your company has completed in the last 5 years.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

I certify that all the information given on the Pool Contractor Pre-Qualification Information Form and Swimming Pool Reference is correct. I understand that any false or misleading information will result in immediate disqualification.

Signature: _____

Date: _____

Company Title: _____

Address: _____

_____

Telephone number: _____

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000600 – FORM OF AGREEMENT: GENERAL CONTRACT

A. The Form of Agreement shall be American Institute of Architects Document A101-2017, Standard Form of Agreement Between Owner and Contractor. A copy of this document is attached.

B. The Standard Form of Agreement Between Contractor and Subcontractor shall be AIA Document A401-2017 and is available upon request.

END OF SECTION 000600

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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.

TABLE OF ARTICLES

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.)

§ 6.2 Binding Dispute Resolution
For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION
§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS
§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000610 – PAYMENT AND PERFORMANCE BONDS

A. Payment and Performance Bonds shall be by a Surety/Bonding Company listed in on Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Missouri.

B. Payment and Performance Bonds forms shall be AIA A312 or approved equivalent.

END OF SECTION 000610

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000700 – GENERAL CONDITIONS

A. General Conditions of this construction project are AIA Document A201-2017 Edition and Supplemental General Conditions. A copy of these documents is attached.

END OF SECTION 000700

AIA® Document A201™ – 2017

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)

TABLE OF ARTICLES

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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

INDEX
(Topics and numbers in bold are Section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

§ 2.3.5 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.

§ 2.3.6 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.

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

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 its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

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

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 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. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be 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 notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative 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 approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 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

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

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 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 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

§ 3.8 Allowances

§ 3.8.1 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 notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 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 and Submittal Schedules

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

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

§ 3.11 Documents and Samples at the Site

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

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and 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 the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, 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 Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

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

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

§ 4.2.4 Communications

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

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

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

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

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

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

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

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

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

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 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 for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

§ 6.1.3 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 any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its 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 or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 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 that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor 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. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

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

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 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, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

§ 8.3.3 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

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

§ 9.3.1 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. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and 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 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, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

§ 9.6 Progress Payments

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

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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

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

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

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

§ 9.6.7 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 or provided by 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, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

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

§ 9.7 Failure of Payment

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

§ 9.8 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; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

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

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

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

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

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, a Subcontractor, or a Sub-subcontractor; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. 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 notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's 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 the material or substance or who are to perform the task of removal or safe containment of the 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 by the amount of the Contractor's reasonable additional costs of shutdown, 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 hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 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.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or

expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 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; (2) the Architect and Architect's consultants; and (3) Separate Contractors, 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 those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 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, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance
The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss
§ 11.5.1 A loss insured under the property insurance required by the Agreement 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 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK
§ 12.1 Uncovering of Work
§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

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

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

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

that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

§ 12.2.3 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 of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

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

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

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

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 Suspension by the Owner for Convenience

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

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. 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 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 Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 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.

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of 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 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

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

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

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

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

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

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

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

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

§ 15.2.8 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 15.1.7, 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 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 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. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 those of the Owner and Contractor under this Agreement.

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000800 - SUPPLEMENTARY CONDITIONS

PART 1 - GENERAL

A. AIA Document A201, "General Conditions of the Contract for Construction - 2017 Edition", Articles 1 through 15, as published by The American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C. 20006 are hereby, made part of these Bidding Documents. These General Conditions apply equally to and are part of all Bidding Documents between the Owner and each separate Contractor for the Work under this Project. Copies of AIA Document A201 may be obtained from the Architect upon request.

B. The following supplements modify AIA Document (A201-2017), General Conditions of the Contract for Construction. 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

Add Section 1.2.1.2. to Section 1.2.

1.2.1.2 In the case of conflicts or discrepancies between Drawings and Divisions 2-49 of the Specifications, or within or among the Contract Documents and not clarified by Addendum, the Architect will determine which takes precedence in accordance with Section 4.2.11, 4.2.12, and 4.2.13. Discrepancies, conflicts, ambiguities, and errors which may have more than one interpretation require that the Architect make the interpretation per General Conditions of the Contract. In the absence of a formal interpretation by the Architect, or by Addendum, the default position shall be the more restrictive and/or more costly interpretation, unless a formal interpretation is rendered by the Architect, by addendum, or in writing if occurrence is after bidding.

ARTICLE 2 – OWNER

Delete Section 2.3.4 and substitute the following:

2.3.4 The Owner shall furnish, upon request, surveys describing physical characteristics, legal limitations and utility locations as may be known, and a legal description of the site. The Owner expressly disclaims the accuracy of utility information, ***and as may be*** indicated by notes on the Contract Drawings.

Delete Section 2.3.6 and substitute the following:

2.3.6 The Owner shall furnish the Contract Documents to the Contractor in digital (PDF) format. If the Contractor requires paper documents, the Contractor shall be responsible for the costs of producing such paper documents. The Contractor shall provide one printed set for use during construction for recording of as-built conditions and to be given to the Owner at the end of the construction.

ARTICLE 3 – CONTRACTOR

Add Section 3.2.5 to Section 3.2

3.2.5 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

Add Section 3.3.4

3.3.4 The Contractor shall be responsible for compliance, during the course of the Work, with any laws and regulations that are protective of the environment or human health and safety that are applicable to the Work.

Add Section 3.4.2.1 to Section 3.4.2:

3.4.2.1 After the Contract has been executed, the Owner and the Architect may consider requests for the substitution of products in place of those specified. The Owner and Architect may, but are not obligated to, consider only those substitution requests that are in full conformance with the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the Contractor:

.1 represents that it has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to the product specified;

.2 represents that it will provide the same warranty for the substitutions as it would have provided for the product specified;

.3 certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be performed or changed as a result of the substitution except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that subsequently become apparent;

.4 agrees that it shall, if the substitution is approved, coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects; and

Add the following to the end of Section 3.4.2:

3.4.2.1 The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and making agreed upon changes in the Drawings and Specifications resulting from such substitutions.

Add Section 3.5.3

3.5.3 The warranty shall extend for ONE (1) year after the Substantial Completion date ***for the project*** or portions thereof that may have varying dates of Substantial Completion. Certain materials and components which have manufacturer's and/or installer warranties, which may be longer than one year, shall not be limited by the General Contractor's general warranty. Warranties on equipment shall start from the date of Substantial Completion, and not on the date of purchase of the equipment that may precede the date of Substantial Completion.

Add Section 3.6.1 to Section 3.6 Taxes

3.6.1 Sales Tax Exemption: The Owner will exercise their tax exempt status and require that the Bid Amount NOT include sales tax on materials. Any materials purchased by Contractor or Sub-Contractors exempt from sales tax may be purchased by the Contractor/Sub-contractor by authorization from the Owner via a Project Exemption Certificate, which will be provided by the Owner. The Contractor does not have to submit separate pay-direct invoices. The Exemption Certificate became law in August of 1994, and is the preferred method. The Contractor and Sub-contractors are obligated to become familiar with the new accounting procedures, responsibilities, and tax law liabilities. All material invoices must be retained by the Contractor(s) for a period of five (5) years and are subject to audit by the Missouri Department of Revenue.

Replace Section 3.7.1 with the following:

3.7.1 The Owner, through the Architect, will submit Drawings and Specifications to the appropriate public authorities for building permit. The Owner will pay all fees for plan review and building permit. Separate fees for electrical, mechanical, and plumbing permits and inspections are to be included in the contract amount and paid for by the Contractor.

Add Section 3.8.3.1 to 3.8.3:

3.8.3.1 Contractor shall notify the Architect of any impact on the Contract time that any work in an Allowance item may have, and shall request in a timely manner, additional information necessary to schedule, coordinate, and complete work required by an Allowance item. See Section 012100 Allowances.

Add new Subparagraph 3.11.1:

3.11.1 The Contractor shall keep up-to-date throughout construction, a complete “as built” set of white prints, which shall be corrected to show all changes from the original Drawings and Specifications This set of drawings shall be kept by the Contractor and used only for this purpose. On completion of the project, submit as-built drawings to Architect as a record set for the Owner. Final payment will not be authorized until these are received and checked for completeness.

Add Section 3.12.5.1 to Section 3.12.5:

3.12.5.1 The Contractor shall include an indicator stamp on all submittals and shop drawings, which indicates the Contractor has reviewed the items and found them to be in compliance with the Contract, and showing the name and date of authorized reviewer. The Architect will not review submittals and shop drawings without the Contractor's stamp affixed.

Modify Section 3.12.10 as follows:

At paragraph 3.12.10.1, in the first sentence which in part reads "…specify all performance and design criteria…" Change the word "all" to "appropriate".

Add Section 3.12.11 to Section 3.12:

3.12.11 The Architect's review of each Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Owner is entitled to obtain reimbursements from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals.

ARTICLE 4 – ARCHITECT

Add Sections 4.2.2.1 through 4.2.2.4 to the end of Section 4.2.2:

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

4.2.2.2 Observations by the Architect shall in no way warrant or guarantee to the Owner and Contractor that all components of the work have actually been provided in exact compliance with the Contract requirements. The Contractor shall bear full responsibility for compliance with this Contract between Owner and Contractor, and for fulfillment of same.

4.2.2.3 Wherever in this Contract the term "inspection" is used as an action of the Architect, it shall mean "general observation" and as further described in 4.2.2 and 4.2.2.2 above.

Add Section 4.2.3.1 to the end of Section 4.2.3:

4.2.3.1 The Architect's report to the Owner regarding the general progress of the work shall be based upon general observations, and upon information provided by the Contractor including verbal reports, pay applications, and the Contractor's construction schedule. The Architect shall not be responsible for damages resulting from the progress, or lack thereof, of the Work.

Add Section 4.2.14.1 to the end of Section 4.2.14:

4.2.14.1 Contractor's requests for information shall be prepared and submitted in accordance with Division 1 "General Requirements" sections on the form included in the Contract Documents, or a form acceptable to the Architect, or on AIA Document G716-2004. The Architect will return without action requests for information that do not conform to requirements for the Contract Documents.

ARTICLE 7 – CHANGES IN WORK

Add Section 7.1.4 to Section 7.1:

7.1.4 No change in the work, whether by way of alteration or addition to the work, shall be the basis for addition to the Contract Sum or change in the Contract Time, unless and until such alteration or addition has been authorized by Change Order executed and issued in accordance with and in compliance with the requirements of the Contract Documents. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alteration of the Work, or claim that the Owner has been unjustly enriched by the alteration of the Work, whether or not there is in fact any such unjust enrichment, shall be the basis for any claim to increase the Contract Sum or to increase the Contract Time.

Add Section 7.1.5 to Section 7.1:

7.1.5 The combined overhead and profit included in the total cost to the Owner for a change in the Work shall be based on the following schedule:

.1 For Contractor, for Work performed by the Contractor's own forces, 10 percent of the cost.

.2 For the Contractor, for Work performed by the Contractor's Subcontractors, 10 percent of the amount due the Subcontractors.

.3 For each Subcontractor involved, for Work performed by that Subcontractor's own, forces, 10 percent of the cost.

.4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractor, 10 percent of the amount due the Sub-subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.4.

.6 In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete itemization of costs including labor, materials, and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where cost items are Subcontracts they shall be itemized also.

ARTICLE 8 – TIME

At paragraph 8.3.1, delete the words "…unusual delay in deliveries, unavoidable casualties…"

Add at the end of 8.3.1, the following sentence…. Notwithstanding the foregoing, no extension shall be made to the contract time unless the Contractor provides the Owner with written notice of the event justifying such extension within three (3) business days of the occurrence of such event.

Add Sections 8.3.4 and 8.3.5 to Section 8.3:

8.3.4 Delays due to adverse weather shall comply with 15.1.6 and an adverse weather day be specifically defined as any work day in which less than 60% of the scheduled work for that day cannot be completed due to weather-related conditions and that such work will have an effect on critical related trade work affecting the completion date. The Contract Time shall include an allowance for adverse weather days equal to a ratio of 3 work days for every 30 calendar days of Contract time or as stipulated in the bidding documents. Requests for extensions of time due to weather shall be evaluated on the basis of lost days in excess of the above allowance. The accounting of adverse weather days will be compounded for the duration of the Contract Time, and not on a monthly basis for purpose of modifying the Contract on a monthly basis; and to be evaluated at the approximately 75% completion mark of the schedule, and after as may be needed to reasonably review and process expected extensions to the Contract Time. Working days exclude weekends.

8.3.5 When the Contract Time has been extended, as provided under 8.3, such extensions of time shall not be considered as justifying extra compensation to the Contractor for General Construction, for office administrative costs, overhead, and other costs related to Division 0 or Division 1 requirements.

ARTICLE 9 – PAYMENTS AND COMPLETION

Add the following sentence to Section 9.3.1:

The form of Application for Payment, duly notarized, shall be a current authorized edition of AIA Document G702 – 1992, Application and Certificate for Payment, supported by a current authorized edition of AIA Document G703 – 1992, Continuation Sheet.

Add Section 9.3.1.3 to Section 9.3.1:

9.3.1.3 Until Substantial Complete, the Owner shall pay 95 percent of the amount due the Contractor on account of progress payments. 5% shall remain in retainage, except as may be certified by the Architect for payment by the Owner, by regular application after substantial completion and only for work verified to be completed by the Architect's observations. Field Observations and reviews by the Architect after Substantial Completion are limited (see Sections 012900 and 017700) and, therefore, pay applications for balance of contract after Substantial Completion may not be certified until such field observation and reviews are scheduled. Further, the amount of work remaining to be completed after Substantial Completion, or partial substantial completion may have amounts retained at a value of 150 % the estimated value of the work. The Contractor shall provide a written and itemized estimate of all work remaining, to be included with the Pay Application, for the Architect's review and approval, or adjustment thereof if required.

Add new Subparagraphs 9.3.3.1 and 9.3.3.2

9.3.3.1 With each Application and Certificate of Payment, submit Partial Waivers and Release of Liens; from the Contractor, subcontractors, sub-subcontractors and suppliers for the construction period covered by the application. Lien waiver forms shall comply with requirements of applicable state laws and area acceptable to the Owner, the Owner's Title Company, and the Owner's Lender.

9.3.3.2 Immediately, upon receipt of each Progress Payment and upon receipt of the Final Payment as provided in Article 9 of the General Conditions, the Contractor shall provide Owner with a statement under oath, acknowledging receipt of such payment and certifying that Contractor has paid all Subcontractors the sums due and owing to Subcontractors as evidenced by the Application for Payment and attached Lien Waivers. Such acknowledgment and certification will be in a form acceptable to the Architect and Owner. Contractor shall not be entitled to receive any further payments pursuant to the Agreement unless and until Contractor is in compliance with the terms of this paragraph. Contractor acknowledges the right of Owner to advise subcontractors and sub-subcontractors that Owner has made a Progress Payment or has made final payment to the Contractor. The Architect may decline to approve any Application for Payment and the owner shall not be required to make any Progress Payments or Final Payment to the contractor if the Contractor is in violation of any term or condition of this Agreement, the General Conditions of the Contract (AIA Document A201), or the Supplementary General Conditions, or if the Contractor fails to timely provide any information reasonably requested by Owner

Add the following Subparagraphs, 9.5.1.8 and 9.5.1.9

9.5.1.8 Failure of the Contractor to comply with any laws and regulations that protect the environment or human health and safety that are applicable to the Work, and

9.5.1.9 Failure to comply with Missouri's Prevailing Wage Laws.

Add the following language to 9.5.3:

.1 If the above reasons are not remediated within Contract time limits, and/or 60 days after date of Substantial Completion (or a different number of days as may be stipulated in the Contract, Contract Form, or Certificate of Substantial Completion,) the Owner may apply the unpaid balance of the Contract toward payment of any damages, liquidated damages, warranty insurance, cost to complete the work and/or remedy defective work, expenses and consultant fees resulting from any of the above which the Owner may incur.

Add the following language to 9.8.1:

Provided however that as a condition to Substantial Completion, the Owner shall have received all permits, approvals, licenses and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial use of the Project.

Add Subparagraph 9.8.2.1 to Section 9.8.2:

9.8.2.1 The list of incomplete items (typically referred to as a "punch list"), may be attached to the Substantial Completion form, and provided that no incomplete item will prevent the Owner's use of the space/facility as it is intended to be used, including life safety components. Additional observations by the Architect to omit items from the list may be limited by requirements of Sections 012900 and 017700. After issuance of Substantial Completion and "punch list", subsequently discovered items which are not complete, and/or in nonconformance with the Contract, may be added to the list until such time as Final Completion and Final Payment. At the discretion and judgment of the Architect, a subsequent item may be classified as warranty work, if such item is ordinarily a warranty item and is not likely to result in significant cost or claims or damages to rectify the item. Refer to 9.3.1.3 of Supplemental Conditions for requirements for retainage and payments.) Final payment and/or exclusion of any item from a "punch list", shall not relieve the Contractor of the obligation to fulfill all requirements of the Contract.

Add Subparagraph 9.8.3.1 to Section 9.8.3:

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

Append Subparagraph 9.8.5 with the following sentence:

The Contractor shall reimburse the Owner for the Architect’s additional services made necessary by the Contractor’s failure to finally complete the Work within sixty (60) days after Project Substantial Completion, (or a different number of days as may be stipulated in the Contract, Contract Form, or Certificate of Substantial Completion). The provisions of Paragraph 8.3, Delays and Extension of Time, shall apply to this Subparagraph.

Add Subparagraph 9.10.1.1 to 9.10.1:

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

Add new Paragraph 9.11 and Subparagraphs 9.11.1 and 9.11.2:

9.11 **Liquidated Damages**

9.11.1 If the Contractor refuses, neglects, or fails to complete the Work and achieve Substantial Completion within the time stated in the Contract, then the Contractor and the Contractor’s surety, if any, shall be liable for and shall pay the Owner, not as penalty but as liquidated damages, the sum indicated in the Instructions To Bidders, and/or the Bid Form for each calendar day, beginning on the first day after the Contractor fails to achieve Substantial Completion within the Contract Time until the date that Substantial Completion is achieved. The Owner may withhold from payments due the Contractor, such amounts as may be assessed as liquidated damages. Upon Substantial and Final Completion of the Work, the Owner may adjust the Contract Sum by the amount of the assessed liquidated damages.

9.11.2 For each consecutive calendar day that the Work remains incomplete after the date established for Final Completion, the Owner will retain from the compensation otherwise to be paid to the Contractor the indicated amount of Liquidated Damages per calendar day. This amount is the minimum measure of damages the Owner will sustain by failure of the Contractor to complete all remedial work, current deficient work, clean up the project, and other miscellaneous tasks as required to complete all work specified. This amount is in addition to the liquidated damages prescribed above.

Add new Paragraph 9.12 and Subparagraph 9.12.1

9.12 **Architect's Compensation for Additional Site Visits, and/or Other Services**

9.12.1 When the Architect's services are required for inspections/observations and/or other services necessary to verify acceptance of the Work in addition to those inspections/service listed under Paragraphs 9.8 and 9.9, the Architect's compensation for such services shall be based on the Architect's invoice to the Owner. The Invoice, when approved by the Owner, shall be the basis for adjusting the Contract Sum by Change Order to compensate the Owner for the Architect's additional services.

ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY

Add Section 10.2.4.1 and 10.2.4.2 to Section 10.2.4:

10.2.4.1 When use or storage of explosives, or other hazardous materials, substances or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall give the Owner reasonable advance notice. The Contractor shall handle such materials in an appropriate manner. This does not relieve the Contractor of the responsibility and liability for the appropriate handling of hazardous materials.

10.2.4.2 If the Contract Documents require the Contractor to handle materials or substances that under certain circumstances may be designated as hazardous, the Contractor shall handle such materials in an appropriate manner

ARTICLE 11 – INSURANCE AND BONDS

Add the following at the end of Section 11.1.1:

The Contractor shall be responsible for ensuring that each Subcontractor on the Project has commercially reasonable insurance coverage with respect to it's role in the Project, all such insurance coverage to identify the Owner, Owner's Lender(s), Owner's Equity Investor(s), Architect, and Architect's consultants as additional Insureds.

Add the following subparagraphs to Section 11.1.2

11.1.2.1 The Contractor shall furnish a Surety Bond in an amount at least equal to one hundred percent (100%) of his Contract covering the faithful performance of the Contract and for the payment of all obligations in connection with said Contract. Such Bond shall include any guarantee or warranty provided in said Contract. Surety Company providing Bid, Payment and Performance must be listed in the latest edition of the Federal Register as holding a certificate of authority and an underwriting limit large enough for the project. The Surety must also be licensed to do business in the State of Missouri.

11.1.2.2 The Contractor shall deliver the required bonds to the Owner not later than seven (7) days following the date the agreement is entered into, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to commencement of the work, submit evidence satisfactory to the Owner that such bonds will be furnished.

11.1.2.3 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of power of attorney.

Add the following new paragraph 11.1.4:

The Contractor's insurance policies shall name both the Architect and the Owner as additional insured. All insurance policies shall provide that no cancellation of the policy or endorsement shall be effective until the tenth day following the mailing (by certified or registered mail return receipt requested) of written notices of such cancellation to the Architect and to the Owner.

Add the following new paragraphs to Article 11:

11.1.5

CONTRACTORS INSURANCE REQUIREMENTS (supplements Article 11 of AIA Document A201, 2017 Edition and other forms) THESE SPECIFICATIONS APPLY TO ALL CONTRACTORS WHO WILL BE ON THE JOBSITE, WHETHER A GENERAL CONTRACTOR OR ANY SUBCONTRACTOR.

11.1.5 Insurance coverage shall be not less than the following:

1.	Worker's Compensation: Section A - Statutory Section B - Employers Liability - $1,000,000	
2.	Contractor's Public Liability	
	a. Bodily Injury:	$1,000,000 per occurrence
	b. Property Damage:	$1,000,000 per occurrence
	c. Personal Injury:	$1,000,000 per occurrence
3.	Contractor's Umbrella Protection:	$5,000,000 per occurrence
4.	Explosions, Collapses, and Underground:	$1,000,000 per occurrence
5.	Automobile Public Liability	
	a. Bodily Injury:	$1,000,000 per occurrence
	b. Property Damage:	$1,000,000 per occurrence or combined single limit $2,000,000 per occurrence
6.	Products & Completed Operations Liability	$1,000,000
7.	Builders Risk:	Provided by the GC for the amount up to the contract for new work in place, stored material, and property damage and add full replacement cost of building plus stored or in transit materials.

Delete Subparagraph 11.4 in its entirety.

ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK

Add the following Section 12.2.2.4 to Section 12.2.2:

12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct, and the Contractor shall attend, a meeting with the Owner to review the facility operations and performance.

ARTICLE 13 – MISCELLANEOUS PROVISIONS

Add the following Section 13.7:

13.7 If the Owner or Contractor receives information specifically designated by the other party as "confidential" or "business proprietary," the receiving party shall keep such information strictly confidential and shall not disclose it to any other person except to (1) those who need to know the content of such information in order to perform services or construction solely and exclusively for the Project, including its employees, or (2) its consultants and contractors whose contracts include similar restrictions on the use of confidential information. However, the party receiving "confidential" or "business proprietary" information may disclose such information, after seven (7) days' Notice to the party providing the confidential or business proprietary information, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by arbitrator(s) order. Notice shall be provided, and deemed to have been duly served, in accordance with § 1.6.2 of A201-2017.

ARTICLE 15 – CLAIMS AND DISPUTES

Replace Section 15.1.6.2 with the following

15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, the Claim shall be documented by evidence substantiating that the weather conditions upon which the Claim is based (1) were abnormal when compared to the previous 3-year period, during the same time frame and at the location of the Work, (2) could not have been reasonably anticipated, and (3) had an adverse effect on the date of substantial completion of the Work in a manner that was beyond the reasonable control of the Contractor; and the Contractor used it's best efforts to remedy any delays in a manner mutually deemed appropriate by the Contractor and the Owner; and the Contractor provided the Owner with written notice of the relevant weather conditions within three (3) business days of their occurrence.

Add Sections 15.1.6.3 and 15.1.6.4 to Section 15.1.6:

15.1.6.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

15.1.6.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

Add the following sentence to Section 15.1.7:

If, before expiration of 30 days from the date of execution for this Agreement, the Owner obtains by separate agreement and furnishes to the Contractor a similar mutual waiver of all claims from the Architect against the Contractor for consequential damages which the Architect may incur as a result of any act or omission of the Owner or Contractor, then the waiver of consequential damages by the Owner and Contractor contained in this Section 15.1.7 shall be applicable to claims by the Contractor against the Architect.

Replace Subparagraph 15.3.2 in its entirety with the following:

The parties shall endeavor to resolve their claims by mediation. A request for mediation shall be filed in writing with the other party to the Agreement. Mediation shall proceed in advance of legal or equitable proceedings, which shall be stayed pending mediation for a period of sixty (60) days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

Delete Paragraph 15.4 Arbitration and Subparagraphs 15.4.1 through 15.4.4.3 without substitutions.

END OF SECTION 000800

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000900 – MISSOURI PREVAILING WAGE DETERMINATION

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. See Section 000950 – "Missouri Revised Statutes" for additional requirements.

1.2 PREVAILING WAGE DETERMINATION

A. Prevailing Wage Determination is included in this section.

B. This project is located in **Greene County**, Missouri and is subject to compliance with Missouri Prevailing Wage Rates, pursuant to RSMo 290.250, for Greene County Missouri. State Prevailing Wage Rates are included in the specifications.

1. Not less than the prevailing wage rates included must be paid to all workers performing work under the Contact.

C. Pursuant to RSMo 290.250 the Contractor will forfeit a penalty to the Contracting Public Body of $100.00 (one hundred dollars) per day (or portion of a day) for each workman employed if such workman is paid less than the prevailing wage rate for any work done under the contract by the Contractor or by any Sub-contractor.

1.3 SUBMITTALS

A. Submit certified payroll data with each pay application to the Owner's Representative.

B. Contractor and Subcontractors shall submit payroll records in compliance with Missouri Prevailing Wage Laws.

C. Before Final Payment can be made, the Contractor and all Sub-Contractors shall submit to the Owner an Affidavit of Compliance with Missouri's Prevailing Wage Laws. Affidavit must state the Contractor has fully complied with Missouri's Prevailing Wage Laws requirements. See also Section 000950.

D. Bidder to whom the Contract is awarded shall provide certification that all on-site employees meet the State of Missouri State Statutes, Ten Hour OSHA Construction Training Law. See Section 000950.

E. General Contractors and Sub-Contractors and each direct lower tier subcontractor shall provide sworn affidavits attesting that all employees are lawfully present in the United States pursuant to 285.530 RSMo. See Section 000950.

END OF SECTION 000900

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 29

Section 039
GREENE COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Todd Smith, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2022**

Last Date Objections May Be Filed: **April 11, 2022**

Prepared by Missouri Department of Labor and Industrial Relations

Building Construction Rates for
GREENE County

Section 039

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$32.85
Boilermaker	$29.20*
Bricklayer	$50.58
Carpenter	$45.61
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$38.00
Plasterer	
Communications Technician	$27.82
Electrician (Inside Wireman)	$46.27
Electrician Outside Lineman	$29.20*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$29.20*
Glazier	$40.53
Ironworker	$63.40
Laborer	$38.31
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$46.95
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$42.14
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$36.40
Plumber	$49.22
Pipe Fitter	
Roofer	$40.77
Sheet Metal Worker	$48.70
Sprinkler Fitter	$62.37
Truck Driver	$29.20*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.
**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in Section 290.210 RSMo.

Heavy Construction Rates for
GREENE County

Section 039

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$50.57
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$29.20*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$41.69
General Laborer	
Skilled Laborer	
Operating Engineer	$48.05
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$46.10
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in Section 290.210 RSMo.

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 000950 – MISCELLANEOUS PROVISIONS & COMPLIANCE WITH LAWS

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. See Sections 000900 "Missouri Prevailing Wage Determination for compliance with Missouri Prevailing Wage Laws.

1.2 GENERAL

A. The following are miscellaneous provisions and compliance requirements with Federal and State Laws for this project. Requirements included in this section are required for work under this Contract but are not inclusive of the requirements to comply with State and Federal Laws under this Contract.

1.3 PREVAILING WAGES

A. **Prevailing Wages**. Contractor and all subcontractors shall pay a wage of no less than the prevailing hourly rate of wages to all workmen performing work under this Contract in accordance with Section RSMO 290.220 et seq., (Missouri Prevailing Wage Law). Contractor agrees (i) that not less than the prevailing hourly rate of wages specified in the applicable Wage Determinations (000900) shall be paid to all workmen performing work under this Contract; (ii) that the Contractor shall forfeit as a penalty to the Owner the sum allowed by statute for each workman employed, for each calendar day, or portion thereof, such workman is paid less than prevailing wage rates for any work done under this contract, by contractor or by any subcontractor or sub-subcontractor; (iii) that while the Contract is being performed, Contractor shall post in a prominent and easily accessible place at the Project site all posters or other information required by applicable law; (iv) that Contractor and its subcontractors or sub-subcontractors shall submit certified copies of payroll records to the Owner; (v) that before final payment is made, Contractor shall file an affidavit stating that Contractor has fully complied with the Missouri Prevailing Wage Law. No final payment can be made unless and until this affidavit is filed in proper form and order.

1. Missouri Affidavit of Compliance with the Prevailing Wage Law form is attached.

1.4 BUY AMERICAN ACT

A. In accordance with the Domestic Product Procurement Act (hereinafter referred to as the Buy American Act) RSMo 34.350-34.359, the bidder is advised that any goods purchased or leased by any public agency shall be manufactured or produced in the United States, unless exceptions to the Buy American mandate in RSMo 34.353 are met. Preferences shall be applied in accordance with RSMo 34.353.

1.5 PAYMENT AND PERFORMANCE BONDS

A. Before commencing construction, Contractor shall provide to Owner bonds covering the faithful performance of the Contract and payment of all obligations arising under the Contract, including the payment of prevailing wages, in the full Contract Amount. The cost of such bonds shall be included in the Contract Amount. The bonds shall be written by a surety satisfactory to Owner and shall name the Owner, as obligee. See Article 11 of the General Conditions.

1.6 RESPONSIBILITIES

A. The Contractor shall at all times be solely responsible to the Owner for acts, errors and omissions of the Contractor and Subcontractors and any of their agents and employees, and other persons performing any portion of the Contractor's obligations under this Agreement.

1.7 IMMIGRATION LAW COMPLIANCE

A. Contractor certifies and agrees that:

1. Contractor does not knowingly or intentionally employ individuals who are ineligible to work in the United States in violation of any federal or applicable state or local laws;
2. All Contractor employees assigned to perform services under this Agreement have satisfied federal I-9 requirement, and, to the best of Contractor's knowledge, are lawfully present in the United States;
3. Contractor does not have any knowledge that any subcontractor employee assigned to perform services under this Agreement is ineligible to work in the United States;
4. Contractor will immediately notify Owner of any investigation or legal proceeding involving the federal or state government or of any requests by the U.S. Immigration and Customs Enforcement to inspect Contractor's I-9 or other employment records.

1.8 EQUAL OPPORTUNITY EMPLOYER

A. Contractor is an Equal Opportunity Employer in compliance with Executive Order 11246; the Rehabilitation Act of 1973, Section 503, the regulations at 41 C.F.R. 60-741.4 and Executive Order 11758; the Vietnam Era Veterans Readjustment Assistance Act of 1974, Section 402 and the regulations at 41 C.F.R. 60-741.4, 60-741.5. 60-250; and Title 38 of the United States Code, Section 2012, and Executive Order 11701; all as amended. Contractor shall comply with all similar requirements and obligations imposed by applicable state law.

1.9 NO TAX DUE

A. In accordance with Section 34.040.6 RSMo, the Owner is precluded from contracting with a contractor/vendor or its affiliate who makes sales of tangible personal property or for the purpose of storage use or consumption in this state but fails to collect and properly pay the tax as provided in RSMo 144. Contractors, subcontractors and suppliers shall provide to the Owner a “Vendor No Tax Due” Certificate from Missouri Department of Revenue.

1.10 OSHA TRAINING LAW

A. Pursuant to the State of Missouri’s RSMo 292.675 Contractor shall provide an Affidavit of Compliance to the Owner that all on-site employees of the Contractor and any Sub-Contractor under such Contractor has completed a 10-hour OSHA construction safety program approved by the Department of Labor and Industrial Relations in accordance with Section 292.675 RSMo. The Contractor acknowledges by submitting a bid that the Contractor shall be subject to penalties as identified in RSMo Chapter 292.675 for each employee employed by the Contractor or Sub-Contractor working on the project without the required training.

1. Affidavit of Compliance with the Section 292.675 form is attached.

1.11 NOTICE TO VENDORS and BIDDERS

A. See attached Notice to Vendors and Bidders for *Required Affidavit for Contracts over $5,000.00.* Within 14 days of award of Subcontracts, the General Contractor shall provide a listing of all entities who will be providing services or labor on the project whose agreement is $5,000.00 or over. All listed entities shall comply with attached Notice to Vendors and Bidders.

1.12 RANDOM DRUG AND ALCOHOL TESTING PROGRAM

A. Pursuant to the State of Missouri’s RSMo Section 161.371, the Contractor and any subcontractors on public works projects shall establish and implement a random drug and alcohol testing program. Said drug and alcohol testing program shall be administered by a laboratory duly certified by the U.S. Department of Health and Human Services, or similar agency approved by the office of administration.

Such program shall require notification to the employer and employee of the results of any positive drug and alcohol test and the Owner shall be notified of the action taken to protect the safety of patrons as a result of such positive test.

B. All costs for the program of screening and testing workers for alcohol and controlled substances, as well as all costs for administration of such drug and alcohol testing program shall be paid by the employer on the public works project. No costs under this section shall be paid by the state, any of its agencies, or any political subdivision thereof.

1.13 EMPLOYEE SCREENING

A. Comply with Owner's requirements regarding current criminal background screening of any personnel working on the project site. Results shall be made available to Owner.

1. All contractors' and subcontractors' personnel working on site shall have had a criminal background screening and results made available to Owner.
2. Maintain a list of approved screened personnel with Owner's representative.

B. Employee Identification: Provide identification tags for contractor personnel working on the project site. Require personnel to utilize identification tags at all times.

1.14 BOYCOTT ISRAEL (Missouri Statute Section 34.600 RSMo)

A. For contracts $100,000 or greater, General Contractor/Contractor/Vendor certifies it is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel.

END OF SECTION 000950

Notice and Instructions to Bidders/Vendors

Sections 285.525 – 285.550 R.S.Mo – Effective January 1, 2009

Effective January 1, 2009 and pursuant to the State of Missouri's RSMo 285.530 (1), No business entity or employer shall knowingly employ, hire for employment, or continue to employ an unauthorized alien to perform work within the state of Missouri.

As a condition for the award of any contract or grant in excess of five thousand dollars by the state or by any political subdivision of the state (e.g., City of Republic) to a business entity…., the business entity (Company) shall, by sworn affidavit and provision of documentation, affirm its enrollment and participation in a federal work authorization program with respect to the employees working in connection with the contracted services. Every such business entity shall sign an affidavit affirming that it does not knowingly employ any person who is an unauthorized alien in connection with the contracted services. (RSMo 285.530 (2)

City of Republic, Republic, MO will put into their bid documents the following requirement to comply with State of Missouri Statute R.S.Mo 285.525 – 285.550.

Required Affidavit for Contracts over $5,000.00 (US) – Effective 1-1-2009, Company shall comply with the provisions of Section 285.525 through 285.550 R.S.Mo. Contract award is contingent on Company providing an acceptable notarized affidavit stating:

1. that said company is enrolled in and participates in a federal work authorization program with respect to the employees working in connection with the contracted services and
2. that company does not knowingly employ any person who is an unauthorized alien in connection with the contracted services.

Copy of the affidavit is attached.

Additionally, Company must provide documentation evidencing current enrollment in a federal work authorization program (e.g. electronic signature page from E-Verify Program's Memo of Understanding (MOU).

The City of Republic requires companies that are not already enrolled and participating in a federal work authorization program to do so. E-Verify is an example of this type of program. Information regarding E-Verify is available at http://www.dhs.gov/xprevprot/programs/gc_1185221678150.shtm or by calling 888-464-4218.

CITY OF REPUBLIC, MISSOURI

AFFIDAVIT OF COMPLIANCE WITH SECTION 292.675 R.S.Mo
FOR ANY PUBLIC WORKS PROJECT CONTRACT
Effective August 28, 2009

STATE OF _____)
) ss
COUNTY OF _____)

Before me, the undersigned Notary Public, in and for the County of _____,

State of _____, personally appeared_____(*name*)

Who is_____(*title*) of _____(*Name of company*),

(a corporation), (a partnership), (a sole proprietorship), (a limited liability company), and is authorized to make this affidavit, and being duly sworn upon oath deposes and says as follows:

(1) that said company has verified the completion of a 10-hour construction safety program with respect to the employees in connection with the contracted services.

The terms used in this affidavit shall have the meaning set forth in Sections 292.675 R.S.Mo, et seq

_____
Signature

Name: _____

Subscribed and sworn to before me this _____day of _____20____.

_____
Notary Public

My Commission Expires: _____

CITY OF REPUBLIC, MISSOURI

AFFIDAVIT OF COMPLIANCE WITH SECTION 285.500 R.S.Mo
FOR ANY PUBLIC WORKS PROJECT CONTRACT
Effective August 28, 2009

STATE OF _____)
)
COUNTY OF _____)

Before me, the undersigned Notary Public, in and for the County of _____,

State of _____, personally

appeared_____(*name*)

Who is_____(*title*) of _____(*Name of company*),

(a corporation), (a partnership), (a sole proprietorship), (a limited liability company), and is authorized to make this affidavit, and being duly sworn upon oath deposes and says as follows:

(1) that said company is enrolled in and participates in a federal work authorization program with respect to the employees working in connection with the contracted services and
(2) that the said company does not knowingly employ any person who is an unauthorized alien in connection with the contracted services.

The terms used in this affidavit shall have the meaning set forth in Sections 285.500 R.S.Mo, et seq

Documentation of participation in a federal work authorization program is attached to this affidavit

_____
Signature

Name: _____

Subscribed and sworn to before me this _____day of _____20____.

_____
Notary Public

My Commission Expires: _____

CITY OF REPUBLIC, MISSOURI

AFFIDAVIT OF COMPLIANCE WITH SECTION 161.371 R.S.Mo
FOR ANY PUBLIC WORKS PROJECT CONTRACT

STATE OF _____)
) ss
COUNTY OF _____)

Before me, the undersigned Notary Public, in and for the County of _____,

State of _____, personally appeared_____(*name*)

Who is_____(*title*) of _____(*Name of company*),

(a corporation), (a partnership), (a sole proprietorship), (a limited liability company), and is authorized to make this affidavit, and being duly sworn upon oath deposes and says as follows:

(1) that said company participates in a Random Drug and Alcohol Testing Program with respect to the employees in connection with the contracted services.

The terms used in this affidavit shall have the meaning set forth in Sections 161.371 R.S.Mo, et seq

_____
Signature

Name: _____

Subscribed and sworn to before me this _____day of _____20____.

_____
Notary Public

My Commission Expires: _____

AIA® Document G706™ – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
		ARCHITECT: ☐
	CONTRACT FOR:	CONTRACTOR: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	SURETY: ☐
		OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G706A™ – 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
		ARCHITECT: ☐
	CONTRACT FOR:	
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	CONTRACTOR: ☐
		SURETY: ☐
		OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY: _____

(Signature of authorized representative)

_____

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

DIVISION OF LABOR STANDARDS

MISSOURI DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

AFFIDAVIT
COMPLIANCE WITH THE PREVAILING WAGE LAW

I, _____, upon being duly sworn upon my oath state that: (1) I am the
(Name)

_____ of _____; (2) all requirements of
(Title) *(Name of Company)*

§§ 290.210 to 290.340, RSMo, pertaining to the payment of wages to workers employed on public works projects have been fully satisfied with regard to this company's work on _____;
(Name of Project)

(3) I have reviewed and am familiar with the prevailing wage rules in 8 CSR 30-3.010 to 8 CSR 30-3.060; (4) based upon my knowledge of these rules, including the occupational titles set out in 8 CSR 30-3.060, I have completed full and accurate records clearly indicating (a) the names, occupations, and crafts of every worker employed by this company in connection with this project together with an accurate record of the number of hours worked by each worker and the actual wages paid for each class or type of work performed, (b) the payroll deductions that have been made for each worker, and (c) the amounts paid to provide fringe benefits, if any, for each worker; (5) the amounts paid to provide fringe benefits, if any, were irrevocably made to a fund, plan, or program on behalf of the workers; (6) these payroll records are kept and have been provided for inspection to the authorized representative of the contracting public body and will be available, as often as may be necessary, to such body and the Missouri Department of Labor and Industrial Relations; (7) such records shall not be destroyed or removed from the state for one year following the completion of this company's work on this project; and (8) there has been no exception to the full and complete compliance with the provisions and requirements of Annual Wage Order No. _____ Section _____ issued by the Missouri Division of Labor Standards and applicable to this project located in _____ County, Missouri, and completed on the ____ day of _____, _____.

The matters stated herein are true to the best of my information, knowledge, and belief. I acknowledge that the falsification of any information set out above may subject me to criminal prosecution pursuant to §§290.340, 570.090, 575.040, 575.050, or 575.060, RSMo.

_____
Signature

Subscribed and sworn to me this ____ day of _____, _____.

My commission expires _____, _____.

_____
Notary Public

_____
Receipt by Authorized Public Representative

Missouri Department of Labor and Industrial Relations is an equal opportunity employer/program.

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 011000 – SUMMARY

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

B. Related Section:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project: Republic Aquatic Center Expansion.

1. Project Location: 711 E. Miller Rd., Republic, MO 65738.

B. Owner: City of Republic, Missouri; 204 N. Main Ave., Republic, MO 65738

1. Owner's Representative: Mr. Jared Keeling, Asst. City Admin. & Parks and Recreation Director.

C. Architect: Sapp Design Associates Architects, 3750 S. Fremont Ave., Springfield, MO 65804.

1. Contact: Kristi Beattie, AIA (417) 877-9600.

D. Project Web Site: A Project web site, paid for and administered by **the Contractor,** will be used for purposes of managing communication and documents during the construction stage.

1. See Division 01 Section "Project Management and Coordination" for Contractor's requirements for establishing, administering, and utilizing the Project Web site.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

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

1. The project consists of construction of a Lazy River at the Republic Aquatic Center, which will include a new Pool House with a filter room. The work consists of, but is not limited to, selective demolition of trees, site work, new construction for lazy river and pool house, concrete, standing seam metal roof, unit masonry and masonry veneer, aluminum framed storefront, electrical, mechanical, plumbing, and landscaping. The project is located at 711 E. Miller Rd., Republic, Missouri 65738 in Greene County, Missouri. Missouri Prevailing Wage Rates will apply to the work.

B. Type of Contract:

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

C. Contractor shall take any and all means necessary to ensure completion by the contracted date of Substantial Completion, including overtime, weekend work, multiple shifts, additional work force, etc.

1.5 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract, work under separate contract, or work by Owner. Coordinate the Work of this Contract with other contracts and with work performed by Owner.

B. Concurrent Work: Owner will or has awarded separate contract(s) or self-perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1. IT, data, and A/V systems, which may be required, unless included in specifications or drawings as being in the contract.
2. All moveable furniture.
3. Equipment, landscaping, and paving.
4. Signage, other than that identified in other specification sections or as indicated on the drawings as being in the contract.
5. Miscellaneous items or equipment specifically noted on the plans to be provided by the Owner.
6. Cooperate and coordinate with Owner and Owner's Contractor's for installation of miscellaneous equipment and furnishings, subject to agreement, regarding insurance, security, and liability.

1.6 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. Concurrent Work: Owner **will or has awarded** separate contract(s) or will self-perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1. Communications and security devices. Reference plans and specs for any conduit, boxes, and cabling included in this contract.
2. Coordinate scheduling of the work with Owner, as some work by other contractors may be required prior to close-in of spaces.

1.7 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 work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to areas directly around the area of new construction. Maintain all other areas of the site for full usage and access by the occupants of the adjacent buildings on site. See "Coordination with Occupants" below.
2. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to area only as required to complete the work. Restore areas disturbed by Construction back to original state or as required by the work under this contract, as soon as possible.
3. Driveways, Walkways and Entrances: Keep driveways, bus loading areas, and entrances serving premises clear and available to adjacent buildings occupants, employees, patrons, general public and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

C. This project site contains or will contain occupied buildings and access to the occupied buildings and associated parking, entrances, exits etc. shall not be interrupted by construction activities, unless agreed upon in writing by the Owner's authorized representative.

D. Contractor shall coordinate with Owner for location of specific areas for parking, materials storage, staging areas, loading, etc.; all trades shall conform to defined use areas and shall not unreasonably or unnecessarily encumber or use other areas of the site.

1. Site must be maintained completely free of trash and construction debris and cleaned every day. Provide containers for use by workmen.
2. Contractor shall provide for secure storage of material via trailers or fenced enclosures.
3. Contractor shall provide for general security of work areas by fencing, posted entries and lighting as may be necessary.
4. Contractor shall take measures to control soil erosion and silt migration by use of silt fences, hay bales, swales, detention, etc.
5. Traffic Control: Contractor shall coordinate with the Owner any temporary construction entrances and take all necessary measures to ensure safe entry and exit, including signs, flagmen, coordination with the Owner, City and other measures as required.
6. All waste materials shall be disposed of off-site. Burning is **NOT** permitted on Owner's property.
7. Provide barricades and/or fences and gates to provide security, and to restrict unauthorized parking and access.

E. Union and Non-Union: Contractor shall take measures as necessary to avoid conflicts between union and non-Union laborers, including separate entrances, or other agreements/arrangements as may be necessary.

1.8 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and the existing adjacent Aquatic Center during construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing site exits unless otherwise indicated.

1. Maintain access to existing adjacent occupied or used facilities. Do not close or obstruct occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify the Owner not less than **72** hours in advance of activities that will affect Owner's operations and coordinate with Owner as to exact time and duration of activities.
3. Maintain construction fencing, barricades, signage, etc. as necessary to ensure the safety of the general public, students, patrons, and staff of the adjacent occupied buildings on site during construction.

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, pool, 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.

1.9 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours:

1. Contractor may have full access to site on weekends and on days Aquatic Center is closed. Contractor shall return areas to usable condition following construction activities including cleaning and protecting existing equipment. Coordinate activities with Owner.
2. Hours for Utility Shutdowns: Limit to non-operational hours or schedule utility shutdowns for holidays, weekends, or other scheduled days when patrons are not on site. Coordinate work with Owner's calendar.
3. Hours for noisy activities: Coordinate with Owner.

C. Existing Utility Interruptions: **Do not** interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify **Owner** not less than **three** days in advance of proposed utility interruptions and coordinate any interruptions with Owner activities and operations. Coordinate with Owner as to interruptions and duration. Contractor should anticipate possibility of some work being conducted over weekends, nights, or holidays to minimize interruption of Owners operations.
2. Obtain **Owner's** written permission before proceeding with utility interruptions.

D. Controlled Substances, Smoking & Alcohol Policy: Smoking or use of tobacco products will **not** be allowed in any of the buildings or any areas on site except as may be designated as a specific smoking area.

1. Contractor, IF approved by the Owner, may designate a specific smoking area away from the building and out of sight by patrons and away from the adjacent buildings subject to approval by Owner and provide for disposal of smoking or tobacco residues.
2. Alcoholic products will **not** be allowed on site **any** time**.**
3. Controlled Substances will **not** be allowed on site **any** time.

E. Employee Identification: Provide identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times. Provide Owner with a list of all workers on site. See Section 000950 for additional requirements.

F. Contractors and Sub-Contractor's Participation in a Drug Testing Program as required by RSMo Section 161.371: Contractor shall establish and implement a random drug and alcohol testing program. (See Section 009500.)

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections or as otherwise noted.
2. Abbreviations: Materials and products are identified by abbreviations and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

D. Conflicts and Precedence:

1. Discrepancies and Omissions. If Contractor is in doubt as to the true meaning of any part of the proposed Contract Documents, or finds discrepancies in, or omissions from, any part of the proposed Contract Documents, he must submit to the Architect a request for interpretation before proceeding with the work.
2. Discrepancies, conflicts, ambiguities, and errors which may have more than one interpretation require that the Architect make the interpretation per General Conditions of the Contract. **Per Contract, the default position shall be the more restrictive and/or more costly interpretation**, unless a formal interpretation is rendered by the Architect, by addendum, or in writing, per Contract, if occurrence is after bidding.
3. Contractor is not at liberty to assume that a discrepancy or conflict thereby voids or omits any item entirely from the Contract.
4. Drawings are not set up specifically according to trade and each Contractor and Sub-Contractor or trade is required to review all the drawings as a whole and provide any misc. items, materials, work etc required to complete the work as shown on all the documents for the project to provide a complete and operational system. This requirement applies to **ALL** trades. All trades including but not limited to, Structural, Civil, Mechanical, Electrical and Plumbing requirements and related work are indicated throughout the set of drawings and may or may not all be shown on the specific trade drawings and **all** drawings shall be coordinated and reviewed by the specific trades for overall scope of work.

1.11 BOUNDARIES AND BENCHMARKS

A. Contractor shall employ a professional Civil Engineer or Land Surveyor registered in the State of Missouri, and approved by the Architect, to confirm or define site boundaries and for layout of building lines. Erect substantial benchmarks and preserve them throughout the work.

1.12 UNANTICIPATED CONDITIONS

A. If in the course of work the Contractor anticipates and/or discovers conditions and/or materials which are beyond the scope of this contract, and/or which may be deemed unreasonably hazardous, and/or uncovers materials which are legally defined as hazardous, the Contractor is to stop work in the area affected, immediately inform the Architect, and do not proceed until resolved in writing from the Architect.

B. The Contractor shall make every reasonable effort to inspect for unanticipated conditions, and to anticipate such conditions by prudent project planning and coordination.

C. Contractor shall review geo-technical report included in this Project Manual for existing conditions of site soils and types of soils or conditions that may be encountered at the Project site. Contractor shall include in the bid any work that may be required as can be reasonably expected based on geotechnical report and recommendations.

1.13 ASBESTOS

A. No products shall be installed in this project which may contain asbestos in any of its various forms. If so requested by the owner, the Contractor shall submit to the Owner upon completion of the project certification in writing that no products contain asbestos. If any supplier or subcontractor has knowledge or access to knowledge that any specified product herein contains asbestos, they shall immediately inform the General Contractor and the Architect prior to submission of bids.

1.14 SUPERINTENDENT

A. The Contractor shall employ a full-time on-site Project Superintendent assigned full time to this project. Superintendent shall be experienced and qualified in projects of similar size and scope; the Owner reserves the right to reject the proposed Superintendent.

B. The Superintendent shall remain with the project until final completion and shall not be replaced with another individual or reassigned to another project except as may be agreed to or approved by the Owner.

1.15 LOCATIONS AND INTERFERENCES

A. Locations of equipment and other work are indicated **diagrammatically** by drawings. Determine exact locations on job, subject to structural conditions, requirements of the documents, and work of other Contractors, access requirements of installation and maintenance and to approval of A/E. Provide necessary material and labor as needed to coordinate with other work and as needed for complete operational system, and other components of which not all may be exactly shown on the drawings but required for a complete system.

B. It is the intent of these documents to provide a weathertight facility. Contractor shall provide all necessary materials and labor to complete the work whether or not specifically noted on the documents. Contractor shall caulk, seal, enclose and otherwise make weathertight the building whether or not specifically noted on the documents.

C. Study and become familiar with contract drawings of other trades and in particular the general construction plans and details to obtain necessary information for figuring installation. Cooperate with other workmen and install work to avoid interference with their work. Minor deviations, not affecting design characteristics, performance or space limitations may be permitted if reviewed and approved by A/E prior to installation.

D. Installation of any pipe, apparatus, appliance or other item which interferes with proper placement of other work as indicated on drawings, specified, or required, shall be removed, relocated and reconnected, without cause for change in the contract amount. Coordination of trades is the responsibility of the General Contractor. See General Conditions for additional coordination responsibilities.

E. Drawings are not to be scaled. Dimensional data shall be obtained from written information only. Verify all dimensions before proceeding, any dimensional deviation from that shown on drawings, which may affect intent of design or proper incorporation of elements shall be brought to Architect's attention promptly and resolution obtained before proceeding. Dimensions indicated in contract documents are from face of stud to face of stud, face of existing structure, or finish, face of concrete or block, or structural line, except as noted otherwise. Dimensions of existing structure, or conditions, etc. are plus or minus and should be field verified prior to commencement of work and Architect notified of any discrepancies.

1.16 MINIMUM REQUIREMENTS AND STANDARDS

A. It is the intent of this Contract that a completed and fully operational product be delivered by the Contractor as required by the General Conditions. It is the intent of the documents for all indicated

equipment and components to be powered, connected, attached, supported, piped, wired, and otherwise functional as necessary to meet manufacturer's recommended installation requirements, and industry standards. The documents are not intended to necessarily show detailed fabrication and installation instructions, nor to show every distinct part and component and their exact location.

B. Minimum Standards: Where supportive details and components are not specifically indicated, but required for a complete and proper installation, the Contractor shall refer to the manufacturer's recommendations and installation instructions, and to industry standards for installation of the component or system. See Section 014200 Reference Standards and Definitions.

1.17 WARRANTIES

A. General Contractor shall provide a one year unlimited warranty against defects in workmanship and materials, as well as minor adjustments to components of the work, in addition to product warranties provided by manufacturers of individual components. The contractor's warranty shall include labor and material and other incidental costs as necessary to correct any defects. All warranties shall commence at date of Substantial Completion. (See Supplemental General Conditions also.)

END OF SECTION 011000

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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SECTION 012100 – ALLOWANCES

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 administrative and procedural requirements governing allowances.

1. Certain items and in some cases, installation is specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection or quantification of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
2. Allowances which are to be included in the Contract are to be activated only upon instruction from the Architect. After implementation, any difference in actual costs, shall be added to or deleted from the Contract by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.

C. Related Sections:

1. Division 01 Section "Unit Prices" for procedures for using unit prices.
2. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
3. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed 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.

1.4 SUBMITTALS

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

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Submit time records and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM, UNIT-COST AND QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials selected by Architect under allowance and shall include taxes (if applicable), 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 selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. At Project closeout, credit unused amounts remaining in the allowance to Owner by Change Order.

D. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. Prepare unused material for storage by Owner when it is not economically practical to return the material for credit, as determined by the Architect. Deliver unused material to Owner's storage space as directed. Otherwise, disposal of unused material is Contractor’s responsibility.

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 margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

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 lower-priced 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: Quantity Allowance:** Include 400 cubic yards of unsatisfactory soil excavation and disposal off-site (Item "a" in Schedule of Unit Prices) and replacement with compacted engineered fill from off-site (Item "f" in Schedule of Unit Prices) as specified in Division 31 Section "Excavation and Fill."

1. Coordinate quantity allowance adjustment with unit price requirements of Division 01 Section "Unit Prices".
2. All quantities shall be verified and any adjustments (either adds or deducts) are subject to approval by the Architect.
3. If actual conditions require less than the allowance listed above of unsatisfactory soil excavation, a change order will be issued to deduct the remaining balance from the Contract. Costs will be based on Unit Prices identified in Section 012200 and submitted on the bid form.
4. **The Contractor shall provide 2'-0" Low Volume Change layer under all slabs on grade, per structural drawings, as part of the base bid. This allowance is for any unsuitable soils outside of the Low Volume Change layer.**

B. **Allowance No. 2: Quantity Allowance:** Include 50 cubic yards of rock excavation (for footings and trenches) and disposal off-site (Item "i-2" in Schedule of Unit Prices) and replacement with satisfactory soil material from off-site (Item "f" in Schedule of Unit Prices) as specified in Division 31 Section "Excavation and Fill."

1. Coordinate quantity allowance adjustment with unit price requirements of Division 01 Section "Unit Prices".
2. All quantities shall be verified and any adjustments (either adds or deducts) are subject to approval by the Architect.
3. If actual conditions require less than the allowance listed above of mass rock removal, a change order will be issued to deduct the remaining balance from the Contract. Costs will be based on Unit Prices identified in Section 012200 and submitted on the bid form.

C. **Allowance No. 3: Lump Sum Allowance:** Include $100,000 as a construction contingency to be included in the Base Bid by the General Contractor. 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.

END OF SECTION 012100

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SECTION 012200 – UNIT PRICES

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 administrative and procedural requirements for unit prices.

B. Related Sections:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.
3. Division 01 Section “Allowances” for quantity allowance for unsuitable soils.

1.3 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, as proposed by Bidders and stated on the Bid Form, applicable during the duration of the Work as 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.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, General Contractor’s and Sub-Contractor’s overhead, and profit and any other related costs for completed work.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. Contractor shall notify Architect and Owner immediately upon uncovering any unanticipated conditions before proceeding with removal and/or replacement of any items identified below under unit cost schedule.

E. Contractor shall include as part of this bid and this contract, amounts of items listed as unit prices, necessary for the completion of the Work. Unit prices listed below shall be listed only to determine prices of changes to the Work. Unit prices shall include materials, labor, transportation, General Contractor’s and Sub-contractor’s overhead and profit, and any other related costs for complete installation.

F. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Contractor shall include as part of this bid and this contract, amounts for items listed as unit prices, necessary for the completion of the work. Unit prices listed below shall be listed only to determine prices of Changes to the Work. Unit prices shall include materials, labor, transportation, General Contractor's (and subcontractors) overhead and profit; and any other related costs for a complete installation.

B. **Unit Prices: Excavation, Unsuitable Soils and Rock Removal:** Unit costs identified below for are for **unanticipated** conditions which may arise during excavations that are not part of the work required by the Contract Documents. Contractor shall include in the base bid all work required and that can be reasonably anticipated based on the Contract Documents and on-site observations. Unit prices shall be listed only to determine prices of changes to the work. Contractor shall notify Architect and Owner immediately upon uncovering any unanticipated conditions before proceeding with removal and/or replacement of any items identified below under unit cost schedule.

C. Description: Unsatisfactory soil or rock excavation, disposal and replacement with satisfactory fill material or engineered fill from off site, as required, in accordance with Division 31 Section "Earth Moving."

a. General excavation and removal from site of unclassified material or unsuitable materials. Cost for more or less than that shown on plans. Fill in one price only. $ _____ /cu.yd.

b. General excavation and relocation on site of unclassified material or unsuitable materials. Cost for more or less than that shown on plans. (Requires respreading of soil.) Fill in one price only. $ _____ /cu.yd.

c. Earth borrow; in place (non-structural) – (from site material.) $ _____ /cu.yd.

d. Earth borrow; in place (non-structural) – (from off-site material.) $ _____ /cu.yd.

e. Compacted engineered fill or structural fill; in place – (from site material.) $ _____ /cu.yd.

f. Compacted engineered fill or structural fill; in place – (from off-site material.) $ _____ /cu.yd.

g. Compacted drainage fill; in place (clean ¾" crushed stone.) $ _____ /cu.yd.

h. Compacted granular fill; in place (base rock and gravel.) $ _____ /cu.yd.

i. Price for rock excavation:

1. Mass Rock $ _____ /cu.yd.
2. Footing & Trench Rock less than 10' below existing grade. $ _____ /cu.yd.
3. Pit Rock $ _____ /cu.yd.

j. Compacted shot rock; in place (8" – unless otherwise approved by the geotechnical engineer.) $ _____ /cu.yd.

k. Flowable fill, in place. $ _____ /cu.yd.

D. Unit of Measurement: Cubic yard excavated, based upon survey of volume removed.

E. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."

END OF SECTION 012200

SECTION 012300 - BID ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if 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 alternate into the Work. No other adjustments are made to the Contract Sum.
   3. Contractor shall hold all alternate bid prices for **45 days** from date of contract award, unless specifically noted otherwise.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include as part of each alternate, related coordination, modifications, adjustments, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials and methods necessary to achieve the work described under each alternate.
   1. Include as part of alternate, miscellaneous devices, appurtenances and similar items incidental to or required for complete installation whether or not mentioned as part of alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

A. SCHEDULE OF ALTERNATES

Alternate No. 1: Dual Waterslide:

1. **Base Bid:** Complete waterslide installation as shown on the plans, including footings, pump, plunge area, the 3 main drains, the piping from the main drains to the pump pit, installation of the pump pit with grating, electrical conduit from electrical room to the pump pit, and an additional light pole for PA speaker and security light.
2. **Alternate:** Submit **deduct** price to exclude materials and installation for both waterslides, slide structure, footings and pump. All other elements listed above to be included in the construction.

Alternate No. 2: UV Chamber:

1. **Base Bid:** Complete UV Chamber unit, materials and installation as shown on the plans.
2. **Alternate:** Submit deduct price to exclude UV Chamber unit, materials, and installation of the UV chamber.

Alternate No. 2: Concrete Terrace with Sunshade

1. **Base Bid:** Contractor to provide all work associated with installation of concrete terrace with 20' x 30' hip sunshade canopy and surrounding landscape.
2. **Alternate:** Submit **deduct** price to exclude concrete terrace, sunshade canopy, and planting beds from bid. Contractor to grade area and install sod to allow for future installation.

Alternate No. 4: Pool House Pergola

3. **Base Bid:** Contractor to provide all work and materials, including footings associated with the completion of the pergola per documentation.
4. **Alternate**: Submit **deduct** price to exclude all work and materials, including footings needed to provide pergola per documentation.

END OF SECTION 012300

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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SECTION 012500 – SUBSTITUTION PROCEDURES

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 administrative and procedural requirements for substitutions made prior to and after award of Contract.

B. Related Sections:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
3. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

C. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.

D. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment."

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

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

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to the Owner.

C. The following are not considered substitutions:

1. Revisions to the Contract Documents requested by the Owner or Architect.
2. Specified options of products and construction methods included in the Construction Documents.

1.4 PRE-BID SUBSTITUTIONS

A. The naming of specified items on the drawings or in the specifications means that such named items are specifically desired by the Architect and/or Owner. If the words "or acceptable equal" or "or approved equal" follows such named items, substitution requests may be submitted. **REQUESTS FOR SUBSTITUTIONS MUST BE RECEIVED BY ARCHITECT NOT LATER THAN TEN (10) BUSINESS DAYS PRIOR TO BID OPENING**.

B. **No** substitutions will be considered after receipt of bids unless conditions outlined in Part 2.1 are met as determined by the Architect. Any substitutions considered per Part 2.1 shall be subject to Architect and Owner's approval.

C. Substitution Request Forms: Requests must be submitted on copies of the enclosed form and must name the exact item proposed with complete information filled out and back-up data attached as specified on

that form. Use separate Substitution Request Form for each item. Submit substitution request form and back-up data combined into one Portable Data Format (PDF) file through Submittal Exchange. File shall be named with specification section number first, followed by a brief description of the item submitted for review, (e.g. 095113 Acoustical Ceiling Panels.)

1. Requests showing only brand name or manufacturer, or otherwise incomplete, will not be reviewed. Submit samples if requested.
2. Submit physical samples as directed by A/E, if requested.

D. Samples of proposed substitution and of specified products shall be submitted for comparison and review by Architect.

E. The Architect is the sole judge as to the equality of proposed substitutions. ONLY WRITTEN ACCEPTANCES WILL BE HELD VALID BY THE ARCHITECT.

F. If any substitution will affect a correlated function, adjacent construction, or the work of other trades or contractors, the necessary changes and modifications to the affected work will be considered as part of the substitution, to be accomplished without additional cost to the Owner, if and when accepted.

G. The Architect will review substitution requests received within ten (10) days prior to the Bid Opening date. The A/E is not obligated or required to review any and all substitution requests. The Architect is not obligated to inform bidders of incomplete and non-accepted requests.

H. Acceptance of substitutions will be indicated in writing by addendum.

I. Under no circumstances shall the Architect's acceptance of any such substitution relieve the Contractor from any terms and conditions of the Contract Documents, including timely, full and proper performance of the work.

1.5 SUBMITTALS

A. Substitution Request Submittals: Requests for substitution **may** be considered after commencement of the Work subject to conditions listed under Part 2.1. Requests received more than 30 days after commencement of the Work may be considered or rejected at the discretion of the Architect.

1. Submit three copies of each request for consideration. Submit requests on form in accordance with procedures required for Change Orders.
2. Identify product or fabrication or installation method to be replaced in each request. Include Specification Section number and title and Drawing numbers and titles.
3. Substitution Request Form: Use facsimile of form provided at the end of this Section.
4. 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 modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    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.
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 is equal to or better in every significant respect and complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated and will perform adequately in the application 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.

5. 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 **15** 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.

1.6 QUALITY ASSURANCE

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

1.7 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. **Substitutions for Cause**: Submit requests for substitution immediately upon discovery of need for change, but not later than **30** days prior to time required for preparation and review of related submittals.

1. Conditions: Architect **may** consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
   c. The specified product or method of construction cannot be provided within the Contract Time.

d. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
e. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
f. Substitution request is fully documented and properly submitted.
g. Requested substitution will not adversely affect Contractor's construction schedule.
h. Requested substitution has received necessary approvals of authorities having jurisdiction.
i. Requested substitution is compatible with other portions of the Work.
j. Requested substitution has been coordinated with other portions of the Work.
k. Requested substitution provides specified warranty.
l. 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:** Architect **may** consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations of merit, 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. Substitution request is timely, fully documented and properly submitted.
   e. Requested substitution will not adversely affect Contractor's construction schedule.
   f. Requested substitution has received necessary approvals of authorities having jurisdiction.
   g. Requested substitution is compatible with other portions of the Work.
   h. Requested substitution has been coordinated with other portions of the Work.
   i. Requested substitution provides specified warranty.
   j. 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.

C. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SUBSTITUTION REQUEST FORM

MAIL TO: Sapp Design Associates Architects
3750 South Fremont Avenue
Springfield, Missouri 65804

PROJECT: **Republic Parks Aquatic Center Expansion**
City of Republic
Republic, MO

SPECIFIED ITEM:_____ **SPEC SECTION**:_____

PROPOSED SUBSTITUTE:_____

SUBMITTED BY:

Firm: _____ Date: _____

Address:_____

Name: _____ Signature:_____

Phone No. _____ Fax No._____ Email: _____

Attach complete description, designation, catalog or model number, Spec Data Sheet and other Technical Data and samples, including Laboratory Tests if Applicable.

Why is substitution being submitted? [ ] Pre-Bid Substitution [ ]Specified Product not available (explain)_____
[ ] Cost Savings to Owner [ ] Other (explain)_____

Fill in blanks below:

1. Will substitution affect dimension indicated on drawings? _____
2. Will substitution affect wiring, piping, ductwork, etc., indicated on drawings? _____
   _____
3. What effect will substitution have on other trades? _____
   _____
4. Differences between proposed substitution and specified item? _____
   _____
5. Any and all impacts on costs, design modifications, additional architectural and engineering services, material and labor changes, schedule changes, and other unanticipated consequences, resulting from this substitution in lieu of the specified item, shall be the full responsibility of the contractor and his subcontractors and supplier.
6. Manufacturer's warranties of the specified items and proposed items are: [ ] same [ ] different, *explain:*
   _____
7. Why Specified Product /Material cannot be provided._____
   _____

REVIEW COMMENTS:

[ ] **No Exception taken to Submitted Manufacturer**
Manufacturer only is accepted due to time limitations for full review of product, or because no specific product data is submitted, or other unspecified reasons. Contractor must still bear full responsibility for compliance with contract requirements.

[ ] **No Exception taken to Specific Products**

[ ] **Exceptions Noted**
See attached copy or notes on product literature

[ ] **Not Accepted**

[ ] **Received too Late** **[ ] Incomplete Submission**

By:_____ Date:_____

Remarks:_____

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SECTION 012600 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections:

1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or if not indicated, within 14 days after receipt of Proposal Request, submit to the Architect for Owner's review 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 costs of labor directly attributable to the change. Indicate wage rate and number of man hours to complete the Work.
    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 form in same format as sample included at the end of this section or as acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work within 10 days of occurrence of cause for change. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor directly attributable to the change. Indicate wage rate and number of man hours to complete the Work.
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 Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use cost breakdown in format acceptable to Architect. Sample copy is included in the Project Manual at the end of this section.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: Refer to Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit Price Adjustment: Refer to Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

B. Submit an itemized list of all material and labor in each proposal for change items as shown by example of attached sample itemized proposal (included at the end of this section).

C. Deductive Change Orders shall include percentages for overhead and profit.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Architect may issue a Construction Change Directive when the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request.
2. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 MAXIMUM ALLOWANCE FOR OVERHEAD, PROFIT & LABOR BURDEN

A. Labor costs per hour shall be included with labor burden identified, which shall not be less than the prevailing wage rate, or actual labor rate, etc. Identify any labor burden costs over and above the prevailing wage rate. Labor burden costs shall not include overhead and profit charges as identified below. In no case shall labor burden costs exceed 15% of the wage rate.

1. Reference to wage rates is intended to include prevailing wage rates plus any additional fringe benefits that are part of the wage determination. The maximum Labor Burden of 15% is any additional labor mark ups over and above wage rates plus fringe benefits.

B. The overhead and profit charge by the Contractor and all subcontractors shall be considered to include, but is not limited to: performance/payment bond, job site office expense, incidental job burdens, truck expense including mileage, small hand tools, project supervision including field supervision, company benefits and general office overhead and preparation of additional pricing submittals for the proposed work. Percentages for overhead and profit charged for Change Orders shall be negotiable and may vary according to the nature, extent and complexity of the work involved. Percentage mark ups provided herein are intended to include the costs associated with all delay, disruption, extended job site presence and general office overhead resulting from the changed work.

C. Contractor shall submit with schedule of values, a proposed hourly labor rate schedule for changes to the work for all major trades that includes prevailing wage rate, labor burden as described above. This labor rate once approved by the Architect and Owner will be the basis for the maximum hourly labor rate on any future changes to the work.

D. The maximum Overhead and Profit shall be as follows:

1. For the Contractor, for work performed by the Contractors' own forces, 10% of the cost, including bond.
2. For the Contractor, for work performed by Subcontractors, 10% of amount due the subcontractor.
3. For each Subcontractor or Sub-Subcontractor, a maximum of 10% over direct cost from the supplier for materials.
4. For each Subcontractor, for work by his sub-subcontractor, 10% of the amount due the sub-subcontractor.
5. Overhead and Profit shall be shown separately for each subcontractor and the Contractor.

E. On proposals covering both increases and decreases in the amount of this contract, the application of overhead and profit shall be on the net change in the cost of the work. Proposals must show items to be deleted, if any, and the cost of the change shall be the result of the net difference to the base contract. Proposals are **not** to be determined by a re-bid of the entire scope of work except where changes significantly alter the entire scope of a particular trade.

F. The percentages for overhead and profit credit to the Owner on Change Orders that are solely decreases in the quantity of work or materials shall be no less than 10% but may be negotiated and may vary according to the nature, extent and complexity of the work involved, subject to approval of the Owner and Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - SAMPLE FORM

SAMPLE PRICING SHEET

Project:	Boiler Room Repairs for ABC Company		
Location:	Springfield, Missouri	Date:	March 11, 2017
Labor Rate:	$27.00	Estimator:	Jane Doe

Material	Units	Unit Measure	Material Per Unit	Man Hours Per Unit	Total Man Hrs.	Material Total
6" Tee	1	each	$45.00	2.000	2.0	$ 45.00
less 6" ell	1	each	$30.00	0.000	0.0	30.00
6" sch 40 pipe	15	feet	$10.43	0.253	3.8	156.45
6" cap	1	each	$11.00	1.500	1.5	11.00
6" hanger	1	each	$12.00	0.400	0.4	12.00
4" saddle weld	1	each	$ 0.00	1.200	1.2	0.00
4" sch 40	18	feet	$ 4.44	0.183	3.3	79.92
4" ell	3	each	$13.39	2.000	6.0	40.17
4" hanger	3	each	$ 8.00	0.300	0.9	24.00
4" weld	1	each	$ 3.00	1.000	1.0	3.00
1-1/2" cond sch 80	21	feet	$ 1.63	0.080	1.7	34.23
1-1/2" ell	3	each	$ 4.00	0.400	1.2	12.00
1-1/2" tee	1	each	$ 5.00	0.600	0.6	5.00
1-1/2" weld	1	each	$ 3.00	0.400	0.4	3.00
3/4" F & T trap	1	each	$73.00	0.500	0.5	73.00
3/4" strainer	1	each	$12.00	0.500	0.5	12.00
3/4" XH nipples	4	each	$ 7.70	0.100	0.4	30.80
3/4" unions	2	each	$ 3.18	0.300	0.6	6.36
3/4" cap	1	each	$ 0.65	0.100	0.1	.65
3/4" pipe sch 80	10	feet	$ 0.72	0.040	0.4	7.20
3/4" tee	1	each	$ 1.50	0.300	0.3	1.50
3/4" ell	3	each	$ 0.95	0.200	0.6	2.85
3/4" hanger	2	each	$ 2.50	0.200	0.4	5.00
SUBTOTAL					28.4	618.47
SALES TAX (if applicable)			6.125%			37.88
LABOR	28.4	MH	$27.00			765.96
SUBTOTAL						$1422.31
10% OVERHEAD AND PROFIT					142.23	
TOTAL						$1,564.54

END OF SECTION 012600

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SECTION 012900 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections:

1. Division 00 Section 000800 “Supplementary General Conditions” for administrative requirements governing retainage.
2. Division 00 Section 000900 “Prevailing Wage Determination.”
3. Division 01 Section "Allowances" for procedural requirements governing the handling and processing of allowances.
4. Division 01 Section "Unit Prices" for administrative requirements governing the use of unit prices.
5. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
6. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
7. Division 01 Section "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Correlate 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.
3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:
   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703.
3. If required by the Architect, arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.

b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
    1) Labor.
    2) Materials.
    3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of 5% of contract sum.
    a. Include separate line items under Contractor and principal subcontracts for project closeout requirements.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
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. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
9. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
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.
    a. Identify changes as separate line items.

1.4 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: Progress payments shall be submitted to Architect not later than the 25th day of the month for review and submission to Owner for payment. The period covered by each Application for Payment is one month, ending on the 15th day of the month prior to submission to Architect.

1. Submit draft copy of Application for Payment a minimum of seven days prior to due date for review by Architect.
2. Any pay application submitted after the 25th may not be acted upon or processed for payment until the next scheduled progress payment review.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
5. Include certified payroll and certification of compliance with all applicable rules and regulations for prevailing wage rates. See section 000900.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Payment for stored materials off site, is generally not allowed, and is strictly at Owner's option, and if allowed, is subject to compliance with Owner's specific requirements for right of entry confirmation and certification of Owner as additional insured.
2. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials and Right of Entry letter authorizing Owner to enter properly to verify stored materials or take possession of materials in case of default of subcontractor.
3. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
4. Provide summary documentation for stored materials indicating the following:
    a. Materials previously stored and included in previous Applications for Payment.
    b. Work completed for this Application utilizing previously stored materials.
    c. Additional materials stored with this Application.
    d. Total materials remaining stored, including materials with this Application.
5. Comply with any other requirements designated by the Owner.

F. Transmittal: Submit four signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien, and similar attachments if required.

1. Submit one copy of payroll on approved forms and certification of compliance with all applicable rules and regulations. See Section 000900 Prevailing Wage.
2. 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 liens from subcontractors, sub-subcontractors, and suppliers and any other entities lawfully entitled to file a mechanics lien arising out of Contract and related to work covered by payment for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or proceeded by conditional final waivers from every entity involved with performance of the Work covered by the application that is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner 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. Contractor's construction schedule (preliminary if not final).
4. Schedule of unit prices.
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal consultants, suppliers and fabricators.
8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Report of preconstruction conference.
11. Certificates of insurance and insurance policies.
12. Performance and payment bonds.

I. Application for Payment at Substantial Completion: After issuance of the Certificate of Substantial Completion, submit an Application for Payment. This application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

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.
3. See Section 017700 “Closeout Procedures” for limitations on number of onsite reviews for completion and related pay applications.

J. Administrative Actions and submittals that shall proceed or coincide with this application include:

1. Warranties (guarantees) and maintenance agreements.
2. Maintenance instructions.
3. Application for reduction of retainage.
4. Advice on transference of insurance coverage.
5. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

K. Final Payment Application: 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. Assurance that all work that has not been completed and accepted will be completed without delay. Final payment will not be made until all work has been completed and accepted.
3. Transmittal of required Project construction records to Owner.
4. Removal of temporary facilities and services.
5. Removal of surplus materials, rubbish and similar elements.
6. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

7. Updated final statement, accounting for final changes to the Contract Sum.
8. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
9. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
10. AIA Document G707, "Consent of Surety to Final Payment."
11. Evidence that claims have been settled.
12. 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.
13. Final liquidated damages settlement statement.
14. See Section 017700 “Closeout Procedures” for limitations on number of onsite reviews for completion and related pay applications.
15. See Supplemental General Conditions and Section 017700 for additional limitations to pay applications and release of retainage.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Administrative and supervisory personnel.
3. Coordination drawings.
4. Requests for Information (RFIs).
5. Project Web site.
6. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Sections:

1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

1.4 COORDINATION

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.
9. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out 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. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 KEY PERSONNEL

A. Key Personnel Names: Within **15** days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

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. All RFI’s from Sub-contractors shall be coordinated and routed through General Contractor.
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.
    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow a minimum of **seven (7)** working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following 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 or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "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 **10** days of receipt of the RFI response and before proceeding with any change in the work.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within **seven** (7) days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly Include the following information:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Construction Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT WEB SITE

A. General Contractor shall arrange for, provide, pay costs for, administer, and utilize Project Web Site with "Submittal Exchange" http://www.submittalexchange.com/public/implementation.aspx 1-800-714-0024, or pre-approved equal, third party Submittal Exchange Provider, for processing of construction administration documents for purposes of hosting and managing project communication

and documentation until Final Completion. Project Web Site shall include, but is not limited to, the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting minutes.
4. Submittals forms and logs.
5. Contract modifications forms and logs.
   a. Change Orders.
   b. Construction Change Directives.
   c. Supplemental Instructions.
6. Proposal Requests.
7. Requests for Change.
8. RFI forms and logs.
9. Field Reports and Photo Documentation.
10. Testing Reports.
11. Schedule and calendar management.
12. Payment application forms.
13. Online document collaboration.
14. Reminder and tracking functions.
15. Archiving functions.

B. Provide access licenses for use of the Owner, Architect, and Architect's consultants. All associated costs to obtain, set up, implement, utilize and manage the exchange service shall be by the General Contractor, including but not limited to, all distribution costs, licensing, set up costs, software costs and distribution to participating parties, as well as any other costs associated with use of the web based exchange or secure site.

C. Upon completion of Project, provide one complete archive copy of Project Web site files to Owner and to Architect in a digital storage format acceptable to the Owner and the Architect.

D. Contractor, subcontractors, and other parties granted access by the Contractor to project Web site shall execute a data licensing agreement in the form of **AIA Document C106**.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, at regularly scheduled intervals unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
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 (3)** days of the meeting.
4. Schedule Updating: Revise the construction schedule after each progress meeting.

B. Preconstruction Conference: Architect in conjunction with Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than **fifteen (15)** days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. 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.

3. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Any Phasing required.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Lines of communications.
   f. Procedures for processing field decisions and Change Orders.
   g. Procedures for RFIs.
   h. Procedures for testing and inspecting.
   i. Procedures for processing Applications for Payment.
   j. Distribution of the Contract Documents.
   k. Submittal procedures, shop drawings, product data & samples.
   l. Preparation of record documents.
   m. Use of the premises and existing buildings (if applicable).
   n. Work restrictions.
   o. Working hours.
   p. Owner's occupancy requirements.
   q. Responsibility for temporary facilities and controls.
   r. Procedures for moisture and mold control.
   s. Procedures for disruptions and shutdowns.
   t. Parking availability.
   u. Office, work, and storage areas.
   v. Equipment deliveries and priorities.
   w. Safety Procedures and First Aid.
   x. Security.
   y. Progress cleaning.
4. Minutes: Contractor shall be responsible for recording and distribution of meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. In addition and prior to installation of the following work, notify the Architect and Owner in writing a minimum of (7) days prior to the installation of the following items. Schedule pre-installation conference so that Architect, Consultants and Owner may attend.
   a. Concrete work / flat work.
   b. Structural Steel.
   c. Roofing.
   d. Masonry.
   e. Tile & Flooring.
   f. Ceiling Systems.
   g. Studs & Drywall.
   h. Underslab Plumbing.
   i. Electrical Work.
   j. HVAC Systems.
2. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner, of scheduled meeting dates.
3. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents requirements.
   b. Related RFIs and Change Orders.
   c. Deliveries.
   d. Submittals & Review of mockups.

e. Possible conflicts.
f. Time schedules & Weather limitations.
g. Manufacturer's written recommendations.
h. Warranty requirements.
i. Acceptability of substrates.
j. Surface protection during curing times (for concrete installations).
k. Temporary facilities and controls.
l. Space and access limitations.
m. Regulations of authorities having jurisdiction.
n. Testing and inspecting requirements.
o. Installation procedures.
p. Coordination with other work.
q. Protection of adjacent work.
r. Protection of construction and personnel.

4. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
5. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
6. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals but no less than once monthly. Notify Architect and Owner of scheduled meeting dates.

1. Coordinate dates of meetings with preparation of payment requests.
2. 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.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
        1) Review schedule for next period.
    b. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication updates and schedules.
        6) Access & Site utilization.
        7) Temporary facilities and controls.
        8) Progress cleaning.
        9) Quality and work standards.
        10) Status of correction of deficient items.
        11) Field observations.
        12) Status of RFIs & Status of proposal requests.
        13) Pending changes & Status of Change Orders.

14) Pending claims and disputes.
15) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information no later than 3 days after each progress meeting.
   a. Include a brief summary in narrative form of progress since the previous meeting and report.
   b. 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.

E. Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 60 days prior to the scheduled date of Substantial Completion. This meeting may be held in conjunction with a regularly scheduled progress meeting.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
   a. Preparation of record documents.
   b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
   c. Submittal of written warranties.
   d. Requirements for preparing operations and maintenance data.
   e. Requirements for demonstration and training.
   f. Preparation of Contractor's punch list.
   g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
   h. Owner's partial occupancy requirements.
   i. Installation of Owner's furniture, fixtures, and equipment.
   j. Responsibility for removing temporary facilities and controls.
4. Minutes: Contractor will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Daily construction reports.
3. Material location reports.
4. Field condition reports.
5. Special reports.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. One paper copy for Architect and Owner.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

C. Daily Construction Reports: Submit at **weekly** intervals.

D. Material Location Reports: Submit at **monthly** intervals to coincide with submission of application for progress payments.

E. Field Condition Reports: Submit at time of discovery of differing conditions.

F. Special Reports: Submit at time of unusual event.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, 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.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed 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: Comply with the following:

1. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
2. 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.
3. Punch List and Final Completion: Include not more than **30** days for punch list and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Work Restrictions: Show the effect of the following items on the schedule:
    a. Seasonal variations.
    b. Environmental control.
6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Startup and placement into final use and operation.
7. Other Constraints: Indicate as needed.

D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered RFIs.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.

E. 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. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

F. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within **20** days of date established for **Notice to Proceed**. Base schedule on the start-up construction schedule and additional information received since the start of Project.

G. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. Utilize the same breakdown of units as indicated in the “Schedule of Values” for the project.
2. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in **10** percent increments within time bar.
3. As work progresses, place a contrasting mark in each bar to indicate actual completion.

2.2 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents and unusual events.
8. Meetings and significant decisions.
9. Stoppages, delays, shortages, and losses.
10. Emergency Procedures.
11. Orders and requests of authorities having jurisdiction.
12. Change Orders or Construction Change Directives received and implemented.
13. Services connected and disconnected.
14. Equipment or system tests and startups.
15. Partial completions and occupancies.
16. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.3 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events,

persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At minimum, 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

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 013233 – PHOTOGRAPHIC DOCUMENTATION

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 administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final Completion construction photographs.

B. Related Sections include the following:

1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
2. Division 01 Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.
3. Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
4. Division 02 Section "Selective Structure Demolition" for photographic documentation before selective demolition operations commence.

1.3 SUBMITTALS

A. Construction Photographs: Submit digital files of each photographic view within seven days of taking photographs.

1. Identification: On each CD-ROM, provide an applied label with the following information:
   a. Name of Project.
   b. Name of Architect and Contractor.
   c. Date photograph was taken if not date stamped by camera.
   d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
2. Digital Images: Submit a complete set of digital image electronic files as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed tiff or jpeg format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.

C. Preconstruction Photographs: Before starting construction, take digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Take photographs to show existing conditions adjacent to property before starting the Work.
2. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs: Take min. of 12 digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

END OF SECTION 013233

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

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 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 including:

1. Shop drawings
2. Product Data
3. Samples
4. Color Selection Packages

B. Related Sections:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Division 01 Section “Project Management and Coordination” for administration and utilization of Project Web Site for managing submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.

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, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.

b. Specification Section number and title.
c. Submittal category: Action, informational.
d. Name of subcontractor.
e. Description of the Work covered.
f. Scheduled date for Architect's final release or approval.
g. Scheduled dates for purchasing.
h. Scheduled dates for installation.
i. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals except for the following disciplines. A **processing fee of $200 per sheet** will be charged for any requested CAD files.

1. Fire Protection

B. Electronic Submittals: See Division 01 "Project Management and Coordination" for administration of and utilization of Project Web Site for managing and processing submittals.

1. Shop drawings shall be submitted and processed through project web site.

C. Coordination:

1. Coordinate preparation and processing of submittals with performance of construction activities.
2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
3. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
4. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
5. 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 related submittals are received.

D. Processing Time: Allow sufficient 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 **three (3) weeks** for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow **two (2) weeks** for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow **three (3) weeks** for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow **three (3) weeks** for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
6. The Architect will make every effort to expedite reviews and will return submittals as soon as reasonably possible. However, the Contractor shall not base construction schedules upon anything less than a 3 week submittal review period.

7. Special conferences can be arranged upon request in order to expedite a submittal due to circumstances beyond control of the Contractor, and when agreed to by the Architect as reasonable and necessary.

E. Contractor's Stamp: All shop drawings and submittals shall bear the General Contractor's review stamp, dated and initialed, before being submitted to the Architect.

1. Any shop drawing submittal without General Contractors review stamp will be returned to the Contractor for review and re-submittal.

F. Fabrication Stamps:

1. **DO NOT submit shop drawings and submittals stamped "FOR REVIEW ONLY" or "NOT FOR CONSTRUCTION"**, or similar notations which imply a second review is required.
2. Architect's review and stamp is only for documents which are to be used in the field for construction. "Review only" sets require a second submittal and complete re-review. Second reviews of this nature will be back charged to the Contractor.

G. Copies: If a shop drawing submittal must be submitted via paper copy in lieu of electronic submittals, provide copies as follows:

1. A/E will retain (3) three copies. Provide minimum plus number of additional copies required by General Contractor.
2. Samples: Provide (2) sets

H. Identification and Information: Place a permanent label or title block on each paper copy 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 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:
    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.
        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
    j. Number and title of appropriate Specification Section.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Other necessary identification.

I. Identification and Information (Electronic Submittals): Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file 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 project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Include the following information on an inserted cover sheet:
    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    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. Related physical samples submitted directly.
    m. Other necessary identification.
5. Include the following information as keywords in the electronic file metadata:
    a. Project name.
    b. Number and title of appropriate Specification Section.
    c. Manufacturer name.
    d. Product name.

J. Options: Identify options requiring selection by the Architect.

K. Deviations: Identify deviations from the Contract Documents on submittals. The Contractor bears responsibility for informing the Architect of any submittals and/or products data which deviate from the contract requirements and specifications. Deviations must be clearly indicated and the reasons for the deviations reported in writing. Any costs related to any deviations whether accepted or not shall be the Contractor’s responsibility.

L. Contract Modification: Return of reviewed shop drawings and submittals DOES NOT CONSTITUTE AN AUTHORIZED CONTRACT MODIFICATION OR CHANGE. Failure to fully comply with the contract requirements and specifications is not waived by review of submittals. (See General Conditions of the Contract).

M. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

N. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will **NOT REVIEW** submittals received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:
    a. Project name.
    b. Date.
    c. Destination (To:).
    d. Source (From:).
    e. Names of subcontractor, manufacturer, and supplier.
    f. Category and type of submittal.
    g. Submittal purpose and description.
    h. Specification Section number and title.
    i. Indication of full or partial submittal.

j. Drawing number and detail references, as appropriate.
k. Transmittal number.
l. Submittal and transmittal distribution record.
m. Remarks.
n. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

O. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

P. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

Q. Use for Construction: Use only final submittals that are marked with approval 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. Submit electronic submittals via email as PDF electronic files.
   a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction, system and type of product or equipment. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options or choices are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications and installation instructions & recommendations.
   c. Standard color charts.
   d. Roughing in diagrams.
   e. Statement of compliance with specified referenced standards.

f. Testing by recognized testing agency.
g. Application of testing agency labels and seals.
h. Compliance with recognized trade association standards and testing agency standards.
i. Notation of coordination requirements.
j. Availability and delivery time information.

4. 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.
5. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific newly prepared information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Standard information prepared without specific reference to the Project is not considered Shop Drawings. Shop drawings marked "Not for Construction" or "For Approval Only" or other disclaimer type marks or notations by the supplier, subcontractor, manufacturers or contractor shall be rejected and returned for re-submittal.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products and materials included.
   b. Manufacturer's printed recommendations.
   c. Schedules.
   d. Compliance with specified standards.
   e. Installation drawings, setting diagrams & templates.
   f. Notation of coordination requirements.
   g. Notation of dimensions established by field measurement.
   h. Relationship and attachment to adjoining construction clearly indicated.
   i. Seal and signature of professional engineer if specified.
   j. General Contractors review stamp with initials and date of review.
2. Submit shop drawings in the following format:
   a. PDF Electronic file.

D. Samples: Submit Samples 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. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Architect will retain ONE Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least **three** sets of paired units that show approximate limits of variations.

E. Color Submittals: Submit all interior products requiring a color selection as a group, at one time. Colors must be coordinated as a single package and requires Architects and Owner's review and approval. Missing submittals may be cause for delay in approval of all color selections:

1. No extension of contract time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance to permit processing.
2. Typical minimum interior color package submittal:
   a. All flooring goods, wall base, and accessories.
   b. Paint materials.
   c. Ceiling materials.
   d. Wood finish products.
   e. Laminates.
   f. Stained concrete samples.
   g. Door stain samples.
   h. Interior cmu block.
   i. Any other prefinished components, requiring a color selection.
   j. Electrical and mechanical items; light fixtures.
   k. Special accessories.

F. Submit all exterior products requiring a color selection. Same requirements and procedures as listed above for interior color selections.

1. Typical minimum exterior color package submittal:
   a. Paints and special coatings.
   b. Masonry and Precast Materials.
   c. EIFS or Stucco finishes.
   d. Window and storefront finishes.
   e. Tinted glazing.
   f. Manufactured or colored masonry products.
   g. Prefinished metal products.
   h. Prefinished copings, flashings, etc.
   i. Siding materials.
   j. Metal roofing.
   k. Light fixtures and electrical equipment.
   l. Site appurtenances, if applicable.

m. Other prefinished components, including plumbing, mechanical louvers, etc.

G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

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.
4. Submit subcontract list in the following format:
   a. PDF electronic file.

J. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

K. Qualification Data: Where required, 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.

L. Welding Certificates: Where required, 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 American Welding Society (AWS) forms. Include names of firms and personnel certified.

M. Installer Certificates: Where required, 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.

N. Manufacturer Certificates: Where required, submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. Material Test Reports: Where required, 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.

R. Product Test Reports: Where required, submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. 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.

T. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

W. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

Y. 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 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally-signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will **NOT** review submittals that do not bear Contractor's approval stamp and will return them without action for Contractor's review and resubmittal.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

G. Only shop drawings and submittals which have Architect's and General Contractor's review stamps marked for release/review (see Paragraph 3.3) shall be used for fabrication, ordering, and for field installations.

3.3 ARCHITECTS STAMP

A. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked "Reviewed," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
2. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
3. Returned for Re-submittal: When submittal is marked "Rejected, Revise and Resubmit, Submit Specified Item," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
    a. Do not permit submittals marked "Rejected, Revise and Resubmit, Submit Specified Item", or for unmarked submittals, to be used at the Project site, or elsewhere where Work is in progress.

B. See below a copy of the Architect's submittal stamp.

☐ REVIEWED FOR DESIGN CONFORMANCE ☐ MAKE CORRECTIONS NOTED
If checked above fabrication MAY be undertaken.

☐ REVISE AND RESUBMIT ☐ SUBMIT SPECIFIED ITEM ☐ REJECTED
If checked above fabrication MAY NOT be undertaken. Resubmission is required prior to final approval. Identify any changes made in addition to the items marked.

This review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the plans and specifications. Review and acceptance of a specific item does not mean approval of an assembly of which the item is a component. Contractor is responsible for dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes and the means, methods, techniques, sequences, and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SAPP DESIGN ARCHITECTS

BY: _____

DATE: _____

PHONE: 417-877-9600 FAX: 417-877-9696

PLEASE NOTE

PER CONTRACT, THE CONTRACTOR BEARS ALL RESPONSIBILITY FOR CONFORMANCE WITH THE PLANS & SPECS, & FOR NOTIFYING THE ARCHITECT OF ANY DEVIATIONS &/OR SUBSTITUTIONS WITHIN THE SHOP DRAWING/SUBMITTAL, IN COMPLIANCE WITH SPEC SECTIONS 013300 "SUBMITTAL PROCEDURES" & 012500 "SUBSTITUTION PROCEDURES."

SHOP DRAWING USE

PER CONTRACT, THE ONLY SHOP DRAWINGS WHICH MAY BE USED IN THE FIELD ARE THOSE BEARING THE CONTRACTOR'S AND THE ARCHITECT'S STAMP, PROVIDED THAT ALL CONDITIONS OF THE CONTRACT ARE MET.

END OF SECTION 013300

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 014000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. The Contractor shall provide a Statement of Responsibility for all work requiring inspections, structural observations, and construction materials testing in accordance with Chapter 17 of the International Building Code. See attached "Contractor's Statement of Responsibility" form at the end of this Section. Form shall be submitted with balance of closeout documents or as required during permitting.

C. The **Contractor bears the sole responsibility** for the quality of the work performed.

D. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract observation activities performed by the Architect.

E. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

F. Related Sections:

1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.

1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.
2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.7 REPORTS AND DOCUMENTS

A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Architect, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

B. Test and Inspection Reports: Prepare and submit certified written reports of each inspection, test or similar service specified in other Sections. Include but not be limited to the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.

4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

D. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing & Inspection Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities and which specialize in the types of inspections and tests to be performed.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
3. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. When testing is complete, remove test specimens, assemblies, mockups, do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
   a. Allow seven days for initial review and each re-review of each mockup.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed, unless otherwise indicated.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in the drawings and individual Specification Sections, and as he may deem necessary to ensure the quality of the work, except where they are specifically indicated to be the Owner's responsibility or are to be provided by another identified entity. Those services specified to be performed by an independent agency and not by the Contractor shall be included in the Contract Sum unless specifically noted otherwise. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections or similar services were Contractor's responsibility, Contractor shall provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

1. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
2. Retesting shall be conducted by the Owner’s designated agency, and costs thereof deducted from the Contract amount.

F. Testing Agency Responsibilities: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities, deficiencies, or non-compliant work observed in the Work during performance of its services. Notify Contractor immediately of any non-compliant Work, or deficiencies observed.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.
7. Contact Owner or Architect immediately of any irregularities or deficiencies observed, if Contractor fails to correct noted non-compliant Work.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Services required include but are not limited to:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination:

1. Contractor and each agency engaged to perform inspections, tests, and similar services shall coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
    a. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner or Contractor as noted below will engage a qualified **testing agency** or **special inspector** to conduct special tests and inspections required by authorities having jurisdiction as indicated in individual Specification Sections, and as follows:

1. The **Contractor** will engage and pay for the services of an independent agency to perform specified quality control services. Generally, they include:
    a. **Scoping and Videotaping of new sanitary waste lines under building slabs, as well as any existing sanitary waste lines under the building into which the new lines feed.** General Contractor shall hire an independent agency to scope and camera new and existing sanitary sewer waste lines (3” and larger) under building slab to confirm adequate flow and compliance with documents. Videotaping of lines shall be conducted after lines have been installed, covered, filled and activated. A copy of the report and tapes of videos shall be given to the Owner.
    b. All other testing required by specification sections and not specifically identified as by the Owner shall be by the Contractor.
    c. Copies of testing reports shall be made available to all parties on the project web site. If a project web site is not utilized for the project, hard copies shall be sent to the Owner and Architect.

2. The **Owner** will engage and pay for the services of an independent agency to perform specified quality control services. Generally, they include:
    a. Concrete testing: Contractor shall be responsible for notifying testing agency and coordinating testing with the work.
    b. Earthwork compaction testing: Contractor shall be responsible for notifying testing agency and coordinating testing with the work.
    c. Structural steel connections/welds.
    d. Copies of testing reports shall be made available to all parties on the project web site. If a project web site is not utilized for the project, hard copies shall be sent to the Contractor and Architect.
    e. If Contractor notifies Owner's testing agency and Owners testing agency is not able to conduct testing due to improper scheduling or notification, then Contractor shall pay or reimburse Owner for any charges as a result thereof.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas, substrates and finishes to eliminate deficiencies including deficiencies in visual quality and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Cutting & Patching."

B. Protect construction exposed by or for quality-control service activities and protect repaired construction.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

REPUBLIC AQUATIC CENTER EXPANSION FOR THE CITY OF REPUBLIC

FOR WORK REQUIRING SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, AND CONSTRUCTION MATERIALS TESTING IN ACCORDANCE WITH CHAPTER 17 OF THE INTERNATIONAL BUILDING CODE.

Pursuant to Chapter 17 of the International Building Code identified in the Code Summary of the Documents, the Contractor identified herein is responsible for the construction of main wind- or seismic force-resisting system, designated seismic system or a wind- or seismic force-resisting component listed in the statement of special inspections of this Project and is hereby submitting this statement of responsibility to the building official of the jurisdiction having authority over this permit and to the Owner of this Project.

Project Name & Address: _____

_____

Are you the owner of this project and also acting as the contractor/builder? Yes No

Contractor's Company Name: _____

Name: _____

Title/Position in the Contractor's/Builder's Organization: _____

Mailing Address: _____

Email:_____ Phone:_____

1. I acknowledge awareness of the special requirements contained in the statement of special inspections noted on the approval plans;

2. I acknowledge that control will be exercised to obtain conformance with the construction documents approved by the building official;

3. I will have in-place procedures for exercising control within our (the contractor's/builder's) organization, for the method and frequency of reporting, and the distribution of the reports; and

4. I certify that I will have a qualified person within our (the contractor's/builder's) organization to exercise such control.

Signature: _____ Date: _____

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 014200 – REFERENCE STANDARDS AND DEFINITIONS

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 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. The term "approved" shall mean "no exception taken" in so far as the Architect's determination that submittals or work is observed to be in general compliance with the Contract. "Approval" does not relieve the Contractor of his duties to fulfill 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. The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

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": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. “Equal”: shall mean reasonably and/or exactly identical to or better. The Architect shall be the sole judge of compliance to this definition, in regard to submittals, substitutions, and work performed and proposed.

J. "Similar to" shall mean the same as equal.

K. "Project Site": Space available for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards establish different or conflicting requirements for minimum quantities or quality levels, the most

stringent requirements will be enforced unless specifically indicated otherwise by the Architect. Requirements that are different, but apparently equal, and other uncertainties shall be referred to the Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.

C. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

D. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections and generally based on the Construction Specifications Institute's Division format and MASTER FORMAT numbering system.

B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the full context of the Contract Documents so indicates.
   a. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

C. Products and Manufacturer’s Listings:

1. Where one or more products is named and without reference to an equal one of those products shall be supplied unless a substitute is approved by the Architect by written addendum or other contract modification procedure.
2. Where one or more products is named and associated with the phrases “or approved equal”, “or equal”, “similar to”, or similar language, the Contractor may substitute equal products by another manufacturer. See above for definition of equal. Any risks associated with the Architect making a judgment of “not equal” are the responsibility of the Contractor. Pre-bid requests and review are recommended, see Section 001250 “Substitution Procedures”.
3. Where one or more named products is not available or conflicts with a model no. or performance requirement, or is otherwise ambiguous or unclear, the Contractor shall inform the Architect prior to bidding for a clarification by addendum.

D. Performance Requirements:

1. Where a specific product is not named, and instead performance requirements and design criteria are indicated, the Contractor may submit a product which meets or exceeds such requirements.
2. Where performance criteria is indicated in addition to a named product, both requirements shall be met, or the more specific, stringent, or higher value, criteria shall be met. Any conflicts or ambiguities shall be reported to the Architect for clarification by pre-bid addendum.

1.5 GOVERNING REGULATIONS/AUTHORITIES

A. The Architect has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents; that information may or may not be of significance to the Contractor. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

1.6 ABBREVIATIONS AND ACRONYMS

A. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

1.7 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

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 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 requirements for temporary services, utilities, support facilities, and security and protection facilities.

B. Related Sections:

1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
2. Division 31 Section "Dewatering" for disposal of ground water at Project site.
3. Division 32 Section "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

C. Temporary utilities required include, but are not limited to:

1. Temporary electric power, as may be required.
2. Temporary lighting and power distribution and temporary security lighting.
3. Telephone service for field office by Contractor.
4. Storm sewer and/or erosion control and detention.
5. Temporary heating of components under construction and of completed spaces to protect from effects of cold and weather, and as may be required by other Sections of the Specifications.
6. Temporary water as may be required for construction activities.

D. Temporary construction and support facilities required include but are not limited to:

1. Field offices and storage sheds.
2. Sanitary facilities, including drinking water.
3. Temporary Project identification signs and bulletin boards.
4. Waste disposal services.
5. Construction aids and miscellaneous services and facilities.
6. Ramps, shoring, cribbing, coverings, etc.
7. Safety fencing around entire project, gates, barricades & traffic control as conditions may require.
8. Project sign.

E. Security and protection facilities required include but are not limited to:

1. Barricades, warning signs, lights, locked enclosures, etc.
2. Environmental protection.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated below. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

D. See “Prudent Use of Services” under “Operations, Termination and Removal” this Section.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1.5 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulations.

B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

D. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

B. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Chain Link Fencing: Provide a temporary fence construction of chain link fencing no less than 6 feet in height and supported by movable posts spaced no more than ten feet apart. Secure fence posts as necessary. Provide steel wire fabric with 2” mesh size. Posts and rails shall be sized as required for fence height, post spacing, and post type. Provide gates as required by the work. Provide all miscellaneous hardware and fittings. Check daily and maintain fence until completion of the work. This type of fencing shall be provided as a means of separation between all areas of construction and adjacent, student-occupied playground facilities.

C. Open-Mesh Fencing: Provide a temporary fence construction of plastic woven fencing no less than 4 feet in height and supported by metal tee posts spaced no more than ten feet apart. Secure fence posts as necessary to remain secure. Check daily and maintain fence until completion of work. Install fencing around entire boundary of work and portions of work as may be necessary to maintain the safety of the general public.

D. Project Sign: General Contractor shall provide 4'x8'pre-printd sign and erect framework for 8'x4' Project signage. Architect to provide graphic with both Architect and General Contractor logos. No additional signage or sign of advertisement will be allowed to be displayed, other than that specified, without written approval of the Architect.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, lockable entrances, operable windows, temperature controls, and foundations adequate for normal loading. At such time a designated location within the building is available for an office, which provides the same accommodations as above, and with Owner approval, the temporary office may be discontinued.

1. Provide temporary heat and cooling for Contractor's office area only.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
3. Drinking water.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
6. First Aid Supplies.

C. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material. Shield toilets to ensure privacy. Use of pit type privies will not be permitted. At such time new building toilets are operational, use of self-contained units may be discontinued, however Contractor shall be responsible for any damages as a result of use by Contractor or Sub-Contractors employees or others that are on site as a result of the work under this contract. Do not use plumbing lines for disposal or flushing of construction residues or debris. Contractor or Sub-contractor employees shall **not** use toilets in any portion of the building that is occupied or adjacent occupied buildings.

D. Temporary Communications: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station. All installation & usage costs for temporary phone service will be by the Contractor.

1. At each telephone, post a list of important telephone numbers.
2. Provide a fax machine in the temporary office or a computer with email and web access capabilities. Connect to service.
3. Project foreman/superintendent is required to carry a cellular phone.

E. Drinking Water Facilities: Provide containerized tap-dispenser bottled-water type drinking water units, including paper supply, or other approved sanitary drinking water service.

F. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

B. HVAC Equipment: 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 Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Contractor shall provide temporary heat as necessary until all sheetrock finishing and sanding or other duct producing activities are complete. **DO NOT** start up or use new mechanical equipment for temporary heat for completion of sheetrock work. Note: all warranties shall begin at Substantial Completion regardless of date of startup.

PART 3 - EXECUTION

3.1 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.

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect and will not be accepted as a basis of claims for a Change Order.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Gas Service: Contractor to provide temporary gas service if needed for construction services.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use. **See prudent use of services.**

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will **not** be permitted.

F. 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.

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

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

H. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

I. Electric Power Service: Connect to Owner's existing electric power service on site. Coordinate with other Contractors under separate contract. Maintain equipment in a condition acceptable to Owner. Include all materials required.

1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
2. Costs of installation of temporary power service or distributions systems will be by Contractor.

J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Provide Temporary Communications: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Provide telephone for each temporary office and first aid station. All installation & usage costs for temporary phone service will be by the Contractor.

1. At each telephone, post a list of important telephone numbers.
2. Provide a fax machine in the temporary office or a computer with email and web access capabilities. Connect to service.
3. Project foreman/superintendent is required to carry a cellular phone or a pager.
4. Provide superintendent with cellular telephone.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds, sanitary facilities and other temporary construction and support facilities for easy access located within construction area.
2. 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 Use of Permanent Roads and Paved Areas: Protect existing paved areas, sidewalks and roads from damage from deliveries or any other construction activities. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Cost of repairs of any existing areas damaged by Contractor or any deliveries or other activities by anyone providing service to the Contractor shall be paid by the Contractor.
2. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
3. Prepare subgrade and install subbase and base for new paved areas according to Division 31 Section "Earth Moving."
4. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
5. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."

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: Provide temporary parking areas for construction personnel. Coordinate with Owner and other Contractors on site. for use of existing parking areas or for designation of temporary parking areas. Maintain access for busses, staff and public access. Restore any areas used for temporary parking to original condition upon completion of the work.

E. 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 nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs or supports as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings or specified in this section.
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 signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

1. Do not use waste disposal facilities of other Contractors under separate Contracts.

H. 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.

I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 01 Section "Summary."

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, and authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

C. 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.

D. Tree and Plant Protection: Comply with requirements specified in Division 01 Section "Temporary Tree and Plant Protection."

E. 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 environmentally safe materials.

F. Site Enclosure Fence: **Before construction operations begin,** furnish and install enclosure fencing in a manner that will prevent students, people and animals from easily entering areas of construction except by entrance gates. Fencing shall be of type to provide security and safeguard against children in adjacent playground from entering into the areas of construction.

1. Extent of Fence: As required to fence off areas of Project site or portions determined sufficient to accommodate construction operations. Coordinate with other Contractors under separate contracts on site.
2. Any additional fencing as may be needed by the Contractor for storage of materials shall be the responsibility of the Contractor as he deems necessary to secure stored materials. All such fencing shall be included in the contract.

G. 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.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction and for safety of occupants.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions as necessary to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise and as noted on drawings for temporary access corridors.

1. Construct dustproof partitions with gypsum wallboard or plywood with joints taped on occupied side.
2. Insulate partitions to control noise transmission to occupied areas.
3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
4. Protect air-handling equipment.
5. Provide walk-off mats at each entrance through temporary partition.

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.

1. Prohibit smoking in construction areas.
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.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction and replace any materials with mold visible.

B. Exposed Construction Phase: 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 Phase: 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, replace or clean stored or installed material that begins to grow mold.

7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: 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 permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for **48** hours are considered defective.
   b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
   c. Remove materials that cannot be completely restored to their manufactured moisture level within **48** hours.

3.6 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. **Prudent Use of Services:** Owner will pay monthly usage costs, once permanent electric and water service is established. Contractor will use services only as necessary to perform the work, and will endeavor to avoid wasted usage and imprudent usage of energy services. Excessive or irresponsible usage and/or damages to utilities which cause excessive usage charges or repairs shall be borne by the Contractor. Contractor shall turn off lights at night (except as needed for security), shall keep openings in building closed and protected, and in all ways use utility services as if Contractor were paying for the services. Failure to do so may require Owner to back charge misuse or excessive usage costs to Contractor.

C. 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.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

C. Related Sections:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Substitution Procedures" for requests for substitutions.
3. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.

B. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
4. “Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
5. “Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

C. 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.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within (2) two weeks of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.
    a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

B. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products at site to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Store 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.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

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 Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, safety guards and other items, devices and details needed for a complete installation and indicated use and effect.
2. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
3. Where products are accompanied by the term "as selected," Architect will make selection.
4. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
5. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:

1. Product: (Proprietary)
   a. Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions will not be considered.

2. Manufacturer/Source: (Proprietary)
   a. 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 will not be considered.
3. Products: (Semi-Proprietary)
   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 will not be considered.
4. Manufacturers: (Semi-Proprietary)
   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 will not be considered.
5. **Non-Proprietary Specifications:** When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with requirements in "Comparable Products" Article (this section) and Contract Document provisions concerning "Substitutions" to obtain approval for use of an unnamed product.
6. **Descriptive Specification Requirements:** Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
7. **Performance Specification Requirements:** Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.
   a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
8. **Basis-of-Design Product:** Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
9. **Compliance with Standards, Codes and Regulations:** Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes **both** standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 016000

SECTION 017300 – EXECUTION

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 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. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting surveys.
2. Division 01 Section "Cutting & Patching" for cutting and patching.
3. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Division 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.
5. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor or professional engineer for Project construction staking.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal (if any).

1.5 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. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

A. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

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, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "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. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. 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.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable.

Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
   a. Utilize containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 017329 – CUTTING AND PATCHING

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 procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 01 Section "Selective Structure Demolition" for demolition of selected portions of the building.
2. Divisions 02 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
3. Division 07 Section "Penetration Firestopping" for patching fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least **10** days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information as applicable:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:

a. Foundation construction.
b. Bearing and retaining walls.
c. Structural concrete.
d. Structural steel.
e. Lintels.
f. Structural decking.
g. Miscellaneous structural metals.
h. Equipment supports.
i. Piping, ductwork, vessels and equipment.

B. 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. Obtain approval of cutting and patching proposal before cutting and patching operating elements. Operating elements include, but are not limited to the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Fire separation assemblies.
5. Mechanical systems piping and ducts.
6. Control systems.
7. Communication systems.
8. Conveying systems.
9. Electrical wiring systems.
10. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety. Miscellaneous elements include, but are not limited to the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Shoring, bracing and sheeting.
6. Piping, ductwork, vessels, and equipment.
7. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces 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.

E. If possible, retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

1. Processed concrete finishes.
2. Stonework and stone masonry.
3. Ornamental metal.
4. Matched-veneer woodwork.
5. Aluminum Wall Panel System.
6. Window wall system.
7. Exterior Finish and Insulation System.
8. Acoustical ceilings.

9. Tile Flooring.
10. Carpeting.
11. Wall covering.
12. HVAC enclosures, cabinets or covers.

F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, if identical materials are not available or cannot be used where exposed surfaces are involved, use materials that visually match in-place adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection:

1. Protect in-place construction during cutting and patching to prevent damage.
2. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

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. 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 as small as possible, neatly to 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 & Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. 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 possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate 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.
3. Floors and Walls:
    a. Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space.
        1) Provide an even surface of uniform finish, color, texture, and appearance.
        2) Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    b. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch.
        1) Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning:

1. Thoroughly clean areas and spaces where cutting and patching is performed or used as access.

2. Remove completely paint, mortar, oils, putty and items of similar nature.
3. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied.
4. Restore damaged pipe covering to its original condition.

END OF SECTION 017329

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Sections:

1. Division 0 Sections – Bidding and Contract Requirements regarding certificates of compliance.
2. Division 01 Section “Photographic Documentation" for submitting final completion construction photographic documentation.
3. Division 01 Section "Execution" for progress cleaning of Project site.
4. Division 01 Section "Operation and Maintenance Data" for O&M manual requirements.
5. Division 01 Section "Project Record Drawings" for submitting Record Drawings, Record Specifications, and Record Product Data.
6. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
7. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. 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. Upon written statement from the Contractor that the Work is complete, the Architect will repeat the inspection and notification procedure. **In the event the work is not complete, the Architect will repeat the inspection process one (1) additional time only. Further inspection procedures will be at the expense of the Contractor.**
2. Results of the completed inspection will form the basis of requirements for final acceptance.
3. Release of Retainage or portions thereof will not be approved without Consent of Surety.
4. Release of retainage or portions thereof will be determined by a multiplier of 150% applied to all remaining work not complete. Inspections to determine status of work complete and, therefore, release of retainage and pay applications are contingent upon the limits to number of inspections indicated above in 1.3.B.1.
5. Also see Supplemental Conditions.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit the final application for payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
3. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
6. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
7. Submit consent of surety to final payment.
8. Submit a final liquidated damages settlement statement.
9. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

B. Inspection: Submit a written request for final inspection for 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.

C. **INSPECTION SUMMARY**

1. **Architect will conduct one (1) inspection at notification for Substantial Completion.**
2. **Architect will conduct only one (1) additional inspection, if necessary, for determining Substantial Completion.**
3. **Architect will conduct one (1) inspection for Final Completion.**
4. **Architect will conduct only one (1) additional inspection, if necessary, for Final Completion.**

5. **Any additional inspections for Substantial Completion or Final Completion will be at the cost of the Contractor.**

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page: Project name, date, Architect, Contractor, page number.
4. Submit list of incomplete items in the following format:
   a. PDF electronic file or 2 paper copies.

1.6 WARRANTIES

A. Submittal Time: 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.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of 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.

D. 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 portion of Project:
   a. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   b. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   c. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice as necessary to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
   l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
   m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
   o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
   r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
   s. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls".

E. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

F. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not

discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 017700

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SECTION 017823 – OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 01 Section “Closeout Procedures” for submitting operation and maintenance manuals.
3. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 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. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Final Manual Submittal: Submit three copies each manual in final form at least 15 days before Final Completion. Architect will return copy with comments within 15 days.

1. Correct or modify each manual to comply with Architect's comments. Submit three copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. 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 materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
8. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

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

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold **8.5” x 11”** paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on **8.5" x 11"** white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

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

1. Emergency instructions.
2. Emergency procedures.

B. 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.

C. 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.

2.4 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. Operating standards.
3. Operating procedures.
4. Operating logs.
5. Wiring diagrams.
6. Control diagrams.
7. Piped system diagrams.
8. Precautions against improper use.
9. 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. Complete nomenclature and number of replacement parts.
5. Equipment function, characteristics and limiting conditions.

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.

2.5 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 and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. 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.

1. Include procedures to follow and required notifications for warranty claims.

2.6 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 and drawing or schedule designation or identifier where applicable.

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.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

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. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

H. Service Contracts: Include copies of any maintenance agreements with name and telephone numbers of service agents.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. 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.

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

D. 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.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. 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.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. 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.
2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

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SECTION 017839 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Sections:

1. Division 01 Section "Closeout Procedures" for general closeout procedures.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:
   a. Initial Submittal: Submit one set of marked-up record prints. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
   b. Final Submittal: Submit one paper copy set and PDF electronic files of marked-up record prints. 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 to the architect for the Owners records.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.

B. Record Prints: Maintain one set of blue or black line white prints of the Contract Drawings and Shop Drawings at the Project Site field office.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Mark whichever drawing is most capable of showing conditions fully and accurately.
    e. Record and check the markup before enclosing concealed installations.
    f. Cross-reference record prints to corresponding archive photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
7. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

C. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, scan a full set of fully annotated paper copies of Record Drawings and as follows:

1. Format: Annotated PDF electronic file with comment function enabled.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.

D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. 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. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

B. 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. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

C. Format: Submit record Specifications as annotated PDF electronic file or paper copy and scanned PDF electronic file(s) of marked up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations.

1. Upon completion of mark-up, submit complete set of record Product Data to the Architect for the Owner's records.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

C. Format: Submit record Product Data as annotated PDF electronic file or paper copy or scanned PDF electronic file(s) of marked up paper copy of Product Data.

1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

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.

1. Prior to Substantial Completion, submit to Architect for Owner’s records.

2.5 RECORD SAMPLES

A. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

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 modifications to project record documents as they occur; do not wait until the 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

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SECTION 017900 – DEMONSTRATION AND TRAINING

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 administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

B. Related Sections:

1. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including 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. At completion of training submit one complete training manual(s) for Owner’s use.

B. Attendance Record: For each training session, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: Equipment installer if experienced in equipment procedures or an authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations and personnel. Adjust schedule as required to ensure availability of Owner’s personnel.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training sessions for each system and for equipment not part of a system, as required by individual Specification Sections and as follows:

1. Pool, Pumps, chemical and chlorine systems, filters and controls.
2. Shade structures.
3. Motorized doors, including automatic entrance doors.
4. Equipment, including projection screens and food-service equipment.
5. Fire-protection systems, including fire alarm.
6. Intrusion detection systems.

7. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
8. HVAC instrumentation and controls.
9. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies and motor controls.
10. Packaged engine generators, including transfer switches.
11. Lighting equipment and controls.
12. Communication systems, including intercommunication, surveillance, clocks and programming, voice and data.

B. Training Modules: Develop a learning objective and teaching outline for each module. For each module, include instruction for the following as applicable:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Operating standards.
   c. Regulatory requirements.
   d. Equipment function.
   e. Operating characteristics.
   f. Limiting conditions.
2. Documentation: Review the following items:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Identification systems.
   e. Maintenance service agreements and similar continuing commitments.
   f. Warranties and Bonds.
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 and procedures for routine cleaning.
   c. Procedures for preventive and routine maintenance.
   d. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. 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. Assemble training modules into a training manual.

B. Set up instructional equipment at instruction location or arrange for instruction at equipment locations.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

   1. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

   1. Schedule training with Owner with at least seven days' advance notice.
   2. Training location and reference material: conduct training on-site in completed and fully operational facility using the actual equipment in place. Conduct training using final operation maintenance data.

C. Cleanup: Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 017910 – WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
2. General closeout requirements are included in Section "Project Closeout."
3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions-2 through 49.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, 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.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, 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.

D. 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.

1. Rejection of Warranties: 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.

E. The Owner reserves the right to refuse to accept Work for the Project where a special 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.

1.4 SUBMITTALS

A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other

than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. Refer to individual Sections of Divisions 2 through 49 for specific content requirements, and particular requirements for submittal of special warranties.
2. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (not applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF WARRANTIES

A. General Contractors Warranty: The General Contractor shall provide the Owner with a minimum one year warranty on the entire project in addition to specific warranties. Warranty period shall begin at time of Substantial Completion; except that for punch list items, and/or items not deemed complete or properly functioning as intended, the warranty shall begin from the point the Owner/Architect accepts the item as complete.

B. Schedule: Provide warranties and bonds on products and installations not specifically mentioned in this section but included in Sections 2-49.

END OF SECTION 017910

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 018000 – GEOTECHNICAL REPORT

A. A Geotechnical Report was completed for the City of Republic Aquatic Center Expansion on December 28, 2022. The report was prepared by Palmerton & Parrish, Inc. A copy of the report is included in this specification.

END OF SECTION 018000

GEOTECHNICAL ENGINEERING REPORT

REPUBLIC AQUATICS CENTER EXPANSION

711 EAST MILLER ROAD

REPUBLIC, MISSOURI

Prepared for:

City of Republic
c/o Sapp Design Architects
3750 South Fremont Avenue
Springfield, Missouri 65804

Prepared by:

Springfield, MO
4168 W. Kearney Springfield, MO 65803
Call 417.864.6000 Fax 417.864.6004
www.ppimo.com

PROJECT NUMBER: 285164

December 28, 2022

PALMERTON & PARRISH, INC.

GEOTECHNICAL & MATERIALS ENGINEERS
MATERIALS TESTING LABORATORIES
ENVIRONMENTAL SERVICES

4168 W. Kearney Street.
Springfield, MO 65803
Ph: (417) 864-6000
www.ppimo.com

December 28, 2022

City of Republic
c/o Sapp Design Architects
3750 South Fremont Avenue
Springfield, Missouri 65804

Attn: Ms. Kristi Beattie, AIA, LEED AP
Email: beattie@sdaarchitects.com

RE: Geotechnical Engineering Report
Republic Aquatics Center Expansion
711 East Miller Road
Republic, Missouri
PPI Project Number: 285164

Dear Ms. Beattie:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the proposed Republic Aquatics Center Expansion in Republic, Missouri. We appreciate this opportunity to be of service and if you have any questions, please don't hesitate to contact this office.

PALMERTON & PARRISH, INC.
By:

Shane M. Rader, P.E.
Geotechnical Engineer

STATE OF MISSOURI
SHANE M. RADER
NUMBER PE-2008019592
PROFESSIONAL ENGINEER
12/28/22
MO PE-2008019592

PALMERTON & PARRISH, INC.
By:

Brandon R. Parrish, P.E.
Vice-President

Submitted: One (1) Electronic .pdf Copy

BRP/SR

10,000 Hwy 160
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Ph: (417) 624-2005

PALMERTON & PARRISH, INC.

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APPENDICES

EXECUTIVE SUMMARY

A Geotechnical Investigation was performed for the Republic Aquatics Center Expansion located at 711 East Miller Road in Republic, Missouri. It is understood that the expansion will include, but not limited to the following structures:

- Cast-in-place or gunite lazy river with a slab-on-grade pool deck;
- Pool House(s);
- Pump Pit Structures;
- Slides;
- Retaining Walls; and
- Rental terraces that connect to the existing Aquatics Center.

Foundation loads are anticipated to be light to moderate. Minimal to moderate depths of cut and/or fill are anticipated to provide finish subgrade elevations.

Based upon the information obtained from the borings drilled and subsequent laboratory testing, the site is suitable for the new Republic Aquatics Center Expansion. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- Topsoil and soils influenced by vegetation were noted to depths of 0.5 to 1 foot below the ground surface. This material should be removed prior to the placement of new fill and reused outside structural fill areas;
- Up to 2 feet of undocumented fill material was encountered in Boring 1. It is recommended that this material be removed during initial site grading and may be reused as structural fill if properly re-compacted;
- Moisture sensitive lean clays were noted near the surface of the subgrade exploration. This material is generally stable in dry conditions but is sensitive to the

EXECUTIVE SUMMARY - CONTINUED

addition of moisture and repeated traffic especially when containing minor amounts of gravel and sand. Some over excavation and replacement or stabilization may be required of these soils where these soils are not removed during initial grading;

- It is recommended that the pool and lazy river bottoms be supported upon a minimum of 2 feet of non-frost susceptible materials for protection from frost heave, as well as provide uniform bearing to decrease the potential for differential settlements;
- Shallow or perched groundwater was not encountered at the subject site. Care should be taken during construction to limit the possibility of ponded water beneath the pool shell to reduce the effects of buoyancy on the pool shell;
- Due to the anticipated cuts along the southwest portion of the site, highly plastic (CH) clays may be exposed near finish grade. To decrease the potential for shrink/swell, it is recommended that site paving for pool decks and sidewalks be undercut sufficient to allow placement of a minimum 1 foot of LVC material. This will require natural CH soils to be undercut within the southwest portion of the site;
- Shallow foundations and the pool mat foundation can bear on native low volume change soils or non-frost susceptible controlled fill. Foundations bearing in native soils can be designed for an allowable bearing capacity of 3,000 psf for column footings and 2,500 psf for continuous/mat footings. Foundations bearing on controlled fill should be designed for an allowable bearing capacity of 2,500 psf for column footings and 2,000 psf for continuous/mat footings;
- The project site classifies as a Site Class C in accordance with Section 1613 of the 2018 International Building Code (IBC); and
- Palmerton & Parrish, Inc. should be retained for construction observation and construction materials testing. Close monitoring of subgrade preparation work is considered critical to achieve adequate subgrade performance.

GEOTECHNICAL ENGINEERING REPORT
REPUBLIC AQUATICS CENTER EXPANSION
711 EAST MILLER ROAD
REPUBLIC, MISSOURI

1.0 INTRODUCTION

This is the report of the Geotechnical Investigation performed for the proposed Republic Aquatics Center Expansion located at 711 East Miller Road in Republic, Missouri. This investigation was authorized by a letter proposal dated November 17, 2022 and signed by Ms. Jennafer Mayfield, Assistant Parks & Recreation Director for the City of Republic. The approximate site location is shown below:

The purpose of the Geotechnical Investigation was to provide information for foundation design and construction planning, and to aid in site development for the planned expansion. Palmerton & Parrish Inc.'s (PPI) scope of services included field and laboratory investigation of the subsurface conditions in the vicinity of the proposed project site, engineering analysis of the collected data, development of recommendations for foundation design and construction planning, and preparation of this engineering report.

2.0 PROJECT DESCRIPTION

Item	Description
Site Layout	See Figure 1: Boring Location Plan
Republic Aquatic Center Expansion	It is understood that the expansion will include a new cast-in-place or gunite lazy river, possible slide, pump pits, pool house(s), retaining walls and rental terraces that connect to the existing Aquatics Center.
Pavements	Paved sidewalks and decks are anticipated around the subject site.
Anticipated Foundation Loadings	Light to moderate bearing loads with light to moderate uplift loads.
Grading	Minimal to moderate depths of cut and/or fill are anticipated to provide finish grade elevations across this site.

3.0 SITE DESCRIPTION

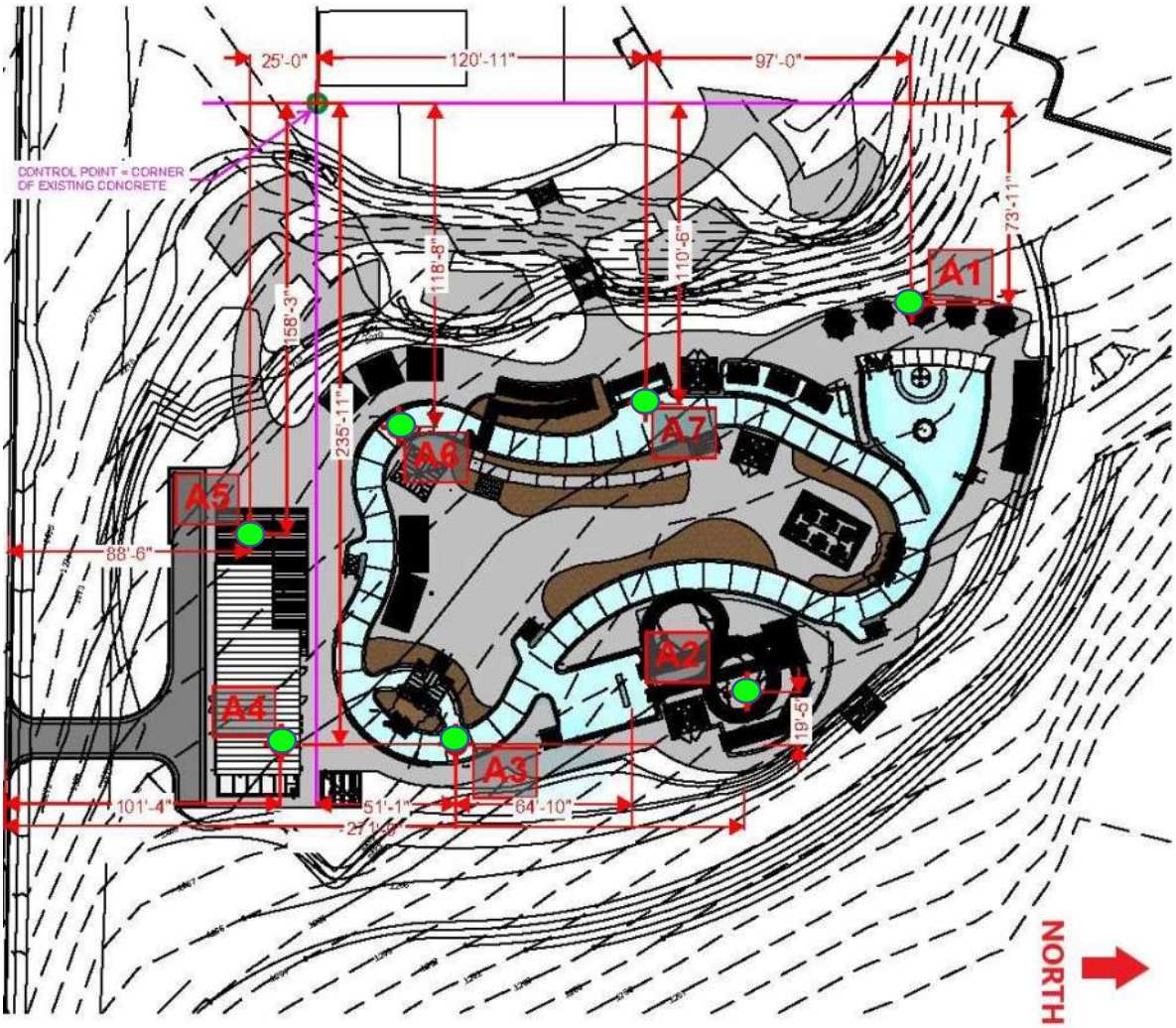
Item	Description
Physical Location	711 East Miller Road in Republic, Missouri.
Latitude: Longitude: (± Center of Project Site)	37.111592° -93.463685°
Available Historic Aerial Photography	The subject site in the area of the proposed pool has had little to no changes since 2005 when the Aquatics Center was constructed.
Current Ground Cover	The subject site is currently an open, grass covered park area with a walking trail located along the east side of the planned expansion.
Existing Topography	The subject site slopes with decreasing elevations to the east side of the subject site. The elevation change across the project area is up to 15 feet.
Drainage Characteristics	The site is well drained.

4.0 SUBSURFACE INVESTIGATION

As requested by the Design Team, subsurface conditions were investigated through completion of seven (7) subsurface borings and subsequent laboratory testing.

4.1 Subsurface Borings

Boring locations were selected by Sapp Design Architects (Sapp) and staked in the field by PPI using a site plan provided by the Client. Approximate boring locations are shown on the image below. Boring Locations are indicated by the green circles and labeled A1 through A7, and referenced as Borings 1 through 7 throughout this report.



The Missouri One-Call System was notified prior to the investigation to assist in locating buried public utilities. Logs of the borings showing descriptions of soil and rock units encountered, as well as results of field tests, laboratory tests and a "Key to Symbols" are presented in **Appendix I.** Approximate surface elevation at each boring location was estimated using the site plan provided by Sapp and are noted on each boring log.

Borings were drilled on December 16, 2022 using 4.5-inch O.D. continuous flight augers powered by an ATV-mounted drill-rig. Soil samples were collected at 2.5 to 5-foot centers during drilling using a split spoon sampler while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586. Please refer to **Appendix II** for general notes regarding boring logs and additional soil sampling information.

4.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Moisture Content (ASTM D2216);
- Atterberg Limits (ASTM D4318);
- Grain Size Analysis (ASTM D6913); and
- Pocket Penetrometers.

Laboratory test results are shown on each boring log in **Appendix I** and are summarized in the following table. Results of the grain size analysis are presented in **Appendix III**.

Boring	Depth (ft.)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Moisture Content (%)	USCS Symbol	% Passing No. 200 Sieve
2	3	39	18	21	18.6	CL	59.2
3	3	56	17	39	25.3	CH	-
5	3	70	22	48	32.9	CH	86.7
6	6	87	26	61	43.8	CH	86.2

5.0 SITE GEOLOGY

The general site area is underlain at depth by the Mississippian Age Burlington Limestone Formation. This unit characteristically consists of coarse-grained gray limestone, which is nearly pure calcium carbonate. Isolated chert nodules and discontinuous chert layers are present throughout the formation. The upper surface of this limestone unit is generally

irregular due to the effects of differential vertical weathering and solution activity. Limestone pinnacles, some of which are 10 to 15 ft. high, are common in the general area. In upland areas, overburden soils are usually composed of red clay and chert and are residual having developed from physical and chemical weathering of the parent limestone. The chert fragments were interbedded with the limestone, but are much more resistant to weathering and retain rock-like properties. The contact between comparatively unweathered bedrock and the residual soils is usually abrupt.

The general site area is located within the Ozarks Physiographic Region of Missouri, which is characterized by rugged to rolling hill terrain, meandering streams and karst topography. Karst topography forms over areas of carbonate bedrock where groundwater has solutionally enlarged openings to form a subsurface drainage system. Springs, caves, losing streams and sinkholes are common in karst areas. Sinkholes are defined as a depression in the landscape with an internal drainage system.

Based upon readily available digital topographic information, as well as conditions encountered within the borings drilled, no indications of sinkhole activity was identified. However, the Owner and contractor should be aware that it is possible for karst features to be encountered at the project site during construction. If a karst feature is identified during site grading, PPI should be contacted immediately for evaluation on a case-by-case basis.

6.0 GENERAL SITE SUBSURFACE CONDITIONS

Based upon subsurface conditions encountered within the borings drilled at the project site, generalized subsurface conditions are summarized below. Soil stratification lines on the boring logs indicate approximate boundary lines between different types of soil units based upon observations made during drilling. In-situ transitions between soil types are typically gradual.

6.1 Soils

Based on the results of the subsurface exploration, the subject site primarily consists of brown and brown tan lean clays or clayey gravels over red brown gravelly fat clay

with variable amounts of gravel and sand. A shallow layer of undocumented fill was encountered in Boring 1 extending to a depth of 2 feet. The surface of the site is covered in approximately 6 to 12 inches of topsoil containing roots from vegetation. Lean clays or clayey gravels generally extend to depths between 3 to 6 feet below the ground surface in all borings except Boring 1. Shallow to deeper clays encountered in all borings consisted of fat clays with varying amounts of gravel and extended to top of limestone. The fat clays often become very moist and soft a few feet above limestone bedrock which is typical within this general site area.

6.2 Limestone Bedrock

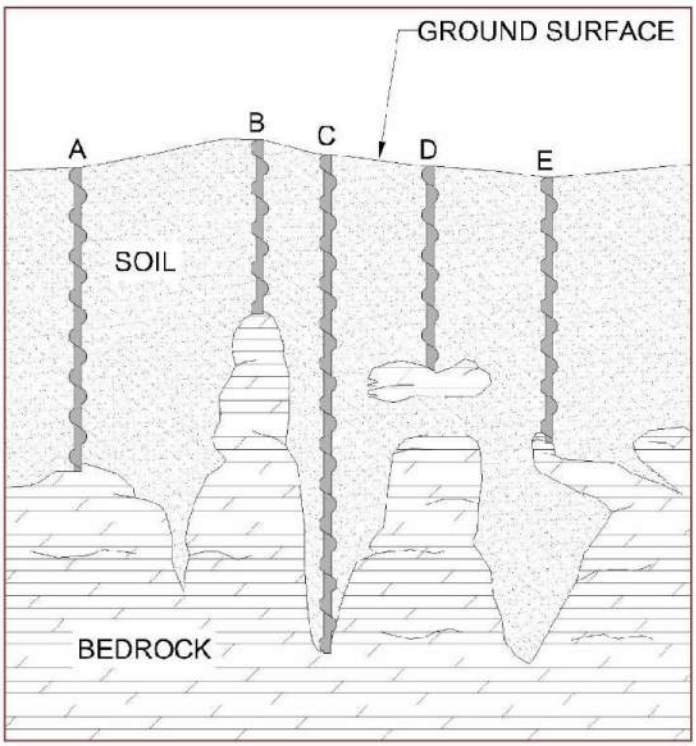
Limestone was encountered in all borings at depths ranging from 11 to 15 feet below existing ground surface. The upper portion of the limestone was pinnacled, as often found in the Republic area. Refer to the table below for approximate depth of limestone encountered in each boring.

Boring	Approximate Surface Elevation	Approximate Depth to Top of Limestone (ft.)	Correlating Elevation of Top of Limestone
1	1268.0	15.0	1253.0
2	1263.5	13.3	1250.2
3	1266.5	11.0	1255.5
4	1268.0	15.0	1253.0
5	1271.0	14.0	1257.0
6	1270.5	13.8	1256.7
7	1268.5	14.0	1254.5

6.3 Auger Refusal

Auger refusal is defined as the depth below the ground surface at which a boring can no longer be advanced with the soil drilling technique being used. Auger refusal is subjective and is based upon the type of drilling equipment and types of augers being used, as well as the effort exerted by the driller. Several different auger refusal conditions are possible in the general site area. These conditions are represented graphically in the adjacent figure: (A) on the upper surface of continuous bedrock, (B) on rock “pinnacles”, (C) in widened joints that may extend well below the surrounding

bedrock surface, (D) slabs of unweathered rock suspended in the residual soil matrix, or “floaters”, or (E) on the upper surface of discontinuous bedrock.



Note: The bedrock conditions illustrated above are for reference only and do not indicate conditions encountered at the project site.

Due to possibility that some or all of these features exist at this project site, estimating the exact quantity of rock excavation, if any, is difficult. Linear interpolation of apparent bedrock elevations based upon the boring data is often used but can misrepresent actual rock removal quantities where such anomalies exist.

6.4 Groundwater

Shallow groundwater was not observed within the borings on the date drilled. Groundwater levels should be expected to fluctuate with changes in site grading, precipitation, and regional groundwater levels. Perched groundwater is often encountered near the interface of natural overburden soils and the underlying limestone bedrock. Groundwater may be encountered during wetter periods.

7.0 EARTHWORK

7.1 Site Preparation

Minimal to moderate depths of cut and/or fill are anticipated to provide finish grade elevations across this site. The initial phase of site preparation should include the steps listed below;

- **It is recommended that a representative from PPI be present during site preparation to help identify the conditions described below**;
- Stripping and removal of all topsoil and vegetation as describe in **Section 7.2**;
- Removal of the undocumented fill material encountered in Boring 1 extending to a depth of 2 feet as described in **Section 7.3**;
- Areas of lean clay may be sensitive to moisture and require over excavation and replacement or stabilization if exposed to rain, excessive moisture, or repeated traffic as described in **Section 7.4;**
- Fat clay soils were noted in the subsurface exploration within the area of the Aquatic Center Expansion. These materials are noted to be prone to swelling; however, it is the experience of this firm that where these materials contain greater than 35 percent of coarse-grained materials, the amount of swell potential is greatly reduced. Further, based upon PPI's past experience in the Republic area, if these soils are moisture conditioned and maintained, the swell potential is also significantly reduced. **However, within the planned site paving areas for pool decks and sidewalks in cut areas, it is recommended that all natural CH soils be undercut to allow placement of 1 foot of controlled LVC material to limit the potential for shrink/swell. This is further discussed in Section 7.7;**
- Drained pool conditions in winter months are anticipated for the proposed new pool expansion. Accordingly, frost considerations of the subgrade material should be considered, as well as buoyancy of an empty shell in ponded water as described in **Section 7.6 and 9.1;** and

- All areas scheduled to receive new fill should be proof-rolled as described below**. Fill should not be placed on a frozen subgrade**.

Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber-tired construction equipment and noting any areas which rut or deflect during rolling. All soft subgrade areas identified during proof-rolling should be undercut and replaced with compacted fill as outlined below. Proof-rolling, undercutting, and replacement should be monitored by a qualified representative of the Geotechnical Engineer. The depth and areal extent of undercutting, if any, should be minimal but will be largely dependent upon the time of year and related soil moisture conditions. If construction is initiated during wetter spring or winter months, the requirement for undercutting soft surficial soils below normal topsoil stripping should be anticipated and reflected in contract documents. As previously mentioned, lean clays at the project site are moisture sensitive and may pose difficulties regarding subgrade stability and proper compaction.

7.2 Topsoil

Topsoil was noted in the subsurface exploration to depths of approximately 6-inches below the ground surface. Due to the influence of vegetation and trees, this material should be stripped from construction areas and stockpiled for use in non-structural areas or removed from the site. Large root systems, such as root balls from trees or any root over 6 inches in diameter should be included in the removal of topsoil from beneath structures and pavements. Root systems may extend to depths deeper than those noted in the subsurface exploration. It should be noted that the use of the term topsoil within this report is for site construction and does not imply that the material is suitable for sale as topsoil. Due to the increased gravel and sand contents and the plasticity of some of the topsoil, some of this material may not be suitable for re-use as a surficial landscaping material.

7.3 Undocumented Fill

As mentioned previously, undocumented fill material was encountered in Boring 1 extend to 2 feet below existing ground surface. It is recommended that the

undocumented fill material be removed from below all planned structures. Based upon the samples obtained from Boring 1, it is anticipated that the undocumented fill may be reused as controlled fill if placed in accordance with the following sections of this report.

7.4 Soft Surficial Soils

Areas of lean clay were noted near the surface in the borings, sometimes containing minor amounts of gravel and sand. Generally, these materials may be stable during dry weather; however, these materials are anticipated to be sensitive to the addition of moisture. **During wet seasons or rain events or when exposed to repeated traffic, the near surface lean clay soils may become unstable and require over excavation and replacement or stabilization.** The amount of over excavation will be dependent upon conditions encountered during construction and final site grading.

7.5 Drained Pool Conditions

Due to the proposed new pool being an open-air feature with no heating, it is anticipated that the pool will be drained during winter months. If the pool is drained during winter months, the material beneath the water features and lazy river may be exposed to frost conditions. Accordingly, care should be taken that the water features and lazy river are supported on non-frost susceptible materials as described in **Section 9.1.**

Additionally, drained pools have historically been known to have buoyancy issues where groundwater or ponded water conditions are present. Care should be taken to properly counter these conditions or provide proper drainage to the subsurface so water does not collect in the subsurface materials. See **Section 9.0** for additional information on pool buoyancy.

7.6 Pool Bearing Material Sensitivity

Based on the proposed grading plans provided to PPI, pool area final grades will be composed of primarily deeper cuts; however, the east side of the pool may contain up to 3 feet of fill. Due to the sensitivity of pool shells to differential settlements, it is

recommended that the pool features and lazy river bear all on uniform fill (such as non-frost susceptible material) which will be placed on properly prepared native soils. Proper earthwork and compaction of fill placed beneath the pool shell will be critical to the performance of the pool shell. Accordingly, it is recommended that final cuts and full-time inspection of fill placement be performed in the expansion area.

It is anticipated that below pool drainage systems will be placed at the subject site. It is recommended that any fill to be placed beneath the pool structures be placed prior to the placement of piping to allow for proper compaction. Once final grades have been established channels for the piping can be cut into the fill. Care should be taken to disturb the new controlled fill as little as possible during pipe installation.

7.7 Low to Moderate Swell Potential – Site Paving Areas

Based upon anticipated grading, highly plastic soils may be exposed within planned cut areas, especially within the southwest portion of the site. To reduce the potential for shrink/swell, it is recommended that all exterior site paving for pool decks and sidewalks be undercut sufficient to allow placement of a minimum 1 foot of LVC material. This will require natural CH soils to be undercut in the southwest portion of the site. All controlled fill should be placed in accordance with **Section 7.9**.

7.8 Scarifying and Recompacting

Subgrade areas approved after proof-rolling should be scarified to a depth of at least 8 inches and soil moisture adjusted and compacted to comply with project specifications.

7.9 Fill Material Types

Fill Type[1]	USCS Classification	Acceptable Location for Placement
Low Volume Change (LVC) Engineered Fill[2]	Non-shaley CL[5], GC or SC (LL < 50%)	All locations and elevations
On-Site Natural Soils	CL[5], GC & SC	All locations and elevations
	CH	See Note 3
Potential Borrow Material	CL[5], SC & GC	All locations and elevations
	CH	See Note 3
Rock Fill[4]	GW	All locations and elevations

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 4 to 6 in. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use.
2. Non-shaley, low plasticity cohesive soil or granular soil having at least 15% low plasticity fines.
3. CH clays with a Liquid Limit equal to or above 50% are considered suitable for use as controlled fill, only if the percentage of rock fragments exceeds 35% or if placed 2 feet below shallow foundations, or slab areas.
4. If rock fill will be utilized at the project site see Section 7.9.1.
5. Caution should be exercised when utilizing on-site lean clays as fill material, when containing reduced gravel percentages. These soils are moisture sensitive and may not provide a stable subgrade even when properly compacted when soil moisture is above optimum.

7.9.1 Rock Fill

If rock is to be used as the primary filling medium, embankments should be constructed using rock having maximum dimensions in excess of 4 inches, but no greater than 8 inches. Rock material should be placed in horizontal layers having a thickness of approximately the maximum size of the larger rock comprising the lift, but not greater than 12 inches. Rocks or boulders too large to permit placing in a 12-inch-thick lift should be reduced in size as necessary to permit placement or be bladed over the edge of the fill and not used in the compacted fill. Rock fill should not be dumped into place but should be distributed in horizontal lifts by blading and dozing in such a manner as to ensure proper placement into final position in the embankment. Finer material including rock fines and limited soil fines should be worked into the rock voids during this blading operation. Excessive soil and rock fine particles preventing interlock of cobble and boulder sized rock should be prohibited. Rock fill should be consolidated by a minimum of three (3) passes of a large diameter self-propelled vibratory compactor. Terminal fill slopes

using rock may be constructed 1.5 horizontal to 1 vertical for fill height of 15 feet or less. The testing of rock fill quality should include the requirements that a representative of the Geotechnical Engineer be present daily, but not necessarily continuously during the placement of the fill to observe the placement of rock fill in order to determine fill quality and to observe that the contractors work sequence is in compliance with this specification. Progress reports indicative of the quality of the fill should be made at regular intervals to the Owner. If improper placement procedures are observed during the placement of the fill the Geotechnical Engineer should inform the Contractor, and no additional fill should be permitted on the affected area until the condition causing the low densities has been corrected and the fill has been reworked to obtain sufficient density.

7.10 Compaction Requirements

Item	Description
Subgrade Scarification Depth	At least 8 inches
Fill Lift Thickness	8-inch (loose)
Compaction Requirements for Coarse Grained Material[1]	• 70% Relative Density or compacted by a minimum of three (3) passes of a self-propelled smooth drum vibratory compactor.
Compaction Requirements for Fine Grained Material[1]	• 95% Standard Proctor Density (ASTM D698).
Moisture Content	• ± 2% optimum moisture for CL, SC, or GC soil types; or • 0 to 4% above optimum for CL-CH or CH soil types.
Recommended Testing Frequency	• One (1) Field Density (compaction) test for each 2,500 sq. ft. of fill within structure areas; and • A minimum of three (3) tests per lift.
1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.	

7.11 Landscaping & Site Drainage

Discharge from roof/structure downspouts and general site drainage should be collected and diverted well away from the pool perimeter and incorporated into the design drainage plans. Rapid, efficient runoff away from the pool should also be

provided. In addition, landscaping requiring frequent watering should be prohibited adjacent to the pool shell.

Provisions should be implemented to reduce the potential for large fluctuations in moisture within the subgrade soils adjacent to the pool and pool structures. Ponding of surface water outside the pool shell but immediately adjacent to the pool shell and sidewalks can significantly increase subgrade moisture and may result in undesirable subgrade movement. As previously mentioned, careful consideration should be given to the landscaping and drainage elements to be installed at the project site adjacent to the pull shell and other pool structures. **Trees and some large bushes can draw significant moisture from the subgrade soils, resulting in shrinkage and subsequent foundation/shell movement.**

7.12 Earthwork Construction Considerations

Once grading and filling operations have been completed, the moisture within the subgrade should be maintained and soils not be allowed to dry and desiccate prior to construction of pool shell slabs and other pool structure footings. Grading of the site should be performed in such a manner so that ponding of surface water on prepared subgrade or in excavations is avoided. During construction, if the prepared subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be scarified or removed, moisture conditioned and recompacted prior to floor slab construction.

7.13 Excavations

Based upon the subsurface conditions encountered during this investigation, the on-site soils typically classify as Type B in accordance with OSHA regulations. Temporary excavations in soils classifying as Type B with a total height of less than 20 feet should be cut no steeper than 1H:1V in accordance with OSHA guidelines. Confirmation of soil classification during construction, as well as construction safety (including shoring, if required), is the responsibility of the contractor.

8.0 FOUNDATIONS

As requested by the client, PPI has included recommendations for foundation design. It is anticipated that the pool shell will be treated as a shallow mat foundation and that other related pool structures will be supported by a shallow foundation system.

8.1 Building Foundations

Based upon the subsurface conditions encountered across this site and anticipated site grading, footings for pool structures can bear in medium stiff to stiff and/or medium dense to dense natural soils. Additionally, the new pool shell can bear on non-frost susceptible controlled fill as noted above. Please refer to the section below for recommendations regarding shallow foundations.

8.2 Shallow Foundation Design Recommendations

Description	Column (Spread Footing)	Wall (Continuous Footing)
Net allowable bearing pressure[1]	• Native Soil: 3,000 psf • Controlled Fill: 2,500 psf	• Native Soil: 2,500 psf • Controlled Fill: 2,000 psf
Minimum dimensions	2.5 feet	1.5 feet
Minimum embedment below finished grade for frost protection and variation in soil moisture[2] (footings on soil)	2 feet	2 feet
Estimated total settlement[3]	1/2 inch or less	1/2 inch or less
Allowable passive pressure[4]	600 psf	600 psf
Coefficient of sliding friction[5]	0.4 (natural soils/controlled fill)	0.4 (natural soils/controlled fill)
Modulus of subgrade reaction for the proposed pool shell mat foundation[6]	125 psi/in.	

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The recommended pressure considers all unsuitable and/or soft or loose soils, if encountered, are undercut and replaced with tested and approved new engineered fill. Footing excavations should be free of loose and disturbed material, debris, and water when concrete is placed. A factor of safety value of 3 has been applied to these values.
2. For perimeter footings and footings beneath unheated areas.
3. The foundation movement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations.
4. Allowable passive pressure value considers a factor of safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved fill compacted to at least 95% of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 2 feet of the soil below the final adjacent grade due to strength loss from freeze/thaw and shrink/swell.
5. Coefficient of friction value is an ultimate value and does not contain a factor of safety.
6. This value does **not** contain a factor of safety.

8.3 Uplift

Resistance of shallow spread footings to uplift (U_p) may be based upon the dead weight of the concrete footing structure (W_C) and the weight of soil backfill contained in an inverted cone or pyramid directly above the footings (W_S). The following parameters may be used in design:

Description	Weights
Weight of Concrete (W_c)	150 pcf
Weight of Soil Resistance (W_s)	100 pcf
Weight for on-site soils placed in accordance with **Section 7.**	

The base of the cone or pyramid should be the top of the footing and the pyramid or cone sides should form an angle of 30 degrees with the vertical. Allowable uplift capacity (U_p) should be computed as the lesser of the two (2) equations listed below:

$$U_P = (W_S/2.0) + (W_C/1.25) \text{ or } U_P = (W_S + W_C)/1.5$$

9.0 BELOW GRADE POOL CONSIDERATIONS

Pool and aquatic features are highly susceptible to settlement and movements due to the rigidity of the construction materials. Additionally, because these features contain water often chlorinated or salted, failures in the structures typically experience larger movements due to the introduction of water to the subgrade. Therefore, it is important that pool designs take into consideration site specific geotechnical considerations. Proper maintenance operations are also vital in the longevity of a pool/aquatics system and should not be overlooked.

Below is a list of geotechnical items to be considered for pool and aquatic park systems:

- **Groundwater Concerns:** While the pool is filled this is not a concern; however, when the pool is drained, the ponding of water may create enough buoyant force to lift the pool shell out of the ground. It is recommended that pools contain a proper under-pool drainage system to capture possible ground water and remove it from below the pool system;

- **Isolated Pool Shells:** Due to a pool's increased sensitivity to settlement, the pool shell should be isolated from any structure that may increase the possibility of settlement. Generally, foundations for structures should be kept a minimum of 2 foundation widths away from the edge of the pool shell, if possible. If this scenario is not possible, supporting these structures that are adjacent to the pool shell should be supported upon deeper footings or individual drilled shafts bearing below pool shell bottom. It is not recommended that pool decks be tied into the pool shell;

- **Expansion Joints:** Expansion joints within a pool system should be avoided if possible. Due to the degradation of expansion joints with time, expansion joints

are prone to leaking and are often the first areas of failure of a pool system. Leaking in these areas can cause increased swelling or erosion of subsurface soils resulting in pool shell failure. If expansion joints are utilized, they should be evaluated and maintained on a regular schedule;

- **Design for At-Rest Wall Conditions:** Pool side walls should be designed for At Rest wall conditions, as backfill material will generally not be able to be placed properly behind pool walls. Design recommendations for at rest wall conditions are provided below; and
- **Pool Construction and Future Work Near the Pool:** Care should be taken during construction and once the pool system has been installed to not introduce surcharge loads on the pool shell with heavy machinery or by other means.

9.1 Frost Considerations

It is anticipated that the proposed pool area will be an outdoor feature with no controlled heating/cooling. Accordingly, it is anticipated that the pool will be closed and possibly drained during winter months. **Due to the potential for frost induced movement, pool features should be surrounded by a minimum of 2 feet of frost resistant material.** Frost resistant material should consist of clean gravels having less than 10 percent fines. It is recommended that a filter fabric be utilized between soils and frost resistant material to limit soil fine migration. A drainage system may also be required to limit water ponding within this material.

9.2 Pool Lateral Earth Pressure Design

Pool wall backfill should consist of free-draining crushed stone or alternatively, may consist of lean clay with appreciable chert fragments. Depending upon the type of backfill selected and degree of wall restraint, the following table of lateral earth pressures are considered appropriate for wall design.

Type of Backfill	Drained Level Backfill				Drained Sloped Backfill (2H:1V)*			
	Restrained Walls		Unrestrained Walls		Restrained Walls		Unrestrained Walls	
	Equivalent Fluid Pressure	K	Equivalent Fluid Pressure	K	Equivalent Fluid Pressure	K	Equivalent Fluid Pressure	K
Compacted Lean Clay (CL) or Gravelly Fat Clay >35% + No. 4 Sieve	70 pcf	0.6	45 pcf	0.4	80 pcf	0.7	55 pcf	0.5
Clean Crushed Stone	50 pcf	0.4	35 pcf	0.25	60 pcf	0.5	45 pcf	0.35
Rock Fill (Free Draining)	50 pcf	0.4	35 pcf	0.25	60 pcf	0.5	45 pcf	0.35

- **Note:** Structural design of unrestrained walls should permit wall rotation at top of wall equal to 1/240th of wall height.
- **Note:** For backfill sloped other than 2H:1V, interpolate between values given in the table below for level and sloped backfill.

10.0 BUILDING FLOOR SLABS

A slab-on-grade or slab-on-fill floor system is considered appropriate at the site based upon subsurface conditions encountered and future site grading. Listed below are key considerations for design purposes of the floor slab.

- All subgrades should be evaluated and approved in accordance with **Section 7** of this report;
- Prior to placement of **controlled** fill, if any, natural soils should be scarified, moisture content adjusted and re-compacted in accordance with **Section 7** of this report; and
- Prior to slab placement, soil moisture should be adjusted and maintained within the parameters specified in **Section 7** of this report.

Placement of 4 or more inches of compacted free-draining granular base course below slabs that are not below grade is recommended to limit moisture rise through slabs and to improve slab support, particularly at joints. An impervious moisture barrier consisting of 6-mil plastic sheeting or equivalent should be provided in accordance with the 2018

IBC. Use of a 10-mil vapor barrier is recommended below all slab areas with an intended use sensitive to slab moisture.

11.0 SITE RETAINING WALLS

Based upon the project information provided by Sapp, it is understood that several site retaining walls may be constructed between the new expansion and the existing Aquatics Center due to the significant grade change. Composition and heights of the walls have not been finalized but it's anticipated that the retaining walls will consist of pre-cast block type construction with wall heights less than 6 feet. Although geotechnical borings were not drilled in the locations of the planned walls, the Design Team should use **Section 8** for foundation design of the walls and **Section 9.2** for lateral parameters. Analysis of global slope stability was outside the scope of this study.

12.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2018 International Building Code (IBC)[1]	C
1. In general accordance with the *2018 International Building Code*, Section 1613	

13.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes and because we sample only a small portion of the soils affecting the performance of the proposed new pool and associated structures, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event that subsurface conditions or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be monitored

by a representative of PPI, including site preparation, placement of all engineered fill and trench backfill, and all foundation and final pool excavations as outlined below.

- An experienced Geotechnical Engineer or Engineering Technician of PPI should observe the subgrade throughout the proposed project site immediately following stripping to evaluate the native soil, identify areas requiring undercutting, and evaluate the suitability of the exposed surface for fill placement;
- An experienced Engineering Technician of PPI should monitor and test all fill placed within the expansion areas to determine whether the type of material, moisture content, and degree of compaction are within recommended limits;
- An experienced Technician or Engineer of PPI should observe and test all footing excavations. Where unsuitable bearing conditions are observed, remedial procedures can be established in the field to avoid construction delays; and
- The condition of the subgrade should be evaluated immediately prior to construction of the pool floor mat foundation to determine whether the moisture content and relative density of the subgrade soils are as recommended.

14.0 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

APPENDIX I - BORING LOGS & KEY TO SYMBOLS

4168 W Kearney Street
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Telephone: 417-864-6000
Fax: 417-864-6004

GEOTECHNICAL BORING LOG

BORING NUMBER 1

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri
DATE STARTED 12/16/22 **COMPLETED** 12/16/22
SURFACE ELEVATION 1253.0 ft **BENCHMARK EL.**
DRILLER EP **DRILL RIG** 2005 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY MV **CHECKED BY** SR
AT END OF DRILLING
NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION (Unified Soil Classification System)	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ELEVATION (ft)
0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered 0.5 ft	SPT 1		3-5-8 (13)	1	
			FILL-LEAN CLAY, Scattered Limestone Pebbles, Brown, Stiff, Moist (CL) 2.0 ft					
			GRAVELLY FAT CLAY , Red Brown, Very Stiff, Moist (CH)	SPT 2		10-14-24 (38)	3	1250
5				SPT 3		47-39-14 (53)	4.5	
				SPT 4		13-13-15 (28)	1.5	1245
10								
			- Brown, Very Soft, Very Moist to Wet Below 14.0' 15.0 ft	SPT 5		14-24-8 (32)		1240
15			LIMESTONE, Medium Hard 15.5 ft					

DRY UNIT WT (pcf) 20 40 60 80 100
N VALUE 20 40 60 80
PL MC LL 20 40 60 80
SHEAR STRENGTH (ksf) 1 2 3 4

Refusal at 15.5 feet.
Bottom of borehole at 15.5 feet.

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GEOTECHNICAL BORING LOG

BORING NUMBER 2

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri
DATE STARTED 12/16/22 **COMPLETED** 12/16/22
SURFACE ELEVATION 1250.2 ft **BENCHMARK EL.**
DRILLER EP **DRILL RIG** 2005 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY MV **CHECKED BY** SR
AT END OF DRILLING
NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ELEVATION (ft)
0.0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered 0.5 ft LEAN CLAY, With Gravel, Brown Tan, Very Stiff, Moist (CL)	SPT 1		3-11-19 (30)		1250.0
2.5			3.0 ft GRAVELLY LEAN CLAY, Red Tan, Very Stiff, Moist (CL)	SPT 2		12-15-15 (30)		1247.5
5.0			6.0 ft GRAVELLY FAT CLAY, With Sand, Red Brown, Very Stiff, Moist (CH)	SPT 3		8-10-17 (27)	2.5	1245.0
7.5			- Less Gravel, Medium Stiff Below 8.0'	SPT 4		5-5-3 (8)	2	1242.5
10.0								1240.0
12.5			13.3 ft 13.5 ft LIMESTONE, Medium Hard	SPT 5		51/1"	0.25	1237.5

Refusal at 13.5 feet.
Bottom of borehole at 13.5 feet.

DRY UNIT WT (pcf) 20 40 60 80 100
N VALUE 20 40 60 80
PL MC LL 20 40 60 80
SHEAR STRENGTH (ksf) 1 2 3 4

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GEOTECHNICAL BORING LOG

BORING NUMBER 3

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri
DATE STARTED 12/16/22 **COMPLETED** 12/16/22
SURFACE ELEVATION 1255.5 ft **BENCHMARK EL.**
DRILLER EP **DRILL RIG** 2005 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY MV **CHECKED BY** SR
AT END OF DRILLING
NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION (Unified Soil Classification System)	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ELEVATION (ft)
0.0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered — 0.5 ft					1255.0
			GRAVELLY LEAN CLAY, With Sand, Brown Tan, Very Stiff, Moist (CL)	SPT 1		5-12-22 (34)	0.5	
2.5			— 3.0 ft					1252.5
			GRAVELLY FAT CLAY, Red Brown, Very Stiff, Moist (CH)	SPT 2		10-10-10 (20)		
5.0			- Scattered Gravel Below 6.0'	SPT 3		4-6-15 (21)	3.25	1250.0
7.5			- Medium Stiff Below 8.0'	SPT 4		8-4-4 (8)	1.25	1247.5
10.0			— 11.0 ft					1245.0
			LIMESTONE, Pinnacle, Medium Hard — 11.3 ft					

Bottom of borehole at 11.3 feet.

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GEOTECHNICAL BORING LOG

BORING NUMBER 4

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri
DATE STARTED 12/16/22 **COMPLETED** 12/16/22
SURFACE ELEVATION 1253.0 ft **BENCHMARK EL.**
DRILLER EP **DRILL RIG** 2005 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY MV **CHECKED BY** SR
AT END OF DRILLING
NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ELEVATION (ft)
0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered 0.5 ft	SPT 1		2-2-2 (4)	1	
			LEAN CLAY, Trace Gravel, Brown, Medium Stiff, Moist (CL) 2.0 ft					
			CLAYEY GRAVEL, With Sand, Brown Red, Very Dense, Moist (GC)	SPT 2		26-34-51/5"		1250
			5.0 ft					
5			FAT CLAY, With Gravel, Red Brown, Very Stiff, Moist (CH)	SPT 3		7-14-8 (22)	2.75	
			- Scattered Gravel, Stiff Below 8.0'					1245
				SPT 4		11-7-5 (12)	1.75	
10								1240
			- Very Soft Below 14.0'	SPT 5		3-0-1 (1)		
			15.0 ft					
15			LIMESTONE, Medium Hard 15.4 ft					

DRY UNIT WT (pcf) 20 40 60 80 100
N VALUE 20 40 60 80
PL MC LL 20 40 60 80
SHEAR STRENGTH (ksf) 1 2 3 4

Refusal at 15.4 feet.
Bottom of borehole at 15.4 feet.

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GEOTECHNICAL BORING LOG

BORING NUMBER 5

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri
DATE STARTED 12/15/22 **COMPLETED** 12/15/22
SURFACE ELEVATION 1257.0 ft **BENCHMARK EL.**
DRILLER EP **DRILL RIG** 2005 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY MV **CHECKED BY** SR
AT END OF DRILLING
NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ELEVATION (ft)
0.0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered — 0.5 ft LEAN CLAY, With Gravel, Brown, Very Stiff, Moist (CL)	SPT 1		4-9-14 (23)	0.5	1255.0
2.5			— 3.0 ft FAT CLAY, Trace Gravel, Brown Red, Stiff, Moist (CH)	SPT 2		2-3-6 (9)	1.5	1252.5
5.0			- Scattered Gravel & Sand, Very Stiff Below 6.0'	SPT 3		13-13-10 (23)	1.5	1250.0
7.5			- Trace Gravel, Medium Stiff Below 8.5'	SPT 4		6-2-5 (7)	1.75	1247.5
10.0								1245.0
12.5			- Brown, Soft Below 14.0'	SPT 5		0-7-51/3"	0.75	
			14.6 ft 14.8 ft LIMESTONE, Medium Hard					1242.5

Refusal at 14.8 feet.
Bottom of borehole at 14.8 feet.

DRY UNIT WT (pcf) 20 40 60 80 100
N VALUE 20 40 60 80
PL MC LL 20 40 60 80
SHEAR STRENGTH (ksf) 1 2 3 4

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GEOTECHNICAL BORING LOG

BORING NUMBER 6

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri
DATE STARTED 12/16/22 **COMPLETED** 12/16/22
SURFACE ELEVATION 1256.7 ft **BENCHMARK EL.**
DRILLER EP **DRILL RIG** 2005 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY MV **CHECKED BY** SR
AT END OF DRILLING
NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ELEVATION (ft)
0.0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered — 0.5 ft	SPT 1		2-8-12 (20)	1.25	1256.7
			LEAN CLAY, Trace Gravel, Brown, Medium Stiff, Moist (CL) — 1.0 ft					
			GRAVELLY LEAN CLAY, Brown Tan, Very Stiff, Moist (CL)					1255.0
2.5			- Red Brown Below 3.0'	SPT 2		42-24-14 (38)		1252.5
			5.0 ft					
5.0			FAT CLAY, Scattered Gravel, Red Brown, Very Stiff, Moist (CH)	SPT 3		4-5-11 (16)	3.5	1250.0
7.5			- Stiff Below 8.0'	SPT 4		7-7-7 (14)	1.5	1247.5
10.0								1245.0
12.5			13.8 ft 14.0 ft LIMESTONE, Medium Hard	SPT 5		8-51/0"	0.5	

Refusal at 14.0 feet.
Bottom of borehole at 14.0 feet.

DRY UNIT WT (pcf) 20 40 60 80 100
N VALUE 20 40 60 80
PL MC LL 20 40 60 80
SHEAR STRENGTH (ksf) 1 2 3 4

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Springfield, MO 65803
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GEOTECHNICAL BORING LOG

BORING NUMBER 7

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri
DATE STARTED 12/16/22 **COMPLETED** 12/16/22
SURFACE ELEVATION 1254.5 ft **BENCHMARK EL.**
DRILLER EP **DRILL RIG** 2005 CME-55
GROUND WATER LEVELS
HAMMER TYPE Auto
AT TIME OF DRILLING None
LOGGED BY MV **CHECKED BY** SR
AT END OF DRILLING
NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	ELEVATION (ft)
0.0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered — 0.5 ft					1254.5
			LEAN CLAY, Scattered Gravel, Brown, Stiff, Moist (CL)	SPT 1		3-5-6 (11)	0.75	
			— 2.0 ft					
2.5			CLAYEY GRAVEL, Red Brown, Very Dense, Moist (GC)	SPT 2		4-34-24 (58)	0.75	1252.5
			— 5.0 ft					
5.0			FAT CLAY, With Gravel, Red Brown, Very Stiff, Moist (CH)	SPT 3		24-16-7 (23)	3	1250.0
7.5			- With Interbedded Gravel Layers Below 8.0'	SPT 4		15-51/5"		1247.5
10.0								1245.0
12.5			- Scattered Gravel Below 13.0'					1242.5
			— 14.0 ft	SPT 5		5-13-51/0"	2.75	
			LIMESTONE, Medium Hard — 14.5 ft					1240.0

Refusal at 14.5 feet.
Bottom of borehole at 14.5 feet.

DRY UNIT WT (pcf) 20 40 60 80 100
N VALUE 20 40 60 80
PL MC LL 20 40 60 80
SHEAR STRENGTH (ksf) 1 2 3 4

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KEY TO SYMBOLS

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


CH: USCS High Plasticity Clay


CHG: USCS High Plasticity Gravelly Clay


CL: USCS Low Plasticity Clay


CLG: USCS Low Plasticity Gravelly Clay


FILL: Fill (made ground)


GC: USCS Clayey Gravel


LIMESTONE: Limestone


TOPSOIL: Topsoil

SAMPLER SYMBOLS


Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
Water Level at Time Drilling, or as Shown
Water Level at End of Drilling, or as Shown
Water Level After 24 Hours, or as Shown

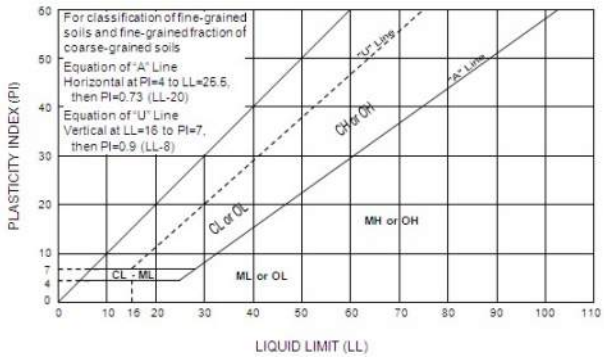
APPENDIX II - GENERAL NOTES

GENERAL NOTES

SOIL PROPERTIES & DESCRIPTIONS

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL –	Lean Clay
ML –	Silt
OL –	Organic Clay or Silt
CH –	Fat Clay
MH –	Elastic Silt
OH –	Organic Clay or Silt
PT –	Peat
CL-CH –	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders	>30-50]
with sand, with gravel, with cobbles, with boulders	>15-30] – secondary coarse grained constituents
scattered sand, scattered gravel, scattered cobbles, scattered boulders	5-15]
a trace sand, a trace gravel, a few cobbles, a few boulders	<5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE
Very Loose	0-4
Loose	5-10
Medium Dense	11-24
Dense	25-50
Very Dense	≥51

MOISTURE CONDITION	
Descriptive Term	Guide
Dry	No indication of water
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table.

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	
*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 inches.		

Coarse Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders	>30-50]
with gravel, with sand, with cobbles, with boulders	>15-30] – secondary coarse grained constituents
scattered gravel, scattered sand, scattered cobbles, scattered boulders	5-15]
a trace gravel, a trace sand, a few cobbles, a few boulders	<5]
Silty (MH & ML)*, clayey (CL & CH)*	<15]
(with silt, with clay)*	5-15] – secondary fine grained constituents
(trace silt, trace clay)*	<5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GENERAL NOTES

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100

*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	
Coarse Grained	2.0-4.76	Individual grains can easily be distinguished by eye.
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with the naked eye to 6mm *1/4-inch)
Vug	Voids 6 to 50mm (1/4 to 2 inches) in diameter
Cavity	50 to 6000mm (2 to 24 inches) in diameter
Cave	> 600mm

BEDDING THCKNESS	
Very Thick Bedded	> 3' Thick
Thick Bedded	1' to 3' Thick
Medium Bedded	4" to 1' Thick
Thin Bedded	1-1/4" to 4" Thick
Very Thin Bedded	½" to 1-1/4" Thick
Thickly Laminated	1/8" to ½" Thick
Thinly Laminated	1/8" or less (paper thin)

DRILLING NOTES

Drilling & Sampling Symbols		
NQ – Rock Core (2-inch diameter)	CFA- Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3-inch diameter)	SS – Split Spoon Sampler	TP – Test Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger

Soil Sample Types

Shelby Tube Samples: Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.

Split Spoon Samples: The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-inch long, 2-inch O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 inches. The Standard Penetration Test is carried out according to ASTM D-1586.

Water Level Measurements

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.

Automatic Hammer

Palmerton and Parrish, Inc.'s CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.

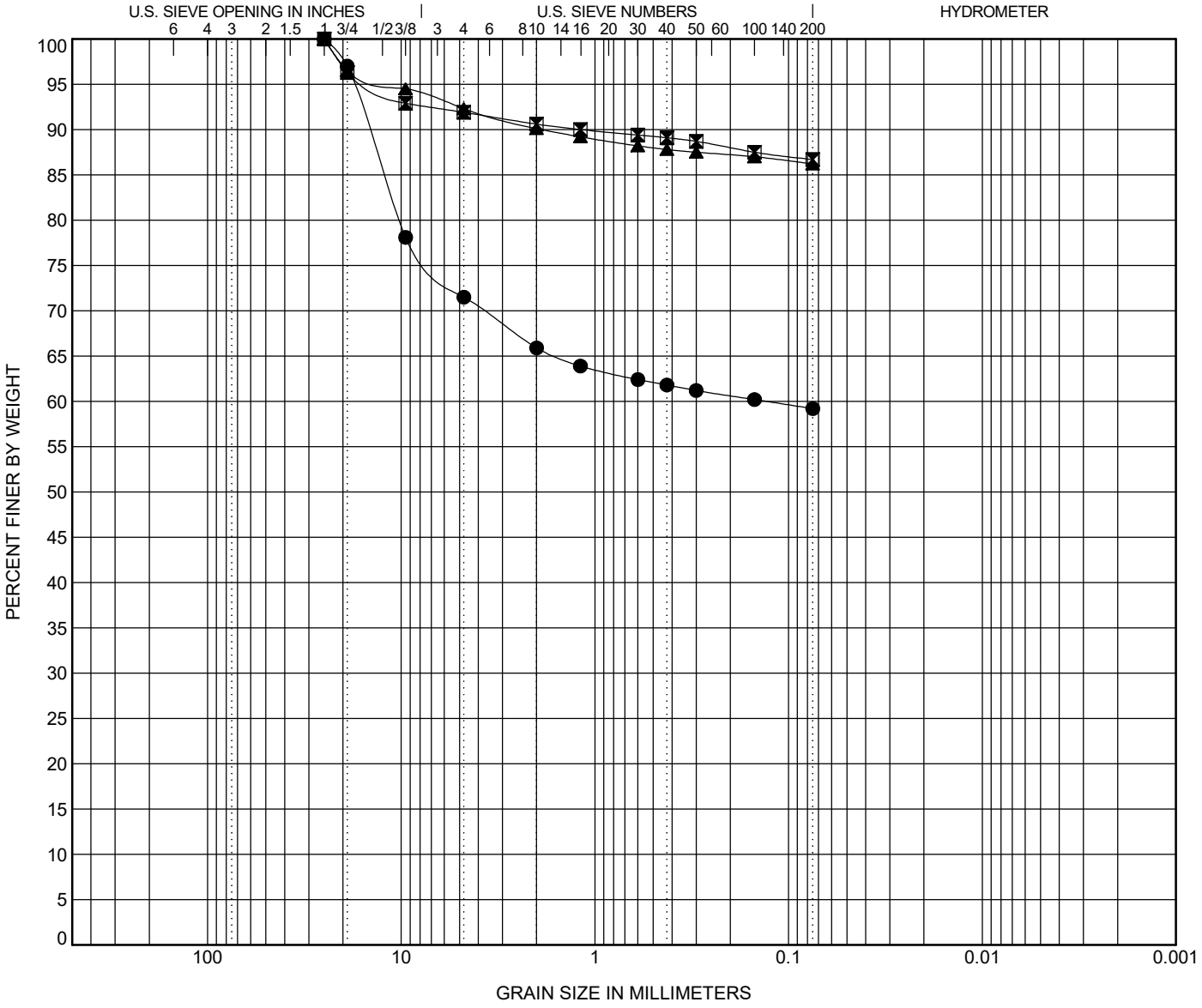
*Modified after Ref. ASTM D2487-93 & D2488-93
**Modified after Ref. Oregon DOT 1987 & FHWA 1997
***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

APPENDIX III - GRAIN SIZE ANALYSIS

4168 W Kearney Street
Springfield, MO 65803
Telephone: 417-864-6000
Fax: 417-864-6004

GRAIN SIZE DISTRIBUTION

CLIENT City of Republic c/o Sapp Design Associates
PROJECT NAME Republic Aquatic Center Expansion
PROJECT NO. 285164
PROJECT LOCATION Republic, Missouri



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	3	3.0	**GRAVELLY FAT CLAY(CH)**	56	17	39		
⊠	5	3.0	**FAT CLAY(CH)**	70	22	48		
▲	6	6.0	**FAT CLAY(CH)**	87	26	61		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	3	3.0	25	0.131			28.5	12.3	59.2	
⊠	5	3.0	25				8.1	5.2	86.7	
▲	6	6.0	25				7.7	6.1	86.2	

APPENDIX IV - IMPORTANT INFORMATION REGARDING YOUR GEOTECHNICAL REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 019000 – SWPPP & LAND DISTURBANCE

A. A copy of the SWPPP and Land Disturbance permit will be maintained in the General Contractor's Job Trailer and available from the General Contractor.

B. A copy of the SWPPP and Land Disturbance permit will be made available upon request from the Architect.

END OF SECTION 019000

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 024119 – SELECTIVE STRUCTURE DEMOLITION

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. Demolition and removal of selected portions of building or structure.
2. Abandoning in place and removing below-grade construction.
3. Disconnecting, capping or sealing, and abandoning in-place or removing site utilities.
4. Salvage of existing items to be reused or recycled.
5. Selective cut-out work of existing building assemblies.

B. Related Sections include the following:

1. Division 01 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.
2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
3. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
4. Division 31 Section "Site Clearing" for site clearing and removal of above grade and below grade improvements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach items from existing construction in a manner to prevent damage and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

E. Demolish: Completely remove and legally dispose of off-site.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

B. Unless otherwise indicated, demolition waste becomes property of Contractor.

C. If any equipment or existing improvement is in the path of construction and not specifically noted as to disposition, contact Architect immediately for resolution before removing.

1.5 SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Shutoff and capping or re-routing of utility services.
5. Locations of proposed dust- and noise-control, temporary partitions and means of egress for adjacent occupied areas affected by selective demolition operations.
6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
7. Means of protection for items to remain and items in path of waste removal from building.

D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

E. Landfill Records: Indicate receipt and acceptance of hazardous wastes (if any) by a landfill facility licensed to accept hazardous wastes.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present (if any) was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Pre-demolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.
6. Review procedures for noise and dust control.

7. Review procedures for protection of adjacent buildings and occupants including maintaining required exits of adjacent buildings.
8. Review items to be salvaged and returned to Owner.

1.7 PROJECT CONDITIONS

A. Owner will occupy portions of site immediately adjacent to selective demolition area. Portions of the site to be removed will be vacated before start of work. Conduct selective demolition so Owner's operations will not be disrupted.

1. Comply with requirements specified in Division 01 Section "Summary."
2. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
3. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
    a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

B. Owner assumes no responsibility for actual conditions of items or structures to be demolished. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition of the building, Owner will remove the following:
    a. Any items Owner deems as salvageable for reuse.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 POLLUTION CONTROLS

A. Comply with all applicable laws, rules and regulations of authorities having jurisdiction.

B. During removal and/or demolition operations, the Contractor shall follow Federal, State and Local Guidelines for the safe handling of Lead-Based substances. State Guidelines are available through the State of Missouri Department of Human Services. (Titled "Rules for Detoxifying Lead-Based Substances").

C. Take all reasonable precautions to avoid annoyance to the public, in particular by limiting the amount of dust and dirt rising in the air, and noise control.

1. Sanding: If sanding of existing painted surfaces and floor tiles is required, Contractor shall follow State and Federal guidelines for potentially hazardous materials.
2. Spray down plaster, drywall, concrete, masonry and similar dust-producing materials before and during placing in trucks or in open storage containers.
3. Use only trucks equipped with approved tarpaulins for transporting of dust-producing materials or mate-rials that could be dislodged by wind.
4. Confine noise-producing activities to accommodate Owner’s scheduled activities or operations.

1.9 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's on-site operations and operations of adjacent occupied buildings.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

B. Contact manufacturer of the existing roofing system for procedures & methods for attaching to, patching or repair of the existing roof system so as to maintain the existing warranty.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Cease operations and notify Owner’s representative immediately to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations if safety of structure appears to be endangered.

1. Take precautions to support structures until determination is made for continuing operation.

F. Survey of Existing Conditions: Record existing conditions by use of pre and post demolition photographs.

1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

H. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
    a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
3. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
4. Maintain existing fire protection services during demolition operation.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished. Refer to MEP specifications for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnection and sealing have been completed.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
    a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

C. Existing Site Utilities:

1. Follow rules and regulations of authorities having jurisdiction for the respective utilities in execution of the work under this section.
2. Protect from damage and remove or relocate active utilities shown on project drawings only as indicated or specified. Take special precautions not to damage utility lines, manholes, or other structures. Correct any damage to utilities or structures to original or better condition at no additional cost to the Owner.
3. When any functioning underground utilities are uncovered during the work that are not shown on the project drawings, promptly notify the Owner in writing. Protect or relocate in accordance with written instructions of the Owner. The Contractor shall exercise caution during all phases of the work, as all utilities may not be shown on the Project Drawings. A utilities' omission from the Project Drawings will not relieve the Contractor of their responsibility to correct any damage to said utility at no additional cost to the Owner.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities. Maintain exits from existing buildings.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection and barricades to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of buildings.
6. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities and Controls."

1. Protect adjacent buildings and facilities from damage due to demolition activities. Site demolition shall be limited to Owner's property. The Contractor shall also protect existing site structures on adjacent properties, including, but not limited to, fences, utility lines, manholes, catch basins, valve boxes, poles, guys and other appurtenances. Damage done to structures on adjacent properties shall be the Contractor's responsibility to repair, at no additional cost to the Owner.
2. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
3. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations and for at least 4 hours following flame cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.
10. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
11. Explosives: use of explosives is not permitted.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

E. Damage: Promptly repair damages caused to adjacent facilities by demolition work.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

1. Use removal methods that will not crack or structurally disturb adjacent slabs or partitions.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

1. Do not use power driven impact tools.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

E. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 07 Sections for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

F. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 DEMOLITION BY MECHANICAL MEANS

A. Below-Grade Construction: Demolish foundation walls and other below-grade construction and/or as indicated on the drawings that are within footprint of new construction and extending **5 feet** outside footprint indicated for new construction. Abandon below-grade construction outside this area.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely to depths indicated.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Burning of demolished materials will **NOT** be permitted.

3.8 CLEANING & REPAIR

A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

B. Where drawings indicate items to be removed or relocated or where work is indicated that may damage or leave holes or gaps in existing walls or finished surfaces, patch areas to match adjacent surface whether or not patching is specifically noted on drawings.

C. Promptly repair damage to adjacent buildings caused by demolition operations.

D. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

E. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.

1. Provide fill in voids of type as required by other Sections for new work.
2. Fill shall be free of trash and debris, stones over 6” diameter, roots or other organic material.

3.9 HANDLING OF ASBESTOS PRODUCTS

A. This contract does not include any removal, handling or disposal of asbestos and asbestos-containing products. Should asbestos be encountered during the work, suspend work, report asbestos findings to Architect immediately, and wait for further instructions.

B. If any other types of hazardous materials are encountered during the work, report finding to Architect immediately and wait for further instructions.

END OF SECTION 024119

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 RELATED SECTIONS

A. Division 312000 Earthwork.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm with minimum of five years' experience

B. The concrete supplier shall have a minimum of five years' experience in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
3. ACI 318 – “Building Code Requirements for Reinforced Concrete”.
4. Concrete Reinforcing Steel Institute (CRSI), “Manual of Standard Practice”.

D. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers. The concrete contractor shall have a minimum of five years’ experience with installation of concrete similar in material, design and extent to that indicated for this Project and whose work has resulted in construction with a record of successful –service performance.

E. Any testing laboratory retained to run tests required by this specification shall meet the basic requirements of ASTM E 329.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

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.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

C. 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."

2.3 CONCRETE MATERIALS

A. Refer to the drawings for classes and strengths of concrete required.

B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I or II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C or Class F.

C. Normal-Weight Aggregates: ASTM C 33, graded, 3/4-inch nominal maximum coarse-aggregate size.
1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94/C 94M and potable.

E. Air-Entraining Admixture: ASTM C 260.

F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will 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/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 RELATED MATERIALS

A. Plastic Vapor Retarder: Refer to section 073100.

B. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

C. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide flat, dumbbell type or centerbulb type.
1. ADCOR ES waterstops: W.R. Grace & Co.

D. Fabricate steel reinforcement: according to CRSI's "Manual of Standard Practice."

E. Anchor Rods: All anchor rods shall conform to the ASTM designation and shall be of the yield strength as specified below as appropriate for the types and at the locations as specified on the drawings:
   1. ASTM F 1554, Grade 36 (1/4 inch to 4 inches in diameter).
   2. Anchor rods used with galvanized baseplates shall be galvanized.
   3. Nuts: All nuts with anchor rods shall be heavy hex head conforming to ASTM A 563.
   4. Washers: Unless noted otherwise on the drawings, washer size and thickness for all anchor rods shall conform to Table 14-2 of AISC "Steel Construction Manual" with holes 1/16" greater than the anchor rod diameter. Washers shall conform to ASTM A 36 steel.

F. NON-SHRINK GROUT
   1. Type: Grout for base plates, bearing plates and grouting under precast or tilt-up wall panels shall be a non-metallic, shrinkage resistant, premixed, non-corrosive, non-staining product containing Portland cement, silica sands, shrinkage compensating agents and fluidity improving compounds.
   2. Specifications: Non-shrink grout shall conform to ASTM C 1107.
   3. Compressive Strength: Provide the minimum strength as shown below as determined by grout cube tests at 28 days: 6,000 PSI for supporting concrete 3000 psi and less. 8,000 PSI for supporting concrete greater than 3000 psi and less than or equal to 4000 psi.
   4. Unless noted otherwise on the drawings, grout strength on supporting concrete greater than 4000 psi shall be 8000 psi.

G. CONTRUCTION JOINT FILLER
   1. Contraction and Construction Joint (including saw joints) -Filler Material for Slabs-on-Grade: In all joints provide a 2 component semi-rigid, 100% solids epoxy joint filler having a minimum shore A hardness of 80 when tested in accordance with ASTM D 2240

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

E. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.6 CONCRETE MIXTURES

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.

B. Cementitious Materials: Use fly ash as needed to reduce the total amount of portland cement, which would otherwise be used, by not more than 30 percent.

C. Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: See Sheet S0.0.
   2. Maximum Water-Cementitious Materials Ratio: See Sheet S0.0.
   3. Slump Limit: See Sheet S0.0.
   4. Air Content: See Sheet S0.0.
   5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, 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.

PART 3 - EXECUTION

3.1 FORMWORK

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. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Do not chamfer exterior corners and edges of permanently exposed concrete unless noted otherwise.

3.2 EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto unless directed otherwise by these specifications. Install reglets to receive top edge of foundation sheet waterproofing where specified by the Architect, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles and other conditions.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

C. Do not install sleeves in concrete slabs, pier caps, footings or walls except where shown on the structural drawings or approved by the Architect and Engineer.

D. Securely fasten embedded plates, angles, anchor rods and other items to be built into the concrete to the formwork or hold in place with templates. Insertion of these items into concrete after casting is prohibited.

E. Installation of Adhesive Anchors using Injectable Epoxy or Adhesive:. After drilling the hole to the diameter and depth recommended by the manufacturer, clean the hole with a wire or nylon brush. Blow the dust out of the hole using compressed air with a nozzle that reaches to the bottom of the hole. When using adhesive from a new pack, the adhesive that is discharged

from the mixing nozzle should be a uniform gray color before any adhesive is installed in the hole. Fill the hole with adhesive starting from the very bottom of the hole until the hole is about 2/3 full. Do not leave an air pocket at the bottom of the hole. Insert the anchor rod or dowel by slowly twisting it into the hole.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 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.

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 the depth 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. Do not use form joint in areas subject to vehicle traffic.
   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 will 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, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.5 CONCRETE PLACEMENT

A. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used. Before placing concrete, verify that installation of vapor barrier, formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Concrete shall not be placed when the outside air temperature is 40°F or less unless cold weather concreting practices are followed per engineers approved methods. Design mix shall be formulated for cold weather placement and approved by engineer.

C. Follow hot weather concreting practices when required to limit the concrete temperature at the truck discharge point to the stated maximum acceptable temperature. Design mix shall be formulated for hot weather placement and approved by engineer.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be 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.

E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use internal vibrators of the largest size and power that can properly be used in the work as described in the table entitled “Range of characteristics, performance, and applications of internal vibrators” found in ACI 301.

G. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix

H. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed. Place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at the same

time as concrete for slabs. Do not place concrete over columns and walls until concrete in columns and walls is no longer plastic and has been in place at least one hour.

I. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners of forms, eliminating air and stone pockets that may cause honeycombing, pitting, or planes of weakness.

J. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats or darbies to smooth surface free of humps or hollows before excess moisture or bleedwater appears on the surface. Do not disturb slab surfaces prior to beginning finishing operations.

K. Maintain reinforcing in proper position during concrete placement operations. Placing Concrete by Pump: If concrete is placed by using a pump, the grout used for pump priming must not become a part of the completed structure unless an engineered grout design mix and grout location are approved in advance by the Engineer.

L. Cold-Weather Placement: Comply with ACI 306.1.

M. Hot-Weather Placement: Comply with ACI 301.

N. SLUMP LIMIT
1. The slump, as measured in the field where concrete cylinders are taken, shall be within plus or minus 1 inch of the design slump noted on the Mix Design Submittal Form. Self-consolidating concrete shall have a slump/flow of plus or minus 2 inches of the design slump noted on the Mix Design Submittal Form. Water may be added to the concrete in the field only to the extent that the prescribed water/cementitious ratio noted in the Mix Design Submittal Form is not exceeded.

3.6 FINISHING FORMED SURFACES

A. Rough Form Finish: Provide rough form finish for formed concrete surfaces not otherwise scheduled on the drawings to receive a smooth-form finish. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
1. Apply to concrete surfaces not exposed to public view.

B. Smooth Form Finish: Provide smooth form finish for formed concrete surfaces as scheduled on the drawings, which may include those exposed-to-view, or that are to be covered with a coating or covering material applied directly to concrete such as waterproofing, dampproofing, painting, veneer plaster or other similar system, or to a surface that is to receive a smooth rubbed finish or grout cleaned finish. This is an as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections exceeding 1/8 inch in height removed and smoothed.

1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled or specified concrete surfaces, which have received smooth-form finish treatment, not later than one day after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.

D. 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.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. 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 restraightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to surfaces indicated

C. 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. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
      a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25. Minimum local values F(F) 24 and F(L) 17.
   2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
   1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete sidewalks, pads, platforms, steps, and ramps, and elsewhere as indicated.

3.8 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. Coordinate with architectural finish schedule for areas to receive staining. No cure and seal shall occur on concrete slabs to receive staining.

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. 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.
   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.

3. Curing and Sealing Compound: Apply uniformly to floors and slabs 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. Verify with flooring subcontractor all that proposed floor covering/adhesives are compatible with cure and seal product.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete:
1. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work can be repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately undertake the approved repair method.
2. The Contractor shall submit for review and approval a detailed work plan of the proposed repair showing areas to be repaired, method of repair and time to affect the repair.
3. Repair method(s), at the sole discretion of the Architect/Engineer or Owner's Representative, may include grinding (floor stoning), planing, retopping with self leveling underlayment compound or repair topping, or any combination of the above.
4. The Architect/Engineer or Owner's Representative maintains the right to require a test repair section using the approved method of repair for review and approval to demonstrate a satisfactory end product. If, in the opinion of the Architect/Engineer or Owner's Representative, the repair is not satisfactory an alternate method of repair shall be submitted or the defective area shall be replaced.
5. The judgment of the Architect/Engineer or Owner's Representative on the appropriateness of a repair method and its ability to achieve the desired end product shall be final
6. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work cannot be satisfactorily repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately commence to remove and replace the defective work.
7. All replacement work as a result of defective workmanship shall be performed at no additional cost to the Owner

B. CONCRETE FINISH MEASUREMENT AND TOLERANCES

C. Testing Procedure: ASTM E 1155

D. Tolerance on Floor Elevations: Construction tolerance on absolute floor elevation from the specified elevation as shown on the drawings shall be as specified below, taken from ACI 117:
1. Slab-on-Grade Construction -+ 3/4".
2. Top surfaces of formed slabs measured prior to removal of supporting shores + 3/4".
3. Top surfaces of all other slabs -+ 3/4".
4. Slab- on- Grade thickness shall be as specified on the drawings with -3/8” tolerance.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
   1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION 033000

SECTION 042200
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Pre-faced concrete masonry units.
4. Steel reinforcing bars.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

C. Samples: For each type and color of the following:

1. Exposed CMUs.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product. For masonry units, include data on material properties.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test 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.

1.5 QUALITY ASSURANCE

A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for typical exterior wall in sizes approximately 48 inches (1200 mm) 48 inches **(1200 mm)** high. Sample panel may remain as part of the final work.

1.6 FIELD CONDITIONS

A. 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.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

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.

2.2 CONCRETE 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, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi (14.8 MPa)
2. Density Classification: Normal weight.
3. Finish - Smooth

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.

E. 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.

F. Aggregate for Mortar: ASTM C 144.

G. Aggregate for Grout: ASTM C 404.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

2.4 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
   1. Walls: Hot-dip galvanized carbon steel.
   2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
   3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
   4. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
   5. Provide in lengths of not less than 10 feet (3 m)**,** with prefabricated corner and tee units.

2.5 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
2. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 7-oz./sq. ft. (2-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

2. 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 (1.02 mm).

3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.02 mm**)**.

4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.0 mm) thick.

C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

E. 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.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.7 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime or masonry cement mortar.
4. For reinforced masonry, use portland cement-lime or masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

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 C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi (21 MPa).
3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. 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.

3.2 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 (12 mm) or minus 1/4 inch (6 mm).

2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 (6 mm in 3 m), or 1/2-inch (12-mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 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 (100-mm) horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E. 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 rod mortar or grout into core.

F. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. 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 plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

F. 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, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

G. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. 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.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. 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 **48 inches (1220 mm)**

3.7 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors 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 B in TMS 402/ACI 530/ASCE 5.

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 Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

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.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at seven days and at 28 days.

3.8 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.9 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 042612 – CONCRETE MASONRY VENEER

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. Concrete Veneer Masonry

B. Related Requirements:
1. Section 033000 “Cast-in-Place Concrete”.
2. Section 042200 “Unit Masonry”.
3. Section 061600 “Sheathing”.
4. Section 072100 “Thermal Insulation”.
5. Section 076200 "Sheet Metal Flashing and Trim”: Through-wall masonry flashings.
6. Section 079200 “Joint Sealants” Sealing control and expansion joints

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Meeting: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
3. Warranty: Submit confirmation and details of Manufacturer’s warranty, extended warranty, and replacement policies.

C. Samples for Initial Selection:

1. Ground Face Masonry Units: submit four actual samples of ground face units from the plant to be used on this project, along with verification that adequate quantities of same ground face unit is available to complete the project.
2. Colored mortar.

D. Samples for Verification: For each type and color of the following:

1. Ground Face Masonry Units: submit four actual samples of ground face units from the plant to be used on this project, along with verification that adequate quantities of same ground face unit is available to complete the project.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties, material test reports substantiating compliance with requirements.
2. Mortar admixtures.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.

D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing the type of work specified and with at least 5 years of documented experience.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Mock-ups: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build sample panel for exposed unit masonry as a wall panel 4 feet wide by 4 feet high; include mortar and accessories in structural backup of mockup. Include 2 pigmented mortar samples and 1 natural mortar sample.
2. Build sample panels facing south.
3. Clean exposed faces of panels with masonry cleaner indicated.
4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; pattern of masonry; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

    b. Mock-up is a stand alone component and may not remain as a part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Deliver CMUs and other cementitious materials neatly stacked and packaged on pallets.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. 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.

F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 WARRANTY

A. Provide the manufacturer’s standard form in which the specified manufacturer agrees to replace products that fail to meet the ASTM standards within the specified warranty period.

1.9 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. Without damaging completed work, provide protective boards at exposed corners that are subject to damage by construction activities.

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

E. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

F. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

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.

C. Basis of Design Manufacturer: Echelon, An Oldcastle Company; Address: 400 Perimeter Center Terrace, Atlanta, GA 30046; Phone: (770) 804-3363; Website: www.echelonmasonry.com.

D. Requests for substitutions will be considered in accordance with provisions of Section 016000.

2.2 PERFORMANCE REQUIREMENTS

A. Adhered veneer units must not exceed 2 5/8 inches in thickness, 36 inches in any face dimension, and no greater than 5 sq. ft. in total area.

B. Individual veneer units not to exceed 15 lbs./sq. ft. (saturated weight).

C. Shear Strength: Adhesion developed between adhered thin veneer units and backing must attain a shear strength of at least 50 psi based on gross unit surface area when tested in accordance with ASTM C482, or shall be adhered in compliance with Article 3.3 C of TMS 602/ACI 530.1/ASCE 6.

D. Compressive Strength: Minimum 3500 psi with no individual specimen having a measured compressive strength less than 3000 psi.

E. Freeze-thaw durability: Meets or exceeds the requirements of ASTM C1262/C1262M -98 and exhibit a mass loss no greater than 1.5%. Test specimens must not show any fracture completely through the cross section when subjected to 50 consecutive freeze/thaw cycles.
   1. Freeze-Thaw Resistance: Meet or exceed the requirements of ASTM C1262.
   2. Abrasion Resistance: Meet or exceed the requirements of ASTM C744.
   3. Adhesion: Meet or exceed the requirements of ASTM C744.
   4. Color Change: Meet or exceed the requirements of ASTM C744.
   5. Resistance to Crazing: Meet or exceed the requirements of ASTM C744.
   6. Integral Water Repellant: Concrete Masonry Units must include an integral water repellant (IWR) admixture at the time of production.

2.3 WATER RESISTIVE BARRIER

A. Provide one layer of asphalt saturated building paper that conforms to ASTM D226, Type 1.

2.4 INSULATION

A. Expanded Polystyrene Insulation – Rigid cellular thermal insulation conforming to the requirements of ASTM C578, Type 1.

2.5 CONCRETE VENEER

A. General/Appearance: Pre-finished, integrally colored concrete blocks with one or more faces ground to expose the variegated colors of the natural aggregates.
   1. Basis of Design Product: Trenwyth Architectural Masonry, Trendstone, from Echelon.
      a. Finish: “Parchment” and “Brick Red”.
      b. Face Appearance: Ground Face veneer with clear acrylic sealant.
      c. Dimensions:
         1) Depth: 4 inches
         2) Height: 4 inches // 8 inches. Refer to drawings.
         3) Length: 16 inches

2.6 MORTAR AND GROUT MATERIALS

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for mortar and grout Materials.

2.7 TIES AND ANCHORS

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for ties & anchors.

2.8 EMBEDDED FLASHING MATERIALS

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for embedded flashing materials.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for miscellaneous masonry accessories.

2.10 CAVITY-WALL INSULATION

A. Reference Section 072100 for cavity wall insulation.

2.11 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, provide products by one of the following:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. ProSoCo, Inc.

2.12 MORTAR MIXES

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for mortar mixes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the 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.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

3.3 VENEER INSTALLATION

A. General:
1. Apply veneer with a full mortar bed and full head joints, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints is not permitted.
2. Install concrete veneer in accordance with industry accepted masonry practices and manufacturer's instructions.
3. Do not use veneer units with broken corners and edges.
4. Construct forms as required to adequately and safely support installed Work until mortar has cured.

B. Cutting: Make all unit cuts, including those for bonding, holes, boxes, etc., with motor-driven masonry saws, using either an abrasive or diamond blade. Cut neatly and locate for best appearance.

C. Placing and Anchoring:
1. Coordinate placement and pattern of veneer installation with the locations specified in the construction drawings and installation details related to the Work specified in this section.
2. Provide a nominal 1 to 1 ½ inch airspace between the veneer and the outermost layer of the wall receiving the Work.
3. Provide wire anchors or adjustable anchors spaced no greater than 16 inches on center vertically and horizontally.
4. Within 8 inches of transitions, terminations and openings in the wall, decrease anchor spacing to no greater than 12 inches on center vertically and horizontally

3.4 TOLERANCES

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for tolerances.

3.5 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. **Reference drawings** for desired pattern.

C. 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.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.6 MORTAR BEDDING AND JOINTING

A. 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.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

C. Remove mortar from the face of masonry units before it sets.

D. Tuckpoint joints of scored units for proper appearance and to prevent water penetration. Raked joints are not permitted and will be considered defective work

3.7 ANCHORED MASONRY VENEERS

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for anchored masonry veneers.

3.8 EXPANSION JOINTS

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for expansion joints.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING, WEEP HOLES, AND VENTS

A. Reference Section 042613 “Masonry Veneer” and Section 042200 “Unit Masonry” for flashing, weep holes, and vents.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors 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 B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Testing Prior to Construction: One set of tests.

D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

F. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for **mortar air content and compressive strength**.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean stone trim to comply with stone supplier's written instructions.
8. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042613

SECTION 042613 - MASONRY VENEER

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. Clay face brick.
2. Mortar.
3. Ties and anchors.
4. Flashings
5. Miscellaneous masonry accessories.

B. Related Requirements:
1. Section 076200 "Sheet Metal Flashing and Trim”: Through-wall masonry flashings.
2. Section 079200 “Joint Sealants” Sealing control and expansion joints

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Meeting: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Clay Face Brick: submit four actual samples of face brick units from the plant to be used on this project, along with verification that adequate quantities of same brick is available to complete the project.
2. Colored mortar.

D. Samples for Verification: For each type and color of the following:

1. Clay face brick: submit four actual samples of face brick units from the plant to be used on this project, along with verification that adequate quantities of same brick is available to complete the project.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties, material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C67.
d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing according to ASTM C67

2. Mortar admixtures.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.

D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing the type of work specified and with at least 5 years of documented experience.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Mock-ups: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build sample panel for exposed unit masonry as a wall panel 4 feet wide by 4 feet high; include mortar and accessories in structural backup of mockup. Include 2 pigmented mortar samples and 1 natural mortar sample.
2. Build sample panels facing south.
3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
4. Clean exposed faces of panels with masonry cleaner indicated.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

    b. Mock-up is a stand alone component and may not remain as a part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

A. 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. Without damaging completed work, provide protective boards at exposed corners that are subject to damage by construction activities.

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

E. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

F. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

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 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

   1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
   2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
   3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
   4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C216
   1. Subject to compliance with requirements provide **ACME “Amaretto”. Texture: Velour**

2. Grade: **SW**
3. Type: **FBX**
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
6. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing according to ASTM C67 with no observable difference in the applied finish when viewed from 10 feet
7. Size: Modular, 3-5/8” depth, 2-1/4” height, 7-5/8” length
8. Color and Texture: “Amaretto” with “Velour” texture.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Capital Materials Corporation; Flamingo Color Masonry Cement.
   b. Cemex S.A.B. de C.V.; Brikset Type N, Citadel Type S, Dixie Type S, Kosmortar Type N, Richmortar, Victor Plastic Cement.
   c. Holcim (US) Inc.; Mortamix Masonry Cement, Rainbow Mortamix Custom Buff Masonry Cement.
   d. Lafarge North America Inc.; Magnolia Masonry Cement, Lafarge Masonry Cement, Trinity White Masonry Cement.
   e. Lehigh Cement Company; Lehigh Masonry Cement, Lehigh White Masonry Cement.
   f. National Cement Company, Inc.; Coosa Masonry Cement.

E. Mortar Cement: ASTM C 1329.

1. Products: Subject to compliance with requirements, provide the following:
   a. Lafarge North America Inc.; Lafarge Mortar Cement or Magnolia Superbond Mortar Cement.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

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. Davis Colors; True Tone Mortar Colors.
   b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
   c. Solomon Colors, Inc.; SGS Mortar Colors.

G. Colored Cement Product: Packaged blend made from masonry cement or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Products: Subject to compliance with requirements, provide one of the following products:
   a. Colored Portland Cement-Lime Mix:

1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
3) Lafarge North America Inc.; Eaglebond Portland & Lime.
4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

2. Products: Subject to compliance with requirements, provide one of the following products:
   a. Colored Masonry Cement:
      1) Capital Materials Corporation; Flamingo Color Masonry Cement.
      2) Cemex S.A.B. de C.V.; Richcolor Masonry Cement.
      3) Essroc, Italcementi Group; Brixment-in-Color.
      4) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
      5) Lafarge North America Inc.; U.S. Cement Custom Color Masonry Cement.
      6) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
      7) National Cement Company, Inc.; Coosa Masonry Cement.
3. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
4. Pigments shall not exceed 10 percent of portland cement by weight.
5. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

H. 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. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

I. Aggregate for Grout: ASTM C 404.

J. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

K. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

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. Euclid Chemical Company (The); Accelguard 80.
   b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
   c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.

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. ACM Chemistries; RainBloc for Mortar.
   b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
   c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

M. Water: Potable.

2.4 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 641/A 641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
   a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
2. Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 12 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with hot dip galvanized finish.
   a. Products: Subject to compliance with requirements, provide the following:
      1) Hohmann & Barnard Inc 2-Seal Tie (to accommodate for 2” insulation over sheathing over metal studs).

2.5 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Stainless Steel: ASTM A240/A240M or ASTM A666, 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 snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate metal drip edges for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam sheds water.
7. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

8. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
9. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
10. Solder metal items at corners.

B. Flexible Flashing: Use **one of** the following unless otherwise indicated:
1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
a. Products: Subject to compliance with requirements provide one of the following:
1) DuPont; Thru-Wall Flashing.
2) Hohmann & Barnard, Inc.; Flex-Flash.
3) Hyload, Inc.; Hyload Cloaked Flashing System.
b. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch thick.
c. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of adhesive.
d. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.
1) Color: Black.
e. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. 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 fully concealed, use flexible flashing.

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.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use the following unless otherwise indicated:

1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, 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.
a. Products: Subject to compliance with requirements, provide the following:

1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, provide the following provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Advanced Building Products Inc.; Mortar Break.
   b. Archovations, Inc.; CavClear Masonry Mat.
   c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
   d. Mortar Net USA, Ltd.; Mortar Net.
2. Provide one of the following configurations:
   a. Strips, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent clogging with mortar droppings.

F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

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. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
   b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
   c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
   d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.7 CAVITY-WALL INSULATION

A. Reference Section 072100 for cavity wall insulation.

2.8 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, provide products by one of the following:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. ProSoCo, Inc.

2.9 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
   a. Allowable Accelerator: Accelgaurad 80, or equal.
2. Use portland cement-lime, masonry cement or mortar cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime, masonry cement or mortar cement mortar.

4. For reinforced masonry, use portland cement-lime,masonry cement or mortar cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type N.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. For interior non-load-bearing partitions, Type O may be used instead of Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
3. Mortar color to be selected by Architect from manufacturer's full range of colors.
4. Application: Use pigmented mortar for exposed mortar joints with the following units:
   a. Face brick.

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. Mortar color to be selected by Architect from Manufacturer's full range of colors. Allow up to two (2) colors.
2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
   a. Face brick.
   b. Ground face masonry units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the 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.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 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. 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.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: 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. 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.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. 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.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and masonry backup. Masonry-veneer anchors to comply with the following requirements:
   1. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
   2. Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
   3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.

4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
5. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings.

3.7 EXPANSION JOINTS

A. General: Install expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

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.

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities 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 multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry.

3. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge counterflashed per fluid applied memebrane air barrier manufacturers recommendations.
4. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
5. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Space weep holes 16 inches o.c. unless otherwise indicated.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

F. Install vents in head joints in exterior wythes at spacing indicated. Use **OPEN HEAD JOINTS** to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors 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 B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Testing Prior to Construction: One set of tests.

D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C67 for compressive strength.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for **mortar air content and compressive strength**.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean stone trim to comply with stone supplier's written instructions.
8. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042613

SECTION 05 1200
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes structural steel and grout.

B. Related Sections:
   1. Division 05 Section "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.

1.2 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
   1. Select and complete connections using details indicated.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
   1. Show fabrication of structural-steel components: Submit for review and approval shop drawings showing complete details and schedules for fabrication and assembly of structural steel members.
   2. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify the type of high-strength bolted connection (slip-critical, direct-tension, or bearing connections). Holes, flange cuts, slots and openings shall be made as required by the structural drawings, all of which shall be properly located by means of templates.
   3. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.

C. Qualification Data: For qualified fabricator.

D. Welding certificates.

E. Mill test reports for structural steel, including chemical and physical properties.

F. Source quality-control reports.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: The structural steel fabricator must have minimum of 5 years' experience in the successful fabrication of structural steel similar to this project. Provide documentation of 5 projects of similar size and scope successfully completed in the past 5 years.

B. Installer Qualifications: A qualified installer that has a minimum of 5 years' experience and has experience on similar size projects. Provide documentation of 5 projects of similar size and scope successfully completed in the past 5 years.

C. Detailer Qualifications: The structural steel detailer shall have not less than 5 years' experience in the successful detailing of structural steel similar to this project including experience in selecting or completing structural steel connection details using information found in tables in the AISC "Steel Construction Manual.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Comply with applicable provisions of the following specifications and documents:
   1. AISC 303.
   2. AISC 360. "Specification for Structural Steel Buildings".
   3. RCSC's "Specification for Structural Joints using High-Strength Bolts".
   4. ANSI/AISC 358, "Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications
   5. ANSI/AWS D1.1 "Structural Welding Code -Steel.

F. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Do not store materials on structure in a manner that might exceed allowable loads on or cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed by Architect/Engineer.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL

A. All structural or miscellaneous support steel exposed to the exterior shall be non-galvanized ferrous metal with a High Performance Coating (Work of Section 099600), except as follows:
   1. Steel bollards shall be galvanized (or coated with a High Performance Coating).

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M , S-Shapes: ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M.

E. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50 (345).

F. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

G. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.

H. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   1. Finish: Black except where indicated to be galvanized.

I. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
   1. Configuration: Straight.
   2. Finish: Plain.

D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
   1. Finish: Plain.

E. Threaded Rods: ASTM A 36/A 36M.
   1. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

2.3 PRIMER

A. Primer: Fabricator to shop prime with standard primer. Primer to be non-asphaltic rust inhibitor, lead and chromate free. At pergola the primer shall be coordinated with the high performance coating.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
   2. Surfaces to be field welded.
   3. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: General Contractor will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.
      d. Radiographic Inspection: ASTM E 94.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 051200

SECTION 051210 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL 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.

1.2 SUMMARY

A. Section includes architecturally exposed structural-steel framing.
   1. Requirements in Division 05 Section "Structural Steel Framing" also apply to AESS framing.

B. Related Sections:
   1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
   2. Division 05 Section "Structural Steel Framing" for additional requirements applicable to AESS.
   3. Division 09 painting Sections and Division 09 Section "Painting" for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

1.4 SUBMITTALS

A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections. Indicate orientation of bolt heads.
   5. Indicate exposed surfaces and edges and surface preparation being used.
   6. Indicate special tolerances and erection requirements.

B. Qualification Data: For qualified Installer & fabricator.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: As indicated in section 051200.

B. Fabricator Qualifications: As indicated in section 051200.

C. Shop-Painting Applicators: As indicated in section 051200.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
   1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.7 PROJECT CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS

A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

2.2 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.3 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

B. In addition to special care used to handle and fabricate AESS, comply with the following:
   1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
   2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
   3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
   4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
   5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
   6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
   7. Fabricate AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
   8. Seal-weld open ends of hollow structural sections with 1/4-inch closure plates for AESS.

C. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for AESS.

D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

E. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.4 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
   2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
   3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
   4. Provide continuous welds of uniform size and profile where AESS is welded.
   5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch for AESS.
   6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch for AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.

7. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
8. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
9. Make fillet welds for AESS oversize and grind to uniform profile with smooth face and transition.
10. Make fillet welds for AESS of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.5 SHOP PRIMING

A. Shop prime **all** steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
   2. Surfaces to be field welded.
   3. Surfaces to be high-strength bolted with slip-critical connections.
   4. Surfaces to receive sprayed fire-resistive materials.
   5. Galvanized surfaces.

B. Surface Preparation for Nongalvanized Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 3, "Power Tool Cleaning."

C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
   2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads.

Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
   1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.

B. Do not use thermal cutting during erection.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Pretensioned.
   2. Orient bolt heads as in same direction for each connection and to maximum extent possible in same direction for similar connections.

B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
   1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
   2. Remove erection bolts in AESS, fill holes, and grind smooth.
   3. Fill weld access holes in AESS and grind smooth.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect AESS as specified in Division 05 Section "Structural Steel Framing." The testing agency will not be responsible for enforcing requirements relating to aesthetic effect.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

D. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 051210

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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SECTION 061053 – MISCELLANEOUS ROUGH 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.

1.2 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood furring and grounds.
4. Plywood backing panels.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 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. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments specified to be High-Temperature (HT) type include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.

6. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep carpentry materials dry during delivery, storage and handling. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

B. Protect bottom of stacks against contact with damp surfaces.

C. Do not store dressed or treated lumber or plywood outdoors.

D. Protect exposed materials against weather.

E. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the 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. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

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.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Any miscellaneous locations specifically noted on the drawings.
5. Field cuts: Treat field cut ends with field treatment complying with AWPA M4. Inspect each piece after drying and discard damaged or defective pieces.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated and/or required by jurisdiction having authority, use materials complying 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. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. 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.
4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.

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 testing and inspecting agency acceptable to authorities having jurisdiction.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:

1. Plywood backing panels.
2. Parapet sheathing.
3. Wood blocking inside walls.
4. Wood blocking at roof edge.
5. Wood blocking/sleepers at the platform floor.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. For items of dimension lumber size, provide No. 2 grade lumber with 19 percent maximum moisture content and the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB, or WWPA.

5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

C. 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.

D. 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.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

F. Provide membrane separation between treated lumber and certain metals that may be subject to corrosion from the treated woods (verify list of at risk metals with treated wood manufacturer. Provide separation at any locations whether specifically noted or not.

2.5 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exterior, AC fire-retardant treated in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

1. Paint all mounting boards with fire retardant paint.

2.6 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 with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1.

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

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. Cleveland Steel Specialty Co.
2. Harlen Metal Products, Inc.

3. KC Metals Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. Southeastern Metals Manufacturing Co., Inc.
6. USP Structural Connectors.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations where stainless steel is not indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds**,** and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

F. Do not splice structural members between supports, unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

H. Sort and select lumber so that natural characteristics will 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.

I. Comply with AWPA 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.

J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

K. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD GROUND, 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. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

1. Match color and grain pattern across joints.
2. Install trim after gypsum board joint-finishing operations are completed.
3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads and fill holes.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

3.4 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.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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REPUBLIC, MO

SECTION 061600 – SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Sheathing joint-and-penetration treatment.

B. Related Sections include the following:

1. Division 06 Section "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
6. For building wrap, include data on air-/moisture-infiltration protection based on testing according to referenced standards.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. Manufacturers: Where specific products are listed, other products may be acceptable, subject to compliance with requirements (refer to EDA Contracting Provisions for Construction Projects Article 10), per Prebid substitution request per Section 012500 Substitutions.
   a. GP Gypsum Corporation: Dens-Glass Gold.
   b. Certainteed Corporation: GlasRoc.
   c. Temple-Inland Inc.; GreenGlass.
   d. United States Gypsum Co.; Securock.
2. Type and Thickness: Regular, ½ inch.
3. Size: **48 by 96 inches, 48 by 108 inches and 48 by 120 inches** for vertical installation.

2.2 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

   1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

   1. For steel framing less than **0.0329 inch** thick, attach sheathing to comply with ASTM C 1002.
   2. For steel framing from **0.033 to 0.112 inch** thick, attach sheathing to comply with ASTM C 954.

2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Provide joint sealant, joint reinforcement, sheathing tape, and penetrations sealant as recommended by manufacturer, complying with section 072726 for compatibility.

2.4 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 and ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

   1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than **0.030 inch.**

   1. Manufacturers: Where specific products are listed, other products may be acceptable, subject to compliance with requirements (refer to EDA Contracting Provisions for Construction Projects Article 10), per Prebid substitution request per Section 012500 Substitutions.
      a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
      b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.
      c. MFM Building Products Corp.; Window Wrap.
      d. Polyguard Products, Inc.; Polyguard 300.
      e. Protecto Wrap Company; BT-20 X.

C. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
4. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
5. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
6. 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."
7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."

D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and 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.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install boards with a **3/8-inch** gap where non-load-bearing construction abuts structural elements.
3. Install boards with a **1/4-inch** gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately **8 inches** o.c. and set back a minimum of **3/8 inch** from edges and ends of boards.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately **8 inches** o.c. and set back a minimum of **3/8 inch** from edges and ends of boards.

3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least **4 inches**, except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 061600

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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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. This Section includes the following:

1. Cold-applied, emulsified-asphalt dampproofing for non-basement foundation walls.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

B. Material Certificates: For each product, signed by manufacturers.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation 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 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

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:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ChemMasters Corp.
2. Degussa Building Systems; Sonneborn Brand Products.
3. Gardner Gibson, Inc.
4. Henry Company.
5. Karnak Corporation.
6. Koppers Inc.
7. Malarkey Roofing Products.
8. Meadows, W. R., Inc.
9. Tamms Industries, Inc.
10. Polyguard.

C. Trowel Coats: ASTM D 1227, Type II, Class 1.

D. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

E. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

F. VOC Content: Zero.

2.2 MISCELLANEOUS MATERIALS

A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Proceed with dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.
2. Test for surface moisture according to ASTM D 4263.

3.2 PREPARATION

A. Protection of Other Work: 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.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

C. Apply patching compound for filling and patching tie holes, honeycombs, reveals, and other imperfections.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

1. Apply additional coats if recommended by manufacturer or if required to achieve coverages indicated.
2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
3. Allow 48 hours drying time prior to backfilling.

B. Apply dampproofing to all footings and foundation walls.

1. 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.
2. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," 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.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Concrete Foundations: Apply 2 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, 1 fibered brush or spray coat at not less than 3 gal./100 sq. ft., or 1 trowel coat at not less than 4 gal./100 sq. ft.

3.5 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 071113

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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SECTION 072100 – THERMAL INSULATION

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. Glass-fiber blanket insulation.
2. Extruded-Polystrene Board Insulation.
3. Spray Polyurethane Foam Insulation.
4. Polyisocyanurate insulation.

B. Related Sections:

1. Division 07 Section “Thermoplastic Polyolefin (TPO) Roofing” for insulation specified as part of roofing construction.

1.3 SUBMITTALS

A. Product Data: For each type and form of product indicated.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

C. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

A. 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.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED-POLYSTRENE BOARD INSULATION

A. ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84, for use in below grade applications only.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Atlas Roofing Corporation.
   b. Dow Chemical Company (The).
   c. Owens Corning.
2. Type IV, 40 psi.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Owens Corning.
5. Knauf Insulation.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Fiber Type: Fibers manufactured from glass.

D. Surface Burning Characteristics: Max. flame spread and smoke developed values of 25 and 50.

E. 3 ½" (R-13), 6" (R-19) or other as indicated on Drawings.

F. Low Emitting: Insulation tested according to ASTM D5116 and shown to emit less than 0.05 ppm formaldehyde.

2.3 SPRAY POLYURETHANE FOAM INSULATION (Top of Wall and other building envelope conditions)

A. Closed-Cell Fire Retardant Polyurethane Foam Insulation: with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Versi-Foam Closed Cell System, Class 1 (flame retardant)
   b. Tiger Foam E-84 Fire Rated SPF Class I Insulation by Commercial Thermal Solutions, Inc.
   c. Handi-foam E84 Class 1 Fire Retardant spray foam by Industrial Insulation Sales, Inc.
   d. Quick Cure (E-84 Class I) Spray Foam
   e. Gacowallfoam 183M by GacoWestern
   f. CertaSpray Closed Cell Foam by CertainTeed Saint-Gobain
   g. Styrofoam Brand MX 2045 Foam by Dow Chemical Co.
   h. Comfort Foam 178 series by BASF
   i. Icynene ProSeal (MD-C-200v3) Spray Foam Insulation
2. Minimum density of 1.75 lb/cu. ft thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

B. Install spray foam insulation in **all** cavities at perimeter walls, and where indicated on the drawings where it is not feasible to install batt or other insulation to close off any air gaps, voids, etc. for airtight seal

including but not limited to connection between walls and roofs. Install spray foam insulation in all non-grouted masonry cells at block walls.

C. Where spray foam insulation is installed in open/exposed structure, foam shall be installed with straight, smooth faces ready for paint.

2.4 THERMAL AND IGNITION BARRIER

A. GeneralFoam plastic insulation shall be separated from the interior of building by an approved thermal barrier of ½" gypsum wallboard or a thermal and ignition barrier in accordance with Chapter 26 of the International Building Code.

B. Basis of Design: DC 315 Fireproof paint is a water-based coating as manufactured by International Fireproof Technology, Inc. – Paint to Protect; 17528 Von Karman Avenue, Irvine, CA 92614; (949) 975-8588.

C. Apply coating over all spray polyurethane foam insulation applications, unless insulation provided does not require a thermal and ignition barrier in each type of application.

1. Thickness as required to meet NFPA 286.
2. Confirm compatibility of coating with insulation manufacturer before ordering and installing insulation.

2.5 POLYISOCYANURATE INSULATION

A. Felt-Faced Polyisocyanurate-Foam Wall and Cavity insulation: ASTM C 1289, Type II, Class 1, Grade 2, glass-fiber-reinforced, rigid, cellular, polyisocyanurate thermal insulation. Foam-plastic core and facings shall have a flame-spread index of 25 or less when tested individually.

B. 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. Apache Products Company.
b. Atlas Roofing Corporation.
c. Dow Chemical Company (The).
d. Johns Manville; Berkshire Hathaway Inc.
e. Rmax, Inc.
f. Thickness: 2 inches.

2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
   b. Gemco; Spindle Type.
2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Gemco; 90-Degree Insulation Hangers.
2. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.

3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. AGM Industries, Inc.; RC150.
   b. Gemco; Dome-Cap.

D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 in between face of insulation and substrate to which anchor is attached.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Gemco; Clutch Clip.

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. AGM Industries, Inc.; TACTOO Adhesive.
   b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Insulate all walls, ceilings, and perimeter as shown, and fill all cavities and voids in structures, joints, and various assemblies. Fill box headers; place rigid insulation at cold side of all structural elements; fill voids and cracks with fiber insulation or foam type.

E. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. Extend insulation to top of footing as indicated on drawings.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings and seal each continuous area of insulation to ensure airtight installation.
    a. Exterior Walls: Set units with facing placed toward interior of construction.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

E. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

1. Spray applied insulation, installer shall provide any additional blocking or masking as necessary to form edges to terminate insulation.

3.5 INSTALLATION OF CAVITY-WALL INSULATION

A. Polyisocyanurate Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry."

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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SECTION 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fluid-applied membrane air barrier, vapor permeable.

B. Related Sections include the following:

1. Division 06 Section "Sheathing" for wall sheathings, wall sheathing joint-and-penetration treatments.
2. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashings.
3. Division 07 Section "Joint Sealants" for joint-sealant materials and installation.

1.3 DEFINITIONS

A. ABAA: Air Barrier Association of America.

B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.5 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1. Include details of interfaces with other materials that form part of air barrier.
2. Include details of mockups.

C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.

D. Qualification Data: For Applicator.

E. Product Test Reports: Based on evaluation of comprehensive tests performed for air barriers.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly, 40 sq. ft., incorporating backup wall construction, external cladding, window, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.

1. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
2. If Architect determines mockups do not comply with requirements, correct mockups and apply air barrier until mockups are approved.
3. Approved mockups may become part of the completed Work.

C. Pre-installation Conference: Conduct conference at Project site.

1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life.

C. Store rolls according to manufacturer's written instructions.

D. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: synthetic polymer membrane.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Sto Corporation; StoGuard.
   b. Henry Company; Air-Bloc 31.
   c. Tremco Incorporated; ExoAir 220R.
   d. Dryvit; Backstop NT.
   e. Prosoco, Inc. Prosoco R-Guard MVP.
   f. Grace Construction Products, Perm-A-Barrier VP.
   g. Carlisle Coating & Waterproofing; Barritech VP.

2. Physical and Performance Properties:
   a. Membrane Air Permeance: Not to exceed 0.004 cfm/ sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Membrane Vapor Permeance: Not less than 10 perms; ASTM E 96.

2.2 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne solvent-borne primer recommended for substrate by manufacturer of air barrier material.

C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, crosslaminated polyethylene film with release liner backing.

D. Modified Bituminous Strip: Vapor-retarding, 40-mil- thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

E. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.

F. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

G. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

H. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

I. Adhesive-Coated Transition Strip: Vapor-permeable, 17-mil- thick, self-adhering strip consisting of an adhesive coating over a permeable laminate with a permeance of 37 perms.

J. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

3.4 TRANSITION STRIP INSTALLATION

A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install modified bituminous strip on base flashing so that a minimum of 3” of coverage is achieved over both surfaces.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane, concrete below-grade structures, floor-to floor construction, exterior glazing, window systems, storefront systems, exterior louvers, exterior door frames, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply adhesive-coated transition strip so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.

G. Fill gaps in perimeter frame surfaces of windows, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, modified bituminous, counterflashing strip.

J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 AIR BARRIER MEMBRANE INSTALLATION

A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.

B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.

C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

D. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.

1. Vapor-Permeable Membrane Air Barrier: 40-mil dry film thickness.

E. Apply transition strip over cured air membrane overlapping 3 inches onto each surface according to air barrier manufacturer's written instructions.

F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.6 FIELD QUALITY CONTROL

A. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.

12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

B. Remove and replace or repair deficient air barrier components.

3.7 CLEANING AND PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 60 days.
2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 074113 - STANDING-SEAM METAL ROOF PANELS

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 standing-seam metal roof panels.

B. Related Sections:

1. Section 074213 "Metal Wall Panels, Soffit Panels, and Prefabricated Aluminum Pergola" for metal panel applications.

2. Section 076200 “Sheet Metal Flashing & Trim”.

1.3 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete watertight roofing system.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at the Project Site: 711 E. Miller Rd. Republic, MO 65738.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review structural loading limitations of deck during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.

9. Review procedures for repair of metal panels damaged after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by 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.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof area and eave, including fascia and soffits, as shown on Drawings; approximately 48 inches (1200 mm) square by full thickness, including attachments, underlayment, and accessories.
2. Build mockups for typical roof area only, including accessories.

a. Size: 12 feet (3.5 m) long by 6 feet (1.75 m)]

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard 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. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 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 that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low-slope roof products.

B. 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 E1980.

C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than **1/180** of the span.

D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).

E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646[or ASTM E331] at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).

F. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.

G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

H. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-**60**
2. Hail Resistance: **MH**.

I. 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.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; material surfaces.

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 joint type indicated and mechanically attaching panels to supports 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 E1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and **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 snapping panels together.

1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
   a. Exterior Finish: Two-coat fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   b. Color: As selected by Architect from manufacturer's full range.

2. Aluminum Sheet: Coil-coated sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

   a. Thickness: 0.032 inch (0.81 mm).
   b. Surface: Smooth, flat finish.
   c. Exterior Finish: Two-coat fluoropolymer.
   d. Color: As selected by Architect from manufacturer's full range.

3. Clips: **Two-piece floating** to accommodate thermal movement.

   a. Material: 24-gauge, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

4. Panel Coverage: 18 inches (457 mm).
5. Panel Height: Per manufacturers' standard.
6. Joint Type: Double folded. Integral snap lock seams with integral weather seal and concealed anchors.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) 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 (116 deg C); ASTM D1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M,

Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, 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- (25-mm-) 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, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
1. Refer to Section 076200 “Sheet Metal Flashing” for additional information.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match **metal roof panels**.
1. Refer to Section 076200 “Sheet Metal Flashing” for additional information.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
1. Refer to Section 076200 “Sheet Metal Flashing” for additional information.

F. Roof Curbs: Fabricated from same material as roof panels, **0.048-inch (1.2-mm)** nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch- (1.52-mm-) nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.

1. Insulate roof curb with 1-inch- (25-mm-) thick, rigid insulation.

G. Panel Fasteners: Self-tapping screws designed to withstand design loads.

H. 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. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 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 major ribs and intermediate stiffening ribs, if any, 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.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are

unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

E. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply over entire roof area, wrinkle free, in

shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
4. Stainless-Steel Panels: Use stainless-steel fasteners.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with 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 recommend in writing by manufacturer as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Clipless Metal Panel Installation: Fasten metal panels to supports with screw fasteners at each lapped joint at location and spacing recommended by manufacturer.

G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

I. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

J. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

K. Roof Curbs: Install flashing around bases where they meet metal roof panels.

L. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 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 in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 074213 – METAL WALL PANELS, SOFFIT PANELS, & PREFABRICATED ALUMINUM PERGOLA & ACCESSORIES

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. Concealed-fastener, lap-seam metal wall panels.
2. Concealed-fastener, lap-seam metal soffit panels.
3. Aluminum Batten System.
4. Aluminum decking and cladding.
5.

B. Related Sections:

1. Division 05 Section "Cold-Formed Metal Framing" for support framing, including girts, studs, and bracing.
2. Division 07 Section "Fluid Applied Membrane Air Barrier" for continuous air barrier systems.
3. Division 07 Section "Sheet Metal Flashing and Trim" for flashing and other sheet metal work that is not part of metal wall panel assemblies.

1.3 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

B. Prefabricated Aluminum Pergola & Accessories refers to the basis of design product by Knotwood. Following information is used where noted as “Cabanas” on drawings.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

D. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

1. Water Leakage: Uncontrolled water infiltrating the system or appearing on system's normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

E. Structural Performance: Provide metal panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:
   a. Uniform pressure of 20 lbf/sq. ft., acting inward or outward.
2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/240 of the span.

F. 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.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

G. Components of Prefabricated Aluminum Pergola: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of walls as calculated in accordance with applicable code.

H. Movement of Prefabricated Aluminum Pergola: Accommodate movement within system without damage to components or movement within system: movement between system and perimeter components when subject to seasonal temperature cycling: dynamic loading and release of loads: deflection of structural support framing.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of prefabricated aluminum pergola, metal wall and soffit panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
   a. Flashing and trim.
   b. Anchorage systems.

C. Samples for Initial Selection for Metal Wall Panels and Soffit Panels: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.
2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.

D. Samples for Initial Selection of Prefabricated Aluminum Pergola: For each finish product specified, two complete sets of color chips representing the manufacturer’s full range of colors and patterns.
1. Verification Samples: For each finish product specified, two samples, minimum size 2-inches (51 mm) by 3-1/2-inches (89mm), representing actual product, color and gloss.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

F. Field quality-control reports.

G. Maintenance Data: For metal wall panels to include in maintenance manuals.

H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of metal panel from single source from single manufacturer.

C. Manufacturer's Qualifications for Prefabricated Aluminum Pergola: Minimum ten year's experience producing aluminum finishes of the types specified in AAMA 2604 and 2605 certified.

D. Mock-up for Prefabricated Aluminum Pergola: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Do not proceed with work until workmanship, color, and gloss are approved by Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package and store products under cover in manufacturer's unopened packing until ready for transport and installation.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Store prefinished material off ground protected from weather, to prevent twisting, bending, or abrasion, and provide ventilation. Slope aluminum extrusions to ensure drainage.

E. Prevent contact with materials capable of causing discoloration or staining.

F. Retain strippable protective covering on metal panel for period of metal panel installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer. Do not fabricate products under environmental conditions outside of manufacturer's recommendations.

C. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of furring channels, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel and soffit panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels and soffit panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Warranty on Prefabricated Aluminum Pergola: Manufacturer's standard form in which manufacturer agrees to repair or replace components of assembly that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Cracking and peeling.
   b. Gloss/color retention within the guidelines stated by the American Aluminum Manufacturers Association (AAMA).
2. Finish Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Square-Reveal-Profile, Concealed-Fastener Metal Wall Panels: Formed with square major reveals at varied spacing.

1. Vertical Tapered Rib Profile Basis-of-Design Product: Subject to compliance with requirements, provide Elevate (formerly Firestone) Delta CFP- 12F or comparable product by one of the following available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
   a. ATAS International, Inc.
   b. CENTRIA Architectural Systems.
   c. Elevate (formerly known as Firestone Building Products).
   d. Metal Sales & Service, Inc.
   e. Metal Sales Manufacturing Corporation.
   f. Morin - A Kingspan Group Company.
   g. Petersen Aluminum Corporation.
2. 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. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Nominal Thickness: **22 gauge 0.86 mm.**
   b. Exterior Finish: Two-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer's full range including PREMIUM Colors.

3. Major-Rib Spacing: Per manufacturer. Refer to basis of design product.
4. Panel Coverage: 12 inches 914 mm.
5. Panel Height: 1.0 inch (25 mm).

C. Trim and flashing shall be fabricated from the same material type and finish as the wall panels. Hem all exposed edges of flashing on underside.

2.2 CONCEALED-FASTENER, LAP-SEAM SOFFIT SYSTEM

A. General: Furnish all labor, materials, accessories, and necessary equipment for installation of prefinished steel soffit system equal to Berridge Vee-Panel soffit system with concealed fasteners or approved equal.

B. Soffit Panels shall be smooth finish and shall have 12-3/4" exposure with 3/8" deep vee-grooves 4-1/4" on center with concealed fasteners and interlocking sidelap.

1. Panels shall be galvalume with Kynar 500 or Hylar 5000 finish.
2. Panel sections shall be formed in continuous lengths for soffit to 40 feet maximum length. Install panels in direction indicated per drawings.
3. Attachment to metal supports with #8 x 12" TEK screws at maximum spacing of 2'-0" on center or per local code, whichever is greater.
4. Optional vented vee-panel shall have a net free vent area of 6.46 square inches per lineal foot of panel.
5. Provide alternating solid and vented panels at applications indicated with open framing support systems.
6. Provide solid soffit panels at applications indicated with fluid applied membrane air barrier over exterior sheathing as the substrate.
7. Color: As selected by Architect from manufacturer's full range.

C. Provide all required accessories including, but not limited to, screws, starter strips, mouldings, utility trim, etc. in finish to match soffit panels. All trim and accessories shall be by soffit manufacturer. Hem all exposed edges of flashing on underside.

D. Properly protect and terminate panels from dissimilar materials as recommended by manufacturer.

E. Provide suspended supports as may be necessary to meet soffit manufacturer's recommendations for required spans and to prevent sagging or deflection. Space additional supports at max. 24" o.c. Provide 18 gage channel support system as recommended by manufacturer consisting of hat sections and channels sections suspended from the roof framing. Provide gage and spacing as recommended by the manufacturer for the required spans.

F. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape, 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.3 PREFABRICATED ALUMINUM PERGOLA

A. Furnish all materials, accessories, and necessary equipment for installation of prefabricated aluminum pergola to Knotwood specified system or approved equal . Prefabricated Aluminum Pergola & Accessories refers to the basis of design product by Knotwood. Following information is used where noted as "Cabanas" on drawings.

B. Basis of Design Manufacturer: Knotwood, LLC; 30 Technology Pkwy S. Suite 400 Peachtree Corners, GA 30092; Email: hpoehlman@parallelrep.com; Tel: (720) 435-1099; Web: www.knotwood.com.

C. Acceptable Manufacturers:
1. Structureworks; 3300 Dill Smith Drive Fredericksburg, VA 22408; Email: info@structureworks.com; Tel: (877) 489-8064.
2. Or an approved equal.

D. Requests for substitutions will be considered in accordance with provisions of Section 016000.

E. Materials: Verify all quantities and accessories are accounted for to provide a complete installation for 10'-0" width x 10'-0" length x 8'-0" height custom pergola.
1. Extruded Aluminum Accessories and Trim: Delegated Design for supports.
   a. KED150 — 6" x 5/8" x 18'-6" Cladding Board Smooth
   b. KEDSTRADJ — Starter Piece for Cladding and Decking 18'-6"
   c. KEDFA5050 — Decking Concealed Fixing Angle 18'-6".
   d. KESINFS — Cladding Infill Small 18'-6".
2. Extruded Aluminum Battens:
   a. KEB5050MNEW — Batten Bracket Part A/Male 2" x 18'-6".
   b. KEB20050F — Batten Part B/Female 2" x 8" x 18'-6".
   c. SCKAB10040 — Internal L Bracket 1-1/5" x 4" to suite 2"x4", 2"x6", or 2"x8" Battens.
   d. KEGR20050 — RHS Beam 2"x 8" x 18'-6".
3. Extruded Aluminum Lattice:
   a. KES10016 — 4" x 5/8" x 18-6" Slat
   b. KESP3030 — 1-1/8" x 1-1/8" x 18'-6" U-Channel
   c. KESINFS — Infill Small 18'-6".
   d. KEGS100100 — 4" x 4" x 18'-6" SHS Post
   e. KAEC100100-R — End Cap Post to suit 4"x4" Post
   f. KAEC3030-R — Routed End Cap to suit 1-1/8" x 1-1/8" U Channel
   g. 4x4 Base Plate

F. Finish:
1. Pretreatment: Comply with AAMA 2604, AND AAMA 2605 Superior Performance Standard and meet EPA, OSHA, State, and Local environmental requirements. Product to be free of chromates, cyanides, or other heavy metals.
2. Color: To be selected by Architect from manufacturer's full range of woodgrain and solid powder coat colors.

2.4 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G40 hot-dip galvanized, ASTM A 653/A 653M, G60 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Base or Sill Channels: 0.079-inch nominal thickness.

C. Hat-Shaped, Rigid Furring Channels:

1. Nominal Thickness: As required to meet performance requirements.
2. Depth: As indicated.

D. Cold-Rolled Furring Channels: Minimum 1/2-inch-wide flange.

1. Nominal Thickness: As required to meet performance requirements.
2. Depth: As indicated.

3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with 0.040-inch nominal thickness.
4. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

E. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.5 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.6 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fascia, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Formed from 0.018-inch minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fascia, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.7 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.

E. Prepare surfaces, pre-treat and coat components in accordance with AAMA 2604 and 2605 Quality Standards for the Pre-fabricated Aluminum Pergola. Wrap and package coated components using methods suitable for transit and covered site storage without damage.

F. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
3. Verify that fluid applied membrane air barrier has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
4. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Framing: Install zee furring, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

1. Soffit Framing: Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Commence metal wall panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
4. Install screw fasteners in predrilled holes.
5. Locate and space fastenings in uniform vertical and horizontal alignment.
6. Install flashing and trim as metal wall panel work proceeds.
7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
9. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
10. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners:

1. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

E. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
7. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

3.4 METAL SOFFIT PANEL INSTALLATION

A. In addition to complying with requirements of "Metal Wall Panel Installation, General" Article, install metal soffit panels to comply with the requirements of this article.

B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.

1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 076200 – SHEET METAL FLASHING AND TRIM

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. Manufactured Products:
   a. Manufactured reglets and counterflashing.
2. Formed Products:
   a. Formed roof drainage sheet metal fabrications.
   b. Formed low-slope roof sheet metal fabrications.
   c. Formed wall sheet metal fabrications.
   d. Formed equipment support flashing.

B. Related Sections:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 07 Section "Standing Seam Metal Roof Panels" for installing sheet metal flashing and trim integral with membrane roofing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated 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. Fabricate and install roof edge flashing and copings capable of resisting the following forces:

1. Wind Zone 2: For velocity pressures of 37.5 to 45 lbf/sq. ft.: 150-lbf/sq. ft. perimeter uplift force, 225-lbf/sq. ft. corner uplift force.

C. SPRI Wind Design Standard: Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: use http://www.metalera.com/CalcWind.aspx?id=2098

D. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.

2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
6. Details of special conditions.
7. Details of connections to adjoining work.
8. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

D. Qualification Data: For qualified fabricator.

E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that 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.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which 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. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a 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. Exposed Coil-Coated Finishes:
   a. Two-coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color: As selected by Architect from manufacturer's full range. Product approval will be subject to product color line and the ability to match existing metal flashing and/or trim.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.

B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Products: Subject to compliance with requirements, provide one of the following:
   a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
   b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
   c. Henry Company; Blueskin PE200 HT.
   d. Metal-Fab Manufacturing, LLC; MetShield.
   e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

D. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by 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 using plastic caps or factory-applied coating.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, white 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 silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Fry Reglet Corporation.
   b. Heckmann Building Products Inc.
   c. Hickman, W. P. Company.
   d. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
   e. National Sheet Metal Systems, Inc.
   f. Sandell Manufacturing Company, Inc.
2. Material: Aluminum, 0.024 inch thick.
3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
5. Accessories:
   a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
   b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
6. Finish: With manufacturer's standard color coating. Product approval will be subject to product color line and the ability to match any existing flashing and/or trim.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

I. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate rectangular downspouts in 10-foot-long sections, complete with mitered elbows and offsets, of size and metal thickness according to SMACNA’s “Architectural Sheet Metal Manual.” Furnish with metal hangers, from same material as conductor heads, and anchors.

1. Fabricated Hanger Style: Custom spacer and stiffener. Refer to details on drawings.
2. Size: 5”x5” square downspouts, typical.
3. Finish color of downspouts shall be selected by Architect during construction. Product approval will be subject to product color line and the ability to match any existing flashing and/or trim. Multiple colors may be required.

2.7 ROOF SHEET METAL FABRICATIONS

A. Roof and Roof to Wall Transition, Roof to Roof Edge Flashing (Gravel Stop) Transition, Roof to Roof Edge Flashing (Gravel Stop) and Fascia Cap Transition Expansion-Joint Cover: Fabricate from the following materials:

1. Aluminum: 0.050 inch thick.

B. Base Flashing: Fabricate from the following materials:

1. Aluminum: 0.040 inch thick.

C. Counterflashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

D. Flashing Receivers: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between course s. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 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, solder, welding rods, 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 and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and 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. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing, metal decking, etc. not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system indicated.

C. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" for specified wind zone and as indicated.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.

F. 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.

3.6 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.8 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 079200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

B. Related Sections:

1. Division 09 Section "Gypsum Board" for sealing perimeter joints.
2. Division 09 Section and "Acoustical Tile Ceilings" for sealing edge moldings at perimeters with acoustical sealant.
3. Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. 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.

D. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

F. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

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. Dow Corning Corporation; 790.
   b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
   c. May National Associates, Inc.;[Bondaflex Sil 290.
   d. Pecora Corporation; 301 NS.
   e. Sika Corporation, Construction Products Division; SikaSil-C990.
   f. Tremco Incorporated; Spectrem 1.

B. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.

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. BASF Building Systems; Omniseal 50.
   b. Dow Corning Corporation; 756 SMS.
   c. GE Advanced Materials - Silicones; SilGlaze II SCS2800.
   d. May National Associates, Inc.; Bondaflex Sil 295.
   e. Pecora Corporation; 864.
   f. Polymeric Systems, Inc.; PSI-641.
   g. Sika Corporation, Construction Products Division; SikaSil-C995.
   h. Tremco Incorporated; Spectrem 2 or 3.

C. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.

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. Dow Corning Corporation; 790.
   b. May National Associates, Inc.; Bondaflex Sil 728 NS.
   c. Pecora Corporation; 301 NS.
   d. Tremco Incorporated; Spectrem 800.

D. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

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. Pecora Corporation; 898.

2.3 URETHANE JOINT SEALANTS

A. Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.

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. BASF Building Systems; Sonolastic SL 1.
   b. Bostik, Inc.; Chem-Calk 950.
   c. May National Associates, Inc.; Bondaflex PUR 35 SL.
   d. Pecora Corporation; Urexpan NR-201.
   e. Polymeric Systems, Inc.; Flexiprene 952.
   f. Schnee-Morehead, Inc.; Permathane SM7101.
   g. Sika Corporation. Construction Products Division; Sikaflex - 1CSL.
   h. Tremco Incorporated; Vulkem 45.

B. Immersible, Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Uses T and I.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. BASF Building Systems; Sonolastic NP1.
   b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
   c. Tremco Incorporated; Vulkem 116.

C. Immersible, Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Uses T and I.

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. Sika Corporation, Construction Products Division; Sikaflex - 1CSL.
   b. Tremco Incorporated; Vulkem 45.

D. Immersible Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type M, Grade P, Class 25, for Use T and I.

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. LymTal International, Inc.; Iso-Flex 880 GB.
   b. May National Associates, Inc.; Bondaflex PUR 2 SL.
   c. Tremco Incorporated; Vulkem 245.

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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. BASF Building Systems; Sonolac.
   b. Bostik, Inc.; Chem-Calk 600.
   c. May National Associates, Inc.; Bondaflex 600.
   d. Pecora Corporation; AC-20+.
   e. Schnee-Morehead, Inc.; SM 8200.
   f. Tremco Incorporated; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Pecora Corporation; AC-20 FTR or AIS-919.
   b. USG Corporation; SHEETROCK Acoustical Sealant.

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
   a. Concrete.
   b. Masonry.
3. Remove laitance and form-release agents from concrete.
4. 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. Nonporous joint substrates include the following:
   a. Metal.
   b. Glass.
   c. Porcelain enamel.
   d. Glazed surfaces of ceramic tile.

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.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. 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.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. 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.

F. 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.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. 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.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal traffic and nontraffic surfaces JS-#1.

1. Joint Locations:
    a. Construction joints in cast-in-place concrete.
    b. Control and expansion joints in unit masonry.
    c. Joints in glass unit masonry assemblies.
    d. Joints in exterior insulation and finish systems.
    e. Joints between different materials listed above.
    f. Perimeter joints between materials listed above and frames of doors and windows.
    g. Control and expansion joints in overhead surfaces.
2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
3. Urethane Joint Sealant: Single component, nonsag, Class 100/50.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces JS-#2.

1. Joint Locations:
    a. Isolation joints in cast-in-place concrete slabs.
    b. Control and expansion joints in tile flooring.
2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
3. Urethane Joint Sealant: Single component, pourable, traffic grade.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#3.

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 walls and partitions.
d. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#4.

1. Joint Sealant Location:
   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Tile control and expansion joints where indicated.
2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces JS-#5.

1. Joint Location:
   a. Acoustical joints where indicated.
   b. Other joints as indicated.
2. Joint Sealant: Acoustical.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

F. Joint-Sealant Application: Precast Concrete Panels.

1. Seal joints with type of sealer as recommended by Precast Concrete Supplier for specific application to provide full weathertight installation.

END OF SECTION 079200

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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. Standard hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

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 “Glazing” for glass view panels in hollow metal doors.
4. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
5. Division 09 Section "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 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. 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 each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of conduit and preparations for power, signal, and control systems.
9. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1.6 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.

1. Provide additional protection to prevent damage to finish of factory-finished units.

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.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 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.

1.9 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, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Pioneer Industries
6. Kewanee Corporation.
7. Mesker Door Inc.
8. Steelcraft; an Ingersoll-Rand company.
9. Windsor Republic Doors.
10. Allied Steel Products, Inc.
11. Republic Builders Products Corp./Subs. Republic Steel.

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. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. 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 polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-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. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
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. 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 one-piece polystyrene core, securely bonded to both faces.
3. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
4. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
5. 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.
6. 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.
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

2.4 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames: Minimum 16 gauge (0.053-inch-1.3mm) thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet (16 gauge).
4. Frames for Borrowed Lights: Same as adjacent door frame.

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.
2. Stud Wall Type: Designed to engage stud and not less than 0.042 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 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.7 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 inch thick.

2.8 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. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: 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.

1. 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 bracing during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcement at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
5. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements. Weld guards to frame at back of hardware mortises in frames to be grouted.
6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
7. 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” on center and as follows:
      1) Two anchors per jamb up to 60 inches high.
      2) Three anchors per jamb from 60 to 90 inches high.
      3) Four anchors per jamb from 90 to 120 inches high.
      4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
   b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on center and as follows:
      1) Three anchors per jamb up to 60 inches high.
      2) Four anchors per jamb from 60 to 90 inches high.
      3) Five anchors per jamb from 90 to 96 inches high.
      4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
8. Door Silencers: Except on weather-stripped doors, or doors receiving sound or smoke seals, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. 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.

F. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

G. 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.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.9 STEEL FINISHES

A. Prime Finish: 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: 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 squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

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.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged. Shim as required to comply with installation tolerances.
   a. At fire-protection-rated openings, install frames according to NFPA 80.

b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that are filled with grout containing anti-freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. 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.
6. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:
   a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
   c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
   d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section “Glazing” and with hollow metal manufacturer’s written instructions.

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 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

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SECTION 084113 – ALUMINUM-FRAMED ENTRANCES & STOREFRONTS

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. General: Provide and install complete window and door framing system, glazing and all required components for a complete and operational, weathertight system.

B. Section Includes:

1. Exterior swing entrance doors and door-frame units.
2. Installation of finish hardware for aluminum doors.

C. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 07 Section “Joint Sealers.”
2. Division 08 Section “Glazing” for types of glazing required for field and factory installed glass.
3. Division 08 Section “Door Hardware”.

1.3 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
    a. Deflection exceeding specified limits.
    b. Thermal stresses transferring to building structure.
    c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    d. Glazing-to-glazing contact.
    e. Noise or vibration created by wind and by thermal and structural movements.
    f. Loosening or weakening of fasteners, attachments, and other components.
    g. Sealant failure.
    h. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads:
    a. Basic Wind Speed: 90 mph.
    b. Importance Factor: 1.

c. Exposure Category: C.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

H. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

1. Maximum Water Leakage: According to AAMA 501.1 Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

I. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F , ambient; 180 deg F, material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
   a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F**.**
   b. Low Exterior Ambient-Air Temperature: 0 deg F.
3. Interior Ambient-Air Temperature: 75 deg F.

J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

K. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

L. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:

1. Sound Transmission Class (STC): Minimum 35 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work, including dimensions, member profiles, glazing details, hardware mounting heights and anchorage to building systems.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Verification: For each type of exposed finish required, min. 12” long extrusions including 2 or more for limits of color variation in finish.

D. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

E. Qualification Data: For qualified Installer.

F. Preconstruction Test Reports: For sealant.

G. Calculations: Submit engineering wind load calculations for storefront systems indicating compliance with specified requirements.

H. Source quality-control reports.

I. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

J. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility: Provide entrance and storefront systems from one source and from a single manufacturer for the entire project, unless specifically noted otherwise.

B. Installer Qualifications: Manufacturer's authorized and experienced installer who is trained and approved for installation of units required for this Project based upon AAMA IPCB-08 “Standard Practice for the Installation of Windows and Doors in Commercial Buildings” and who has successfully completed installations of similar design and extent to this project and has a record of “in-service” performance.

C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review. The burden of proof of equality is on the proposer.

E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

1.7 DELIVERY, STORAGE & HANDLING

A. Deliver aluminum entrance and storefront components in the manufacturer’s original protective packaging.

B. Store aluminum components in a clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.

1. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.

1.8 PROJECT CONDITIONS

A. Field Measurements: Check actual openings and conditions by accurate field measurement before submitting for fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by thermal movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Adhesive or cohesive sealant failures.
   e. Water leakage through fixed glazing and framing areas.
   f. Failure of operating components.
2. Warranty Period: 2 years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 20 years from date of Substantial Completion for painted finishes.
2. Warranty Period: 10 years from date of Substantial Completion for anodized finishes.

C. The warranty shall not deprive the Owner of other rights or remedies under other provisions of the Contract Documents and is in addition to other warranties under requirements of the Contract Documents.

1.10 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide specified systems by Efco Corporation, or approved equal products by one of the following.

1. Kawneer, An Alcoa Company.
2. Tubelite Inc.
3. Oldcastle Building Envelop.
4. United States Aluminum.
5. Vistawall Architectural Products.

2.2 FIXED WINDOWS AND STOREFRONT FRAMING

A. Interior Fixed Windows and Storefront Framing System: EFCO Series 402 center glazed storefront system with 4-1/2” frame depth and 2” sight line with provisions for 1/4” glazing as specified in Section 088000.

B. Provide bottom rail as shown and deep head rail where shown.

2.3 ALUMINUM DOORS AND FRAMES

A. General: See Schedule Section 087100 for specific hardware requirements. All doors shall be factory glazed.

B. Closers: Surface mounted, to meet ANSI specifications for accessible entrances; finish to match frame finish.

C. Weatherstripping: Provide manufacturer’s standard integral seals in door and frame at vestibules to provide weathertight seal.

D. Door frames shall be EFCO Series 402 storefront framing.

E. Aluminum Doors: EFCO Series D500 Wide Stile Entry Doors with 10” bottom rail at all locations unless noted otherwise.

1. Door Construction: 2-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Glazing Stops and Gaskets: Provide nonremovable glazing stops on outside of door.
3. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select

surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

C. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained by structural sealant at vertical edges and mechanically with gaskets at horizontal edges.
3. Glazing Plane: As indicated.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

G. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding flashing compatible with adjacent materials.

H. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing", comply with requirements of Section 088000.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Color: As selected by Architect from manufacturer's full range of colors.
2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
   a. Color: As selected by Architect from manufacturer's full range of colors.

2.6 DOOR HARDWARE

A. General: Hardware for aluminum doors shall be installed at the door manufacturer's factory and be included in the warranty. Provide manufacturer's weatherstripping as noted in this section. Reference Section 087100 "Door Hardware" for hardware set required for a complete installation.

2.7 ACCESSORY MATERIALS

A. Aluminum sills, mullion covers, transom frame covers, break metal parts as shown, and other components as may be needed to complete the system.

1. Miscellaneous brake metal covers or parts required but not available from Efco shall be provided by the Contractor.

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

C. Jamb Closure Flashing Membrane: Provide self-adhering, polyethylene sheet backed membrane. Min. 40 mils thick.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using shear-block system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide cut pile weatherstrip (vinyl bulb type is not allowed).
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Comply with NAAMM Metal Finishes Manual for recommendations relative to application and designations of finishes. Finishes prefixed by “AA” confirm to Aluminum Association for designation of aluminum finishes.

B. Clear Anodic Finish: **Black Anodized Aluminum, AA-M10C21A44 Architectural Class 1.** Comply with AAMA 611.

2.10 SCHEDULE FOR ALUMINUM DOORS

A. Reference Section 087100 “Finish Hardware” for additional hardware information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Provide 3/8 inch shim space at all walls, maximum.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:
   a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
   b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

END OF SECTION 084113

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SECTION 087100 – DOOR HARDWARE

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. Mechanical door hardware for the following:
   a. Swinging doors.
   b. Sliding doors.
   c. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies.
2. Section 081216 "Aluminum Frames" for door silencers provided as part of aluminum frames.
3. Section 102600 "Wall and Door Protection" for plastic door protection units that match wall protection units.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
1. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
2. ICC/IBC – International Building Code.
3. NFPA 70 – National Electric Code.
4. NFPA 80 – Fire Doors & Windows.
5. NFPA 101 – Life Safety Code.
6. NFPA 105 – Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herin shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards – A156 Series.
2. UL10C – Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 – Access Control System Units.
4. UL 305 – Panic Hardware.
5. ANSI/UL 437 – Key Locks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final

door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.

b. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.

c. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.

d. Content: Include the following information:

1) Identification number, location, hand, fire rating, size, and material of each door and frame.

2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.

4) Fastenings and other pertinent information.

5) Explanation of abbreviations, symbols, and codes contained in schedule.

6) Mounting locations for door hardware.

7) List of related door devices specified in other Sections for each door and frame.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Architectural Hardware Consultant.

B. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

C. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

A. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC).

B. Source Limitations: Obtain each type of door hardware from a single manufacturer.

C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in 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 NFPA 252 or UL 10C, unless otherwise indicated.

D. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

E. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:
   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
   b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

G. Keying Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Requirements for access control.
5. Address for delivery of keys.

H. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Review sequence of operation for each type of electrified door hardware.
4. Review required testing, inspecting, and certifying procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.8 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including excessive deflection, cracking, or breakage.
      b. Faulty operation of doors and door hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
   2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
      a. Electromagnetic Locks: Five years from date of Substantial Completion.
      b. Exit Devices: Two years from date of Substantial Completion.
      c. Manual Closers: 10 years from date of Substantial Completion.

1.10 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

1.11 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.

   1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

   1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
   2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:
   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
   a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers: Subject to compliance with requirements provide the following.
   a. Hager Companies (HA) - BB Series, 5 knuckle.
   b. Ives (IV) - 5BB Series, 5 knuckle.
   c. McKinney (MK) - TA/T4A Series, 5 knuckle.

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.

2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers: Subject to compliance with requirements provide the following.
    a. Ives (IV).
    b. Rockwood (RO).
    c. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
6. Manufacturers: Subject to compliance with requirements provide the following.
    a. Ives (IV).
    b. Rockwood (RO).
    c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

D. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2).
2. Master Keys (per Master Key Level/Group): Five (5).

E. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
   1. Manufacturers: Subject to compliance with requirements provide products by the following.
      a. Lund Equipment (LU).
      b. MMF Industries (MM).
      c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
   1. Manufacturers: Subject to compliance with requirements provide products by the following.
      a. Corbin Russwin Hardware (RU) - ML2000 Series.
      b. Sargent Manufacturing (SA) - 8200 Series.
      c. Schlage (SC) - L9000 Series.

2.7 AUXILIARY LOCKS

A. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.

   1. Manufacturers: Subject to compliance with requirements provide products by the following.
      a. Adams Rite Manufacturing (AD) – MSI850S / MS1950 Series

2.8 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.

3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers: Subject to compliance with requirements provide products by the following.
   a. Corbin Russwin Hardware (RU) - DC6000 Series.
   b. LCN Closers (LC) - 4040 Series.
   c. Norton Rixson (NO) - 7500 Series.

C. Door Closers, Surface Mounted (Unitrol): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted closers with door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.

1. Manufacturers: Subject to compliance with requirements provide products by the following.
   a. Corbin Russwin Hardware (RU) - Unitrol Series.
   b. Norton Rixson (NO) - Unitrol Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
   a. Stainless Steel: 300 Grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers: Subject to compliance with requirements provide the following.
   a. Ives (IV).
   b. Rockwood (RO).
   c. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. IVES Hardware; an Allegion company.
      b. Rockwood Manufacturing Company.
      c. Trimco.

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Norton Rixson (RF).
      b. Sargent Manufacturing (SA).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. National Guard Products (NG).
   b. Pemko (PE).
   c. Reese Enterprises, Inc. (RE).

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 Series.

B. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

C. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices, locking devices, closing devices, and seals.

B. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

C. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards. Self-tapping screws are not an acceptable means of installation.

D. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying schedule or directed by Owner.
2. Furnish permanent cores to Owner for installation.

F. Thresholds: Set thresholds for doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame. Where gasketing is soffit mounted install prior to any soffit mounted hardware to ensure continuous perimeter seal.

I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

J. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper function and finish.

D. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Contractor to instruct owner’s personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.7 DOOR HARDWARE SCHEDULE

A. The hardware sets listed below represent the design intent and direction of the owner and Architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the Architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. SA - SARGENT
5. YA - Yale
6. AD - Adams Rite
7. SC - Schlage
8. RF - Rixson
9. NO - Norton
10. SU - Securitron

HARDWARE SETS

Set: 1.0
Doors: 100a
Description: Exterior Pair - Filter

6	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK	087100
2	Flush Bolt	555 - 12"/72" A.F.F.	US26D	RO	087100

1	Dust Proof Strike	570	US26D	RO	087100
1	Storeroom/Closet Lock	LC 8204 LNL	US32D	SA	087100
1	Cylinder	As Required.	626	SC	
2	Surf Overhead Stop	9-336	630	RF	087100
2	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1	Threshold	2005AT		PE	087100
1	Rain Guard	346C		PE	087100
1	Gasketing	2891APK		PE	087100
2	Sweep	3452AV		PE	087100
1	Astragal	357D		PE	087100

Set: 2.0
Doors: 100b, 101, 106
Description: Exterior Filter/Storage/Elec

3	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK	087100
1	Storeroom/Closet Lock	LC 8204 LNL	US32D	SA	087100
1	Cylinder	As Required.	626	SC	
1	Closer w/ Stop/Hold	UNI7500H	689	NO	087100
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1	Threshold	2005AT		PE	087100
1	Rain Guard	346C		PE	087100
1	Gasketing	2891APK		PE	087100
1	Sweep	3452AV		PE	087100

Set: 3.0
Doors: 103
Description: Exterior Guard

3	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK	087100
1	Mortise Deadlock	MS1850S	628	AD	087100
2	Cylinder	As Required.	626	SC	
1	Push Bar & Pull	BF15747	US32D	RO	087100
1	Closer w/ Stop	UNI7500	689	NO	087100
1	Drop Plate	7788	689	NO	087100
1	Threshold	2005AT		PE	087100
1	Rain Guard	346C		PE	087100
1	Sweep	3452AV		PE	087100

Notes: Perimeter Seal by door manufacturer.

Set: 4.0
Doors: 102
Description: Chem Storage

3	Hinge, Full Mortise	TA2314 4-1/2" x 4-1/2"	US32D	MK	087100
1	Storeroom/Closet Lock	LC 8204 LNL	US32D	SA	087100
1	Cylinder	As Required.	626	SC	
1	Surf Overhead Stop	9-336	630	RF	087100
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1	Gasketing	S88BL		PE	087100

Set: 5.0
Doors: 104, 105, 107, 108
Description: Exterior Restroom

3	Hinge, Full Mortise	TA2314 4-1/2" x 4-1/2"	US32D	MK	087100
1	Privacy Lock	V20 8265 LNL	US32D	SA	087100
1	Surface Closer	7500	689	NO	087100
1	Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO	087100
1	Wall Stop	409	US32D	RO	087100
1	Threshold	171A		PE	087100
1	Rain Guard	346C		PE	087100
1	Gasketing	2891APK		PE	087100
1	Sweep	3452AV		PE	087100

Notes: Door can be opened by coin or screwdriver in emergency.

END OF SECTION 087100

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Aluminum Framed Entrances and Storefront.
2. Hollow Metal Doors and Frames.

B. Related Sections:

1. Division 8 Section “Aluminum Framed Entrances and Storefront.”
2. Division 8 Section “Hollow Metal Doors and Frames.”

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 SUBMITTALS

A. Submit under provisions of Section 013000.

B. Product Data: For each glass product and glazing material indicated.

C. Verification Samples: For the following products, in the form of 12 inch square samples for insulating glass units.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

F. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

B. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

C. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

E. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, and direct exposure to sun, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.8 WARRANTY

A. Manufacturer's Warranty for Coated-Glass Products: Manufacturer's standard form, made out to the glass fabricator in which the coated glass manufacturer agrees to replace coated glass units that deteriorates during normal use within the specified warranty period. Deterioration of the coated glass is defined as peeling and/or cracking, or discoloration that is not attributed to glass breakage, seal failure, improper installation, or cleaning and maintenance that is contrary to the manufacturer’s written instructions.
1. Warranty Period: 10 years from date of manufacture.

B. Manufacturer's Warranty on Insulating Glass: Manufacturer's standard form in which the insulating glass unit manufacturer agrees to replace insulating-glass units that deteriorate during normal use within the specified warranty period. Deterioration of insulating glass units is defined as an obstruction of vision by dust, moisture, or a film on the interior surfaces of the glass caused by a failure of the hermetic seal that is not attributed to glass breakage, improper installation, or cleaning and maintenance that is contrary to the manufacturer’s written instructions.
1. Warranty Period: 10 years from date of manufacture.

C. Manufacturer’s Warranty on Laminated Glass: Manufacturer’s standard form in which the laminated glass manufacturer agrees to replace laminated glass units that deteriorate during normal use within the specified warranty period. Deterioration of laminated glass is defined as defects, such as discoloration, edge separation, or blemishes exceeding those allowed by ASTM C 1172 that are not attributed to glass breakage, improper installation, or cleaning and maintenance that is contrary to the manufacturer’s written instructions.
1. Warranty Period: 10 years from date of manufacture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Vitro Architectural Glass; Glass Technology Center, 400 Guys Run Rd., Cheswick, PA 15024. ASD. Toll Free Tel: (855) 887-6457. Fax: (800) 367-2986. Web: http://www.vitroglazings.com

B. List of Pre-Approved Manufacturers of Insulating Glass: Subject to compliance with requirements, provide products of one of the following:
   1. Guardian Industries Corp.
   2. AFG Industries, Inc.
   3. Cardinal IG.
   4. Vitro (formerly PPG Glass).

C. Requests for substitutions will be considered in accordance with provisions of Section 016000.

2.2 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

   1. Minimum Glass Thickness for Interior Lites: Not less than 6.0 mm (1/4”).

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

   1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.

2.3 GLASS PRODUCTS

A. Insulated Glass: Insulating glass units fabricated as follows:
   1. Exterior: 1/4 inch (6 mm) Optigray glass, Solarban R100 solar control (sputtered) on second surface (2) + 1/2 inch (13 mm) air space + 1/4 inch (6 mm) Clear glass.

Characteristics:	Transmittance:	Utraviolet %:	6
		Visible%:	29
		Total Solar Energy %:	13
	Reflectance:	Exterior Visible:	18
		Interior Visible %:	13
		Exterior Solar:	20
	U-Value:	Winter Night-time:	0.29
		Summer day-time:	0.27
	Shading Coefficient:		0.23
	Solar Heat Gain Coefficient:		0.20
	Light to Solar Gain:		1.45

D. All exterior doors indicated to receive glazing shall have 1” insulated tempered glazing.

2.4 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.5 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.6 MONOLITHIC-GLASS TYPES

A. Glass Type GL-1: Low-E Tinted Insulating Glass – Light-gray, ultra-neutral reflective exterior appearance.

1. Thickness: 25 mm (1”).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. 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 spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. 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.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 CLEANING AND PROTECTION

A. 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.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

C. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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REPUBLIC, MO

SECTION 095113 – ACOUSTICAL TILE CEILINGS

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. Acoustical panel and tile ceilings installed with exposed suspension systems.

B. Related Sections: The following sections contain requirements that relate to this section:

1. See Division 23 for grilles, registers, and diffusers in acoustical ceilings.
2. See Division 26 for lighting fixtures in acoustical ceilings.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data for each type of product specified.
2. Samples for verification purposes of each type of exposed finish required, of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has successfully completed acoustical ceilings similar in material, design, and extent to those indicated for Project.

B. Fire-Performance Characteristics: Provide acoustical ceilings that are identical to those tested for the following fire-performances characteristics, per ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
   a. Flame Spread: 25 or less.
   b. Smoke Developed: 50 or less.
2. Fire-Resistance Ratings: As indicated by reference to design designations in UL "Fire Resistance Directory," for types of assemblies in which acoustical ceilings function as a fire- protective membrane and tested per ASTM E 119.
   a. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling unit from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

D. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

E. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quantity of full-size units equal to 2.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CEILING UNITS, GENERAL

A. Standard For Acoustical Ceiling Units: Provide manufacturer's standard units of configuration indicated which are prepared for mounting method designated and which comply with FS SS-S-118 requirements, including those indicated by reference to type, form, pattern, grade (NRC or NIC as applicable), light reflectance coefficient (LR), edge detail, and joint detail.

B. Colors, Textures, and Patterns: Provide products to match appearance characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors, surface textures, and patterns available for acoustical ceiling units of quality designated.

2.2 ACOUSTICAL PANELS AND GRIDS (See ceiling plan for corresponding types schedule.)

A. General: Provide acoustical panels, tile, grids, and systems identified below. Equal products by other manufacturers may be considered but are subject to Architect’s approval.

B. Type C1: 24" x 24" x 5/8”, USG Radar Ceramic Perforated RC-44% with SQ Square Edge - Flat White 050, USG Donn AX/AXCE 15/16” Suspension System – Flat White 050.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Standard for Metal Suspension Systems: Provide metal suspension system soft type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.

B. Finishes and Colors: Provide manufacturer's standard finish for type of system indicated, unless otherwise required. For exposed suspension members and accessories with painted finish, provide color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of standard color.

C. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.

D. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, prestretched, Class 1 coating, sized so that stress at 3-times hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than yield stress soft wire, but provide not less than 12 gauge.

E. Edge Moldings and Trim: Metal or extruded plastic of types and profiles indicated or, if not indicated, provide manufacturer's standard molding for edges and penetrations of ceiling which fits with type of edge design and suspension system indicated.

F. Provide grid types and colors for ceiling types indicated above.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which ceiling system attaches or abuts, with Installer present, for compliance with requirements specified in this and other sections that affect installation and anchorage of ceiling systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for preset inserts, clips and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half-width units at borders and comply with reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical ceiling systems to comply with installation standard referenced below, per manufacturer's instructions and CISCA "Ceiling Systems Handbook."

1. Standard for Installation of Ceiling Suspension Systems: Comply with ASTM C 636.

B. Arrange acoustical units and orient directionally patterned units in a manner shown by reflected ceiling plans.

C. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices that are secure and appropriate for structure to which hangers are attached as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Space hangers not more than 4'-0" o.c. along each member supported directly from hangers, unless otherwise shown, and provide hangers not more than 8 inches from ends of each member.

D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical units.

1. Screw-attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.
2. Provide preformed collars at round pipe or column penetrations where required.

E. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

3.4 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
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SECTION 099000 – PAINTING

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 surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

B. Paint **all exposed** surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

C. Work included in this section to be painted:

1. Painting exposed surfaces as indicated.
2. Paint exposed ductwork.
3. Stain and seal woodwork.
4. Paint exposed woods not scheduled for stain/sealer.
5. Paint all exposed materials not prefinished by factory.
6. Paint equipment-mounting boards.
7. Paint exposed piping, conduit, equipment and supports, except if prefinished with factory painted finish, and as may be noted otherwise.
8. Paint all exposed steel structure and metal deck as scheduled.
9. Paint concrete walls where indicated.
10. Paint all exterior exposed steel lintels whether indicated on drawings or not.

D. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Pre-finished items not to be painted include the following factory-finished components:
    a. Toilet compartments.
    b. Acoustic materials, unless indicated otherwise.
    c. Finished mechanical and electrical equipment, unless indicated otherwise.
    d. Light fixtures.
    e. Switchgear, except as indicated.
    f. Distribution cabinets, except where exposed on walls of occupied spaces.
2. Finished metal surfaces not to be painted include:
    a. Anodized aluminum.
    b. Stainless steel.
    c. Chromium plate.
    d. Copper.
    e. Bronze.
    f. Brass.
3. Operating parts not to be painted include moving parts of operating equipment such as the following:
    a. Valve and damper operators.
    b. Linkages.

c. Sensing devices.
d. Motor and fan shafts.

4. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

E. Related Sections: The following sections contain requirements that relate to this section:

1. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
2. Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.

F. Shelf Stock: Provide at least one gallon of each color and type of paint, stain, sealer, and coating; labeled as to color and location. Do not use shelf stock for punch list work.

1.3 SUBMITTALS

A. Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.

1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.

B. Mock-Ups:

1. After color selection, the Architect will furnish color chips for surfaces to be coated, then provide the following for final approval.
   a. Concrete Masonry: Provide two 4-by-8-inch samples of masonry, with mortar joint in the center, for each finish and color.
   b. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.
2. Mock up for Clear Sealer for Concrete Traffic Surface: Apply a minimum 4’x 4’ sample of application required.
   a. Finish areas designated by Architect.

C. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect of problems anticipated using the materials specified.

D. Coating Maintenance Manual: Upon completion of the project, the Contractor or paint supplier shall furnish a coating maintenance manual, equal to Sherwin-Williams “Custodian Project Color and Product Information” report. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touchup procedures, and color samples of each color and finish used.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect of problems anticipated using the materials specified.

C. Field Sample Panels: On wall surfaces and other exterior and interior components assigned for each color, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.

D. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Federal Specification number, if applicable.
4. Manufacturer's stock number and date of manufacture.
5. Contents by volume, for pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) 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 the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include:

1. Sherwin Williams
2. Benjamin Moore and Co. (Moore.)
3. PPG Industries, Pittsburgh Paints (PPG).

2.2 PAINT MATERIALS, GENERAL

A. See paint schedule at the end of this section.

B. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

C. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

D. Colors: Colors to be selected by Architect from paint manufacturer's full range of standard colors. Colors may be by different paint manufacturers than specified or selected and will require color match.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.

1. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

1. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and re-prime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.
2. Cementitious Materials: Prepare concrete masonry block, precast walls, and ceilings and other surfaces to be painted. 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 of surface preparation.
    a. Use abrasive blast-cleaning or acid etching methods if recommended by the paint manufacturer.
    b. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    c. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
    d. When transparent finish is required, backprime with spar varnish.
    e. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.

f. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

3. Ferrous Metals: Clean nongalvanized 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 recommendations of the Steel Structures Painting Council.
   a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
4. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.

1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer, and only within recommended limits.

D. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint colors, surface treatments, and finishes are indicated in "schedules."
2. Provide finish coats that are compatible with primers used.
3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
6. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
9. Finish interior of wall and base cabinets and similar field- finished casework to match exterior.
10. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.

11. Sand lightly between each succeeding enamel or varnish coat.
12. Omit primer on metal surfaces that have been shop-primed and touch up painted.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

D. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled. Apply additional coats of block filler at infill in existing block walls to match adjacent/surrounding conditions and appearance.

F. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

G. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surface imperfections.

H. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats on wood doors.

J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

3.5 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates indicated. Sherwin Williams Products are listed, equal products by other manufacturers may be acceptable, subject to conformance with requirements.

B. Ferrous Metal: Primer is not required on shop-primed items.

1. Full-Gloss Urethane Alkyd Enamel: 2 finish coats over primer.
   a. Primer: SW Pro-Cryl Universal Metal Primer B66-310.
   b. First Coat: SW Urethane Alkyd Enamel B54-150 gloss.
   c. Second Coat: SW Urethane Alkyd Enamel B54-150 gloss.

C. Zinc-Coated Metal:

1. High-Gloss Alkyd Enamel: 2 finish coats over primer.
   a. Primer: Galvanized Metal Primer, SW Galvite B50 WZ-30.
   b. First Coat: Alkyd Gloss Enamel, SW B54 Series Industrial Enamel, gloss.
   c. Second Coat: Alkyd Gloss Enamel, SW B54 Series Industrial Enamel, gloss.

3.7 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates, as indicated. Not all scheduled substrates may appear on this project.

B. Ferrous Metal: (Interior hollow metal).

1. Primer: SW; B66-310 Pro-Cryl Universal Metal Primer.
2. Two coats: SW; Pro Industrial Pre-Catalyzed WB Epoxy K46 Semi-gloss.

C. Concrete Substrates (Traffic Surfaces).

1. Interior/Exterior clear concrete floor sealer (2 coats) H & C concrete sealer natural look water based clear.

D. Concrete Masonry Units

1. Block Filler: SW; B42W00150 White Pro Industrial Heavy Duty Block Filler
2. Two coats: SW; K45-1150 Series; Pro Industrial Pre-Catalyzed WB Epoxy; Eggshell Sheen.

E. Drywall

1. Undercoat: SW; B28W2600 ProMar 200 0 VOC Latex Primer.
2. Two coats: SW; K45-1150 Series; Pro Industrial Pre-Catalyzed WB Epoxy; Eggshell Sheen.

END OF SECTION 099000

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

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. Public-use washroom accessories.
2. Public-use shower room accessories.
3. Private-use bathroom accessories.
4. Healthcare accessories.
5. Warm-air dryers.
6. Childcare accessories.
7. Underlavatory guards.
8. Custodial accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: **15** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Bradley Washroom Equipment is specified, other manufacturer’s offering products that may be incorporated into the work and other manufacturers may be included upon approval:
1. A & J Washroom Accessories
2. American Specialties, Inc.
3. Bobrick
4. McKinney Parker.

2.2 MATERIALS

A. General: Fabricate toilet accessory items from the following materials and according to requirements specified for individual accessory items:
1. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034 inch (22 gage) minimum thickness, unless otherwise indicated.
2. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16; Castings, ASTM B 30.
3. Sheet Steel: Cold rolled, commercial quality ASTM A 366, 0.04 inch (20 gage) minimum thickness, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.
4. Galvanized Steel Sheet: ASTM A 527, G60.
5. Chromium Plating: Nickel and chromium electro deposited on base metal, ASTM B 456, Type SC 2.
6. Baked Enamel Finish: Factory applied, gloss white, baked acrylic enamel coating.
7. Mirror Glass: Nominal 6.0 mm (0.23 inch) thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro plated copper coating, and protective organic coating.
8. Galvanized Steel Mounting Devices: ASTM A 153, hot dip galvanized after fabrication.
9. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

10. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide a minimum of six keys to Owner's representative.

B. Fabrication:

1. Only a maximum 1 1/2 inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a waterproof, printed label or a stamped nameplate, indicating manufacturer's name and product model number.
2. Surface Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
3. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:
4. Provide galvanized steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
5. Mount one per lavatory/sink.
6. Provide warranty to replace mirrors that develop visible silver spoilage or defects for a period of 15 years.
7. Mirror Unit Hangers: Provide system of mounting mirror units that will permit rigid, tamperproof, and theft-proof installation, as follows:
8. One piece, galvanized steel, wall hanger device with spring action, locking mechanism to hold mirror unit in position with no exposed screws or bolts or;
9. Heavy duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
10. Provide matching filler trim for gaps behind wall mounted accessory units that lap over top of tile wainscots.

2.3 SCHEDULE OF ACCESSORIES

A. Provide products as indicated or equal, (see drawings; if locations are not shown, locate as directed in field) (See Sheet G101 for mounting heights). Products specified are Basis of Design.

1. **BC:** Baby Changing Station – Bradley Model 9631
2. **GB:** Stainless Steel Grab Bars: ASI Series 3800. Provide grab bars with wall thickness not less than .050 inch (18 gage) and as follows and at locations shown on drawings.
   a. 42” Grab bar: 3800 Series x 42”
   b. 36” Grab bar: 3800 Series x 36”
   c. 18” Grab bar: 3800 Series x 18”
   d. Mounting: Concealed, manufacturer's standard flanges and anchorages.
   e. Clearance: 1 1/2 inch clearance between wall surface and inside face of bar.
   f. Gripping Surfaces: type 304 stainless steel, ADA compliant.
   g. Heavy Duty Size: Outside diameter of 1 1/2 inches.
3. **HD:** Hand Dryer – Bobrick Quietdry Surface Mounted ADA Dryer Model B-7120.
4. **M1:** Channel Framed Mirror: ASI Model 0620. Fabricate frame with angle shapes not less than 20 gauge with square corners mitered, welded, and ground smooth. Provide in No. 4 satin finish.
   a. 24” wide x 36” high; mount bottom of mirror as shown on drawings.
5. **SD:** Liquid Soap Dispenser: Provided by Owner; Contractor installed. Contractor to provide blocking as required. Provide one (1) unit at each sink and lavatory.
6. **SN:** Surface Mounted Sanitary Napkin Disposal – Bobrick Model B-270. Provide stainless steel finish.

7. **TPD**: Toilet Paper Dispenser: Provided by Owner; Contractor installed. Contractor to provide blocking and accessories as required for complete installation. Provide one (1) at each water closet.

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. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws.
   1. Set units plumb, level, firmly anchored in locations and at heights indicated.

C. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

D. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

SECTION 131500 - SWIMMING POOL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. Scope:

1. The Pool Contractor shall visit the pool site and carefully examine the existing conditions, observing the site access, site constraints, soils, study the geotechnical report, the Pool structural drawings, and verify it for adequacy of pool site preparation.

2. The Pool Contractor shall construct the pool structures, furnish and installed the systems for filtration, re-circulation, disinfection, with trims and finishes for the outdoor pool at this facility.

3. During construction and completion of soils work, the General Contractor shall retain the services of a Geotechnical Firm as specified in the “Allowance” section of the Contract Documents to verify and supply a "Letter of Certification" that the soils work is in compliance with the requirements for this work and reciting cautions to be observed while constructing the pool structure, and work adjacent to the pool structure. It is the responsibility of the Pool Contractor to coordinate with the Geotechnical Firm and follow their instructions and recommendations. Special attention should be given to the drawings and specifications of the Pool Structural drawings for this project.

4. The Pool Contractor shall be responsible for the proper maintenance of soils conditions at all times. Soil conditions must be maintained as specified by Geotechnical Firm.

5. The Pool structures are to be cast-in-place concrete floors and cast-in-place, dry-gun gunite or shotcrete wall structures installed by the Pool Contractor. The pool shell shall be constructed against temporary form work. The soils work below and adjacent to the pool structures, shall meet the requirements of the Geotechnical Firm and shall meet the additional requirements of the specifications and the Pool Structural Drawings.

6. During construction and completion of the pool shell, the contractor must maintain proper site drainage of ground water until the pool has been filled with water to a level of -3’-0”. The pool structure is not designed to resist buoyancy

forces and hydrostatic pressures. If addition water must be removed for pool maintenance, the contractor ensure that the ground water is below the lowest part of the pool shell using the pool site well and ensure the underdrain pump station is properly function. The contractor with continue to carefully monitor the ground water until the pool has been refilled with water.

7. The specifications on the pool structural drawings must be adhered to precisely.

B. The Contractor shall:

1. Precisely layout pool as shown on pool layout drawings.
2. Install pool under drain system as depicted on project plans and ensure the system is working properly.
3. Perform all required hand trimming of excavation.
4. Furnish and install all and any engineered fill required to the subgrade for the Pool structures and decks.
5. Protect site from flooding and divert water from rainfall/storm events away from pool excavation during construction process.
6. Provide and install all required forms for pool and provide for moisture loss protection of exposed soils during construction.
7. Provide and install specified reinforcing steel, and notify Engineer when ready for inspection, prior to concrete work.
8. The Pool Contractor job superintendent shall be responsible to assure that only a certified gunite or shotcrete nozzleman place the gunite or shotcrete. Also, the job superintendent shall be knowledgeable of the specified soils and material (concrete, gunite or shotcrete & grout) requirements, the specified ASTM and ACI requirements, including testing.
9. Provide Operation and Maintenance Manuals and wall operating charts a the end of the project.
10. Provide "Certificate of Survey" to owner stating conformity to the required pool depths and dimensions.
11. Provide start-up supervision and instruction (Owner designates persons to be trained upon completion of pool work). Contractor must arrange for video production of training. The Pool Operation & Maintenance Manual shall be the basis for the start-up and instruction, and provide notice to the Engineer, Owner, and Owner's Representative 15 days prior to start-up.
12. Provide first 30 days of pool startup chemicals, including chlorine stabilizer.
13. Properly dispose of all trash and debris after construction.
14. Contractor must provide any and all work necessary to provide complete, functional, first class swimming pool installation.

1.3 INTENT OF PLANS AND SPECIFICATIONS.

A. The intent of this work is to provide a high quality, cost-effective, long life, and easy to maintain aquatic facility. The "bid" for this work, shall reflect that the plans and specifications are intended to furnish Owner with complete, operational, and functional facilities and systems of the "best accepted practice" of commercial

swimming pool construction. All materials and equipment not specifically noted shall be selected and furnished suitable for intended duty, appearance, operation, and long life. No change orders will be granted at a cost to the owner for anything required to complete the project as outlined above.

1.4 SUBMITTALS

A. The Contractor shall, within seven days of notification of selection for the award of a contract for this work, submit the following information to the Engineer:
   1. A description of the work to be performed by the Pool Contractor with its own forces.
   2. The product names and the suppliers of all principal items or systems of materials and equipment proposed for the work.
   3. A list of names of the Subcontractors or other persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for this work.
   4. A detailed "schedule of values" for all pool work.
   5. A detailed calendar schedule of work for all phases of the entire project.
   6. The Contractor will be required to establish, to the satisfaction of the Engineer, and the Owner, the reliability of all materials and equipment and responsibility of the suppliers, persons, subcontractors, or entities proposed to furnish and perform work described in the Bidding Documents.
   7. Standard Submittals and Catalog Sheets: (Submit at one time a complete package, not individually)
      a. Pool structural reinforcing steel shop drawings, the Pool structural concrete design mixes (cast-in-place, dry-gun, shotcrete, grout) (review structural specifications on pool drawings).
      b. All pump specifications with pump curves.
      c. Stainless steel recirculation system shop drawings.
      d. Filter and face piping shop drawings.
      e. Filter tank and pump pit shop drawings.
      f. Catalog sheets of all other pool equipment items.
      g. Pool piping shop drawings.
      h. Certification of Compliance for filters, piping, and valving.
      i. Play feature anchor shop drawings with catalog sheets, and specifications. Feature foundations must be designed by a licensed professional engineer.
      j. Complete slide specifications and drawings. Slide foundations must be designed by a licensed professional engineer.
      k. Complete sunshade specifications and drawings. Sunshade foundations must be designed by a licensed professional engineer.

   8. The Contractor shall, during the course of construction, collect and compile a complete catalog of all equipment furnished and installed on the project. This catalog shall include operation and maintenance instructions, part lists, shop drawings, and descriptive literature and guarantee or warranty information as furnished by the equipment manufacturers. All guaranties shall be filled out in

the Owner's name and registered with the manufacture. Owner's portion shall be put in the catalog. All literature shall be submitted in accordance with the General Conditions. Large drawings shall be folded and bound in envelopes and bound in the catalog. The Contractor shall save all literature and instructions shipped with the equipment for inclusion in the catalog. A copy of all shop drawings submitted to the Engineer and approved will be retained for the Owners catalog.

9. Operation and Maintenance Manual:
    a. The Contractor shall furnish four (4) copies of the Operation & Maintenance Manual to the Architect. Upon review by the Architect, the Contractor shall complete, rewrite, and or reissue as required, incorporating suggested modifications and inclusions. It is the responsibility of the Contractor, not the responsibility of the Architect, to write or extensively modify the Operation, & Maintenance Manual. The Operation & Maintenance Manual must be well written, logical, and easily understood by any and all pool operators. The Operation & Maintenance Manual must provide step-by-step procedures for complete operation and maintenance of all facility elements. The O&M should include at a minimum the following:
        1. Seasonal startup procedures
        2. Daily startup procedures
        3. Daily shut down procedures
        4. Seasonal shut down and winterization procedures
        5. Daily maintenance procedures
        6. Weekly maintenance procedures.
        7. Manufacturers induvial manuals incorporated in the O&M manual.
        8. Backwashing procedure
    b. The Operation & Maintenance Manual shall bear an Index of Contents. This index sheet shall also be provided with space to allow for the date of owner instruction and signature of the person instructed for each item of content in the Operation & Maintenance Manual. The sign-off list shall be sent to the Architect for record and distribution**.** This manual shall be the basis of start-up instruction.
    c. The Contractor shall furnish and install in the equipment room one (1) framed with plexiglass wall chart, including a schematic of each pool system, valve and pool equipment, and a valve operation schedule. The wall chart shall be submitted to the Architect for review and approval.
10. Submit to the Owner samples of all exposed materials for selection and approval of color and texture.
11. Submit to the Owner samples of all shades structure fabric material and colors for subsequent selection.
12. Submit to the Owner color selection charts for all slides, water play equipment, etc.
13. All deck tile markings.

1.5 WORKMANSHIP

A. The workmanship requirements of Division 1 of the specifications is the same for all pool work, except where special requirements are noted in this section.

1.6 QUALITY OF MATERIALS.

A. Special attention is directed to the materials, products, and equipment described in this section of the specifications which establish a standard of the required function, dimension, appearance, service, useful life and quality as pre-determined by Owner, staff, and consultants. Pay special attention to the stainless steel gutter, FRP filter, pumps, and chemical control systems.
B. Where manufacturer's names are listed for a particular item of equipment or material without the phrase “or approved equal”, the Contractor’s bid shall be based on those items only. Substitutions may be considered after the low bidder is selected, if such substitutes are deemed at that time to be in the best interest of the Owner.
C. Where references are made to ADA, EPA, OSHA, National Sanitary Foundation, NEC, NSPI, ASTM, ASME, Federal Specifications, American Society for Testing, & Materials, American Standards Association, American Institute of Steel Construction, Steel Institute, and similar institutions, organizations and standards, it shall be construed to mean the current specifications and designations as amended as of the date of the "plans" for this work. This requirement also shall include all federal, state and local codes.
D. All construction must adhere to swimming pool criteria and regulations as established by Missouri State Department of Health, and City of West Point, Missouri.

1.7 WARRANTIES

A. A manufacturer's ten (10) year or more non-prorated warranty for the swimming pool filter tank, the stainless steel recirculation system, and five (5) year non-prorated warranty for the pool water analyzer programmers shall apply. (Furnish warranty with shop drawing submittals).
B. The Contractor shall furnish written, two (2) year warranty of "non-leak" for the Pool structures, all buried piping, and the Diamond Brite and tile finishes. All other warranties shall be as specified herein and in Division 1.
C. Contractor shall in coordination with the Pool Contractor, provide all Owner instructions and pool related documents.
D. Contractor shall outline with bid documents any variance from the warranties specified herein and the warranties actually to be furnished.
E. The Pool Contractor shall assist owner in first-year winterization and second season start-up (two man days required)
F. The Contractor shall also warranty all work as specified in General Conditions and Supplemental Conditions.

PART 2 – PRODUCTS

2.1 POOL STRUCTURES.

A. Excavation - The pool structures work shall include all labor, material, and equipment to complete the excavation, all concrete work (reinforced or otherwise), and all labor, material and equipment for other work as specified under this section.
B. Steel – Refer to Pool Structural Plan
C. Concrete – Refer to Pool Structural Plans
D. Subgrade - Refer to Pool Structural Plans
E. Underdrain - Refer to Pool Structural Plans

2.2 RECIRCULATION SYSTEM - STAINLESS STEEL GUTTER

A. It is the intent of these specifications that gutter flow and water surface cleaning be maintained under all conditions of normal operation and that no water be discharged to waste except when cleaning the filter or emptying the pool.
B. A continuous flow, open channel gutter and filtered water supply line, according to the details shown on the plans, shall be installed as shown on plans, and attached to the pool per manufacturer's guidelines. All gutters shall be 304 stainless.
C. The filtered water return tube shall be fitted with properly sized nylon inlet jet nozzles, not over 36 inches on center around the entire pool perimeter, except where inlet shall be expressly deleted and racing lane end walls (and paired between lanes), stairways or ladders. These inlet jets shall be installed so as to provide a stream of filtered sanitized water on a fixed 45° angle directed toward the bottom of the pool. The inlet openings shall not be larger than 3/8" diameter, and the manufacturer must space all openings and hydraulically model the entire pool area so the system shall deliver an even flow from all perimeter jets, producing an "equalized water distribution system". The perimeter distribution system shall be designed by the manufacturer to provide a uniform and equal pressure at each inlet. The manufacturer shall furnish with shop drawings, inlet locations with sizing calculations for orifice size and provide additional inlets to allow for changes of orifices and pipe sizes and runs to balance flows as indicated during start up.
D. The gutter side of the return tube shall be fitted with removable jet flow nozzles to provide a constant stream of filtered, sanitized water in the gutter to prevent any unhealthy, stagnation or dirt build up in the gutter should the water level fall below a level which permits its entrance into the gutter channel. Jet flow nozzles should be installed at each integral weir location and at intermittent locations (not shown on the plans). Jet nozzles must be provided in adequate numbers to assure proper movement of water within any gutter sections. All areas of the gutter shall be assessable for inspection and cleaning with easy removal of plates at step locations.
E. Converters (piping connections to the stainless steel gutter system) shall be installed in the gutter perimeter as shown on the plans and/or at locations to provide proper water circulation to and from the filters. It is the manufacturer's responsibility to ensure proper hydraulic flow balance with all equipment integrally to ensure proper water cleanliness at all times. Pool Designer must be informed of any suggested changes to ensure proper water circulation using the manufacturer's systems. Piping, as shown, shall connect the converters to the filter. Materials shall be as shown on the drawings. The overflow converters shall be provided with removable trash grates, and return converters as required.

F. The face of the return tube shall have, flush with the surface, cup anchors for the racing lane float lines and safety lines as shown on the plans.
G. There shall be factory installed in the back side of the return tube, 2 inch removable plug of CPB, with/internal hex socket. These plugs shall be removed to flush the pressure tube when required.
H. Filler metal shall be used on all weld joints, whether the sections butt together or not; so as to result in uniform appearing raised welds at each joint. Raised welds shall not be ground. After the weld is cooled, a second pass may be made with the arc puddling and smoothing the original weld if required. The welder shall be factory (gutter manufacture) certified for this work by letter at time of shop drawing submittal.
I. The components of the gutter system shall be fabricated from low carbon content, anti-magnetic stainless steel. The filtered water supply tube which forms the lip of the gutter section shall be fabricated from 12 gauge low carbon type 304 stainless steel with a similar or approved alternate to a #3 polished (100 mesh abrasive) finish. The 1 1/2" by 1 1/3: by 3/16" angle anchors, and all stiffener brackets shall be type 304 stainless steel. The gutter channel sections, shall be manufactured from 14 gauge type 304 stainless steel with a finish similar or approved alternate to # 3 polished (100 mesh abrasive) finish. 304 stainless steel shall have not less than 0.046 carbon content. The horizontal surfaces shall be sandblasted to provide a "nonslip" stepping surface.
J. The stainless steel gutter system as specified above, shall be as manufactured by Paddock Pool Equipment Company, or approved alternate when conforming to the above. specification and pool plan details. For consideration of an alternate, Contractor must submit request with all detailed design information to Engineer at least 7 days prior to bid.

2.3 POOL FILTER

A. Pool filters must be FRP high rate sand media filters type. Filter models: Shall be as shown on plans or approved alternate when conforming to the above specification and pool plan details. Filter package must include filter control panel, VFD for use with recirculation pump, and flow meter. Approved manufacturer is Paddock Pool Equipment Company, Neptune Benson, and Mer-Made. For consideration of an alternate, Contractor must submit request with all detailed design information to Engineer at least 7 days prior to bid.
B. Pool filter must meet all warranty requirements specified in the Contract Documents.
C. Pool filter must provide adequate filtration to meet the standards of the State of Missouri.
D. Minimum filtration rates for the pool filtration and recirculation system are specified on the pool plans.

2.2 POOL PUMP AND MOTOR

HORIZONTAL CLOSE COUPLED END SUCTION CENTRIFUGAL PUMP(S)

A. GENERAL

1. DESCRIPTION: The Contractor shall furnish materials, equipment and labor to furnish and install the pumping system(s) as indicated on the contract drawings and as herein specified.
2. INSTALLATION The Contractor shall insure that the pump(s) and motor(s) are properly installed with no pipe strain transmitted to the pump casing and with the back pullout function of the pump preserved.

B. GENERAL PUMP DESCRIPTION: The pump(s) shall be a centrifugal horizontal close-coupled end suction type and shall be certified by the National Sanitation Foundation (NSF) and bear the NSF50 certification Paco, Aurora, Marlow, or Griswold may be considered as substitutions providing they meet all aspects of this specification. Any cost associated with the use of a substitution, including installation andengineering changes shall be borne by the installing contractor.

1. MATERIALS OF CONSTRUCTION
   a. Casing.....Cast Iron (ASTM A48)
   b. Impeller.....Bronze (ASTM B584)(Max zinc content 5%)
   c. Shaft.....Steel (AISI C1045)
   d. Case Wear Ring.....Bronze (ASTM B62)
   e. Shaft Sleeve.....Bronze (ASTM B62)
2. MECHANICAL SEAL: Shaft sealing shall be accomplished by means of a mechanical seal with a ceramic seat, carbon washer, Buna-N elastomers, and stainless steel metal parts.
3. SHAFT SLEEVE: The pump shaft shall be fitted with a shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring, and shall be positively driven by a pin to the keyway

C. BEP (Best Efficiency Point):
1. To allow for changing conditions and pump wear the selected pump(s) Maximum flow must be not be less than 125% of BEP flow as demonstrated on the published pump curve at full diameter.

D. COATING
1. All wetted surfaces of the pump(s) shall be sandblasted to a white metal surface and coated with fusion bonded epoxy as manufactured by 3M Corp. (SkotchKote 134). This shall include the bronze impeller. The coating shall be approved and listed by the National Sanitation Foundation for the purpose intended.

E. MOTOR

1. The motor(s)shall be a NEMA-JM configuration, TEFC enclosed and supplied in accordance with the latest NEMA Standards. Motors exceeding the horsepower identified in these specifications shall not be allowed. Motor shall be EPACT High Eff. (premium Eff, EPACT high Eff., standard Eff.) with the minimum required efficiency percentage as noted on the following chart for the motor type specified. Each motor shall have a sufficient horsepower rating to operate the pump at any point on the pump's head-capacity curve without overloading the nameplate

horsepower rating of the motor, regardless of service factor. The motor shall have a service factor of at least 1.15. The service factor is reserved for variations in voltage and frequency. The motor shall be inverter duty rated and labeled accordingly.

2. MINIMUM REQUIRED MOTOR EFFICIENCY

HP	RPM	Standard Eff	Epact High Eff	Premium Eff
1	1800	75.5	82.5	85.5
	1200	80.0	80.0	82.5
1 1/2	1800	77.0	84.0	86.5
	1200	85.5	85.5	87.5
2	1800	78.5	84.0	86.5
	1200	86.5	86.5	88.5
3	1800	82.5	87.5	89.5
	1200	87.5	87.5	89.6
5	1800	82.5	87.5	89.5
	1200	87.5	87.5	89.6
7 1/2	1800	84.0	89.5	91.7
	1200	89.5	89.5	91.0
10	1800	84.0	89.5	91.7
	1200	89.5	89.5	91.3
15	1800	87.5	91.0	92.4
	1200	90.2	90.2	91.7
20	1800	87.5	91.0	93.0
	1200	90.2	90.2	91.7
25	1800	89.5	92.4	93.6
	1200	91.7	91.7	93.0
30	1800	89.5	92.4	93.6
	1200	91.7	91.7	93.0
40	1800	91.0	93.0	94.1
	1200	93.0	93.0	94.1
50	1800	91.7	93.0	94.5
	1200	93.0	93.0	94.1
60	1800	93.6	93.6	95.0
	1200	93.4	93.6	94.5

2.3 PUMP BELLOWS

A. Flexible braided hose shall consist of corrugated tube with braided wire to prevent elongation due to pressure thrust. Flexible braided stainless steel hose shall be manufactured using type 304 stainless steel braid and hose with one raised-face fixed and one floating steel plate flange. Grooved ends may be used in sizes 2” through 12” (50mm through 300mm). Welding is not acceptable. Sizes 2-1/2” (65mm) and smaller may have threaded male nipples. Flexible braided hose 4” (100mm) or smaller, with copper sweat ends, may have stainless steel hose and braid for gas service or bronze hose and braid for water service.

2.4 POOL STRAINER

A. Strainers shall be stainless steel or fiberglass by Neptune Benson, Mermade, or Paddock Pool Equipment Company. For consideration of an alternate, Contractor must submit request with all detailed design information to Engineer at least 7 days prior to bid.

1. Stainless steel:
    a. There shall be supplied stainless steel, custom fabricated pump strainers with quick lever acting, removable cover with stainless steel basket which shall be perforated and its open area shall exceed four (4) times the pipe area. The water shall flow downward through the basket. A 4 inch diameter vacuum gauge shall be installed on the strainer inlet to monitor the pump influent. A 3/4 inch bottom tapping shall be provided for a 3/4 inch hose bib winterization drain cock and a side stainless steel connection at 45° angle for vacuum connection.

2. Fiberglass:
    a. Strainer body shall be entirely constructed of high strength vinylester fiberglass not less than ¼” in thickness. All exterior surfaces shall be impregnated with special UV stabilizers. Connections shall be of typical construction with 1" thick fixed flanges. Flanged connections shall be ANSI standard dimensions.
    b. Strainer body shall include one (1) ¾" F.P.T. drain connection and (1) ¼" F.P.T. gauge connection (on the influent side). Unit shall include securing assemblies to permit easy opening and closing of strainer lid without the use of tools. Strainers with Influent connections 4" and smaller shall have four (4) securing assemblies. Strainers with Influent connections 5"-8" shall have six (6) securing assemblies. Strainers with Influent connections 10"-16" shall have eight (8) securing assemblies.
    c. Provide one (1) stainless steel basket and one (1) additional to serve as a spare. Basket shall be Type 304 stainless frame and mesh with 5/32"perforations and not less than 62% open area. Open area of basket shall be no less than 4 times greater than the influent connection. Strainer basket shall have a welded intermediate baffle to reduce cleaning frequency. Basket handle shall be 1/8" in thickness. Strainer basket shall have a 20-25 mil electrostatic applied powder coat finish including clear coat.
    d. Strainer lid shall be 1" thick transparent acrylic machined to eliminate sharp edges and house securing assemblies. Lid shall be grooved to house rubber gasket. Lid shall be seated with a 1/8" thick, full faced 40 durometer neoprene rubber gasket. Strainer lids on units with 10" connections and larger shall include a stainless steel cross brace.
    e. Strainers with influent connections up to 8” shall be pressure tested to 50psi. Strainers with influent connections 10” and up shall be pressure tested to 30 psi, as manufactured by Neptune-Benson.

2.5 RETURN LINE SUPPORT

A. Return line support bracket shall be installed by the Pool Contractor to adequately support the pool return lines. This bracket shall be 1 1/4" by 1 1/4" by 1/8" galvanized steel angle custom fabricated for intended purpose. The piping shall be securely clamped to these brackets with non-corrosive components. Quantity as required.

2.6 CHEMICAL TUBING AND CONDUIT

A. All polyethylene tubing used in conjunction with the chemical feed equipment shall conform to ASTM D635. All tubing shall be supported and installed in PVC ¾" inch conduit with 6 inch radius (or greater) sweep bends to facilitate installation of the tubing. EMT conduit shall not be used.

2.7 CHEMICAL SYSTEMS

A. Contractor shall provide all chemical systems shown on plans. All necessary equipment for chemical distribution as shown on plans must be included in Contractor's bid. All chemical systems must be provided complete and operational for the West Point Aquatic Facility.
B. Contractor must follow all applicable regulatory standards during construction of chemical systems.
C. Proper labeling of all chemicals and chemical storage areas must be completed by Contractor.
D. All required chemical handling and safety equipment must be provided by Contractor including eye wash station.
E. Contractor shall supply professional test kit, Lumiso Pooltest Expert by Palintest USA.
F. The Contractor shall furnish at time of startup Personnel Protection Equipment as shown on the plans..
G. The Contractor shall furnish and install chemical safety signage:
    1. Equipment room door exterior sign stating "DANGER POOL EQUIPMENT ROOM" and appropriate signage for chemical storage.
    2. Chlorine, and acid handling safety signs with instructions placed on the equipment room interior wall.
    3. Emergency phone numbers.
    4. Chemical equipment room doors must have appropriate hazard placards as approved by local fire marshal

2.8 CHLORINE CHEMICAL FEEDERS

A. General Description:
    1. The pump shall be a single head adjustable output pump.
    2. Have a 3-point roller design in anti-siphon protection
    3. Pump head requires no valves, allows for easy maintenance.
    4. Self-priming against maximum working pressure, foot valve not required.
    5. Pump does not lose prime or vapor lock
    6. Pumps off-gassing solutions and can run dry

7. Output volume is not affected by back pressure
8. Certified ANSI/NSF STD 50.
9. The pump shall run at 44rpm and be capable of pumping .03-85.0gpd up to 25 psi max.
10. Basis of design: Stenner Class Series 85M5 - Model 85MJL4

B. Accessories (required for each pump):
1. Wall brackets.
2. Suction and feed tubing - 3/8 inch outside diameter low density linear polyethylene.
3. Feed indicator
4. Threadless injector fitting for 3/8 inch tubing with stainless steel band clamp.
5. Pump tube - Ten extra tubes required for each pump.
4. Drum safety wand suction tube straightener assembly for 3/8 inch suction tubing. Assembly includes PVC tube and 2 inch buttress thread bung. Two assemblies required.
5. Spill containment units must be supplied for each active acid drum in the system as shown on plans.
6. Vapor shield

2.9 ACID CHEMICAL FEEDERS

A. General Description:
1. The pump shall be a single head adjustable output pump.
2. Have a 3-point roller design in anti-siphon protection
3. Pump head requires no valves, allows for easy maintenance.
4. Self-priming against maximum working pressure, foot valve not required.
5. Pump does not lose prime or vapor lock
6. Pumps off-gassing solutions and can run dry
7. Output volume is not affected by back pressure
8. Certified ANSI/NSF STD 50.
9. The pump shall run at 44rpm and be capable of pumping .03-85.0gpd up to 25 psi max.

Basis of design: Stenner Class Series 85M5 - Model 85MJL4

B. Accessories (required for each pump):
1. Wall brackets.
2. Suction and feed tubing - 3/8 inch outside diameter low density linear polyethylene.
3. Feed indicator
4. Threadless injector fitting for 3/8 inch tubing with stainless steel band clamp.
5. Pump tube - Ten extra tubes required for each pump.
4. Drum safety wand suction tube straightener assembly for 3/8 inch suction tubing. Assembly includes PVC tube and 2 inch buttress thread bung. Two assemblies required.

5. Spill containment units must be supplied for each active acid drum in the system as shown on plans.
6. Vapor shield
7. Acid fume separator

2.10 UV CHAMBERS-ALTERNATE BID ITEM

A. Alternate Bid Item:
   1. Base Bid: Install complete UV Chamber system as shown on the plans.
   2. Alternate Bid: No installation of the UV Chamber.
B. UV Chambers shall be chambers rated for a UV dose of 40MJ/CM2 and have the following characteristics:
1. UV system shall have a MET of equivalent (ELT, CSA, OR UL) listing.
2. UV System shall be a complete package to include: 316L Sch. 10 stainless steel chamber, control system located in a NEMA 12 rated panel, medium pressure bulbs, designed to emit wavelengths within the UVC electromagnetic spectrum, strainer basket, and automatic wiper system.
3. Chamber shall be rated for 690 kPa
4. Chamber shall have temperature control system
5. Chamber shall have ANSI flanges and all ports or vents shall be threaded NPT.
6. Chamber shall have sacrificial anode attached to the chamber.
7. Manufacturer to warranty ultraviolet chamber and control panel for a period of 5 years excluding lamps, quartz and seals. Medium pressure Ultraviolet bulbs shall be warranted for a period of 8,000 hours. Intermittently operated lamps (> 1 on/off cycles per day) will be replaced free of charge should failure occur prior to 4,000 hours and replacement will be prorated between 4,000 and 8,000 hours.
8. Power cabinet in NEMA 4 enclosure.
9. Basis of Design: Neptune Benson ETS Wafer series UV Chambers

C. See plans for chamber sizes.
D. Provide in-line strainer for UV Chamber

2.11 LIFEGUARD CHAIRS

A. Type 1: Lifeguard chair shall have the following
   1. 34" x 34" deck, non-slip, ultra-violet stabilized, structural fiberglass T-Bar.
   2. Protective side railings
   3. ANSI/APSP-16 approved
   4. Seat post is 3" O.D. x .109"
   5. 360 degree swivel, closed cell, UV protected, foam padded seat
   6. Two 6" diameter wheels provided for easy transport
   7. Hook for rescue tube
   8. Umbrella holder
   9. Basis of Design: Spectrum Aquatics Model 20211 Torrey II 36"

2.12 ADA POOL LIFT

A. Aqua Creek Products Scout Excel Pool Lift, Model F-SCTXL with anchor F-808SA and spare battery for lift. No substitutions will be allow for the pool lift without express authorization of pool engineer.

2.13 WATER FEATURES

A. Water Features shall be manufactured by one of the following:
   1. Water Odyssey (Basis of design)
   2. Vortex International
   3. Water Play
   4. Aquatix
   5. Splashtacular
   6. Water Play
B. Quantities and models shown on drawings.

2.14 POOL PIPING

A. Buried pool piping for pressure lines of slides and piping that crossed under the pool shall be PVC schedule 80 and schedule 80 fittings. Exposed piping up to slide must be painted with epoxy paint recommended for PVC application to match color selected for slide steel. All other buried pool piping shall be PVC schedule 40 pipe and schedule 40 fittings. PVC shall conform to ASTM 02729. Mechanical/expansion joints shall be used at the pool structure, foundations/grade beams, and when connecting to pool equipment to allow for thermal expansion and soil movement. All piping shall be NSF or AWWA listed for use. All flange fittings shall use 1/8 inch full face rubber gaskets. Mechanical joints at all structures and all equipment are required. Link Seal fitting to be used for all pipe transition from concrete structures.
B. The perforated PVC schedule 40 underdrain piping shall be wrapped with a filter fabric. The underdrain pipe shall flow by gravity to storm manhole as shown on plans.
C. The Pool Contractor shall provide piping shop drawings for winterization low point drains and valving for all piping.
D. All piping must easily drain by gravity during winterization. Provide air fitting to allow water to be blown out and winterization valves at expose low points.

2.15 POOL VALVES

A. Butterfly Valves: Butterfly valves shall be PVC body with PVC disc and EPDM seat & seals. The liner shall be full seat design fully molded around the body where as only the Disc and Seat are wetted parts and feature raised convex rings on the face and be utilized as the mating flange gaskets. Valves shall accept flat faced flanges in accordance with ANSI B16.5 bolt pattern for 150 lb flanges. Valve stem shall be Stainless Steel, be non-wetted, and have engagement over the full length of the disc. The valve lever handle (sizes 1-1/2” – 8”) shall be Blue in color and have a molded provision for a padlock. Valves sizes 1-1/2” – 12” shall feature a molded ISO bolt pattern for accessory and Plasgear™ Gear-operator mounting. Butterfly valves are intended for chlorinated water, swimming pool, and fresh water applications only. Basis of Design: Asahi Pool-Pro Butterfly Valves.

B. Ball Valves: Ball valves sized ½" – 6" shall be of True-Union design with 2-way blocking capability. PTFE seats shall have elastomeric backing cushions to provide smooth even stem torque and to compensate for wear. Valves shall feature molded ISO mounting top flange for actuation installation and Panel Mount feature on bottom of valve for securing in-line. The handle shall double as the spanner wrench for maintenance and carrier adjustment. Basis of Design: Asahi Type 21/21A True Union Ball Valve.
C. Stem Extensions: Stem extensions where required will be provided by valve manufacturer.
D. Check Valves (Ball): Ball Check valves shall be PVC, CPVC, PP or PVDF body with EPDM, FKM or PTFE seals. Valves shall be of solid thermoplastic construction, and be designed with an elastomeric uniseat/seal for tight shut-off under pressure. Sizes 1/2" – 2" shall be true union, and sizes 3" & 4" shall be single union. Basis of Design: Asahi True Union Ball Check Valve and Single Union Ball Check Valve.
E. Check Valve (Wafer): Wafer Check Valves shall be of solid thermoplastic construction, having no metal to media contact. Valves shall incorporate a single disc design suitable for either horizontal or vertical installations. Valves shall be wafer style conforming to ASME/ANSI B16.1 face to face for 150 lb flanges. Valve face to face dimensions shall conform to ISO 5752 short pattern face to face dimension. Valves shall be round body design with all O-ring seals of either EPDM or FKM and accept as an option a SWP-B ETFE coated spring for use in vertical applications. PVC shall conform to ASTM D1784 Cell classification 12454. Valves shall be rated to 150 psi (3" – 8") and 85 PSI (10" & 12"). Basis of Design: Asahi Wafer Check Valves.
F. See pool valve schedule on drawings. All valves required are not shown. Valving for proper operation and maintenance is required as used in standard practice.

2.16 MAIN DRAINS / COVERS / HYDROSTATIC RELIEF VALVES

A. Main drains sumps shall be:
10. Sump must be VGB compliant.
11. Type 304L stainless steel material
12. ANSI/APSP-16 approved
13. NSF listed
14. Basis of Design: Paddock Pool Equipment Company Model #2424ESMD0FC and Model #2448ESMD-FC

B. Main drain cover shall be:
1. Cover shall be VGB compliant and shall be stamped as such.
2. Type 304 material
3. ANSI/APSP-16 approved
4. NSF listed
5. Cover to be flat type cover
6. Basis of Design: Paddock Pool Equipment Company Model #2424ESMD0FC and Model #2448ESMD-FC

C. Hydrostatic relief valves shall be:
1. 2.5in MIP
2. Spring-loaded

3. ABS plastic body with stainless steel spring
4. Comply with provisions of ASME/ANSI A112.19.8 2007
5. Provide 12in threaded ABS collection tube for valve

2.17 FLOW METER

A. The electromagnetic insertion flow sensor shall generate an electrical signal proportional flow velocity from a range of 0.15-33 feet per second. The output signals shall be optional 4-20 mA analog, or digital S3L / open-collector pulse with maximum pull-up voltage of 30 vdc, and a maximum current sink of 50 mA.
B. Sensor shall operate with a power input of 5 – 26.4 VDC, with a maximum current draw of 15 mA.
   1. The microprocessor based sensor shall include Empty Pipe Detection, LED-assisted troubleshooting, and Bi-Directional span.
   2. The sensor shall utilize an Installation Fitting that is factory set to control proper flow sensor insertion depth, and orientate sensor to be parallel with fluid flow.
   3. The sensor shall not create a pressure drop of >1 psi at any flow rate.
   4. With a fully developed flow profile the sensor output shall be linear to ±1% of full range, with a repeatability of ±0.5% of full range, and supplied with a certificate traceable to N.I.S.T.
   5. Three optional sensor lengths shall allow the flow sensor to install into pipes from 0.5 to 36 inches.
   6. The sensor body shall be 316L Polypropylene with stainless steel electrodes and grounding ring: PVDF/316LSS.
   7. The flow sensor shall be equipped with dual o-ring seals. The elastomeric seals shall be FPM-Viton® (standard) with optional EPDM or FFPM-Kalrez®.
   8. Basis of Design: Georg Fischer Signet 2551 Magmeter Flow Sensor

2.18 AUTOMATIC WATER LEVEL CONTROL

A. AquatiControl #ELC-800r-SS-DW-100, Dual sensor for surge tank w/ 100ft of cord.

2.19 BOUY LINES AND ACCESSORIES

A. Rope Float: 5” x 9” Rope float for ¾” rope. Made of Polyethylene and treated with chlorine inhibitors and ultraviolet stabilizers. Color: Blue and White
B. Rope: ¾” Polyethylene Rope. 3 strand twisted. Color: Blue and White
C. Rope Hook: ¾” Chrome plated brass hook with hardware.
D. Cup Anchor: 4” S.S. Cup anchor with eyelet and bonding screw.

2.20 POOL LADDERS

A. Pool Ladders will have the following features:
   1. Rails: The ladder shall be fabricated of 1.90" O.D. x .109" wall thickness 304L stainless steel. Each rail shall have three bends that are to be wrinkle free. Provided with two (2) rubber bumpers.

2. Steps: Treads shall be provided as shown on plans. They shall be 19.66in wide x 5.00in deep with a non-slip top surface, and shall be made of high density plastic. Hardware included.
3. Anchors: The ladder shall be supported by two (2) 4" bronze wedge anchors and two (2) stainless steel keyhole escutcheons.
4. Basis of Design: Spectrum Aquatics Heavy Duty Ladder 1.90" Model 36178-36

2.21 POOL BASKETBALL GAME

A. Basketball game shall be a commercial grade goal with the following features:
1. Single-piece rail, dual post design with 18" anchor set back
2. 1.90" OD 304 stainless steel frame with vinyl coating
3. Regulation rim and net
4. Basketball, needle, anchors, and escutcheons included.
5. Basis of Design: SR Smith Commercial Salt Friendly Pool Basketball Game, Model S-BASK-EC

2.22 POOL VOLLEYBALL GAME

B. Volleyball game shall be a commercial grade net with the following features:
1. 20ft Competition quality net
2. Black vinyl coated posts
3. Bronze anchors with caps
4. Water Volleyball and needle
5. Basic of Design: SR Smith Salt Pool Volleyball Game, Model S-VOLY20

2.23 RING BOUYS

A. Ring bouys shall be USCG approved with the following features:
   a. Size: 24"
   b. Color: Orange
   c. Equipped with straps.
   d. Provide aluminum mounting bracket.
   e. Provide ¼" Polypropylene heaving line with foot float. 60ft in length.
   f. Basis of Design: Jim-Bouy GO-24

2.24 DECK DRAINS

A. Trench Drain (Outdoor): Zurn Z884 4" Trench drain w/ HPP grating or approved alternate or approved alternate.
B. Round Drains: Zurn FR05NIP3SRC Light commercial Adjustable Round PVC Floor drain or approved alternate or approved alternate.

2.25 POOL FINISHES AND MARKINGS

A. Pool Walls and floor:

1. The interior pool plaster finish to be exposed quartz aggregates fortified with white Portland cement installed strictly per manufacturer's guidelines. Color to be white. (Final color to be chosen by owner.)
2. Installed strictly per manufacturer's guidelines.

B. Deck depth markings
1. 6" tile deck inserts with 4" black letters and numerals on white ceramic tile, skid-resistant depth and safety markings. All tiles shall be set in any grouted with pure white Portland cement. The Contractor shall accurately verify that all depth markings are appropriately located to meet regulatory requirements before placement. Tiles as manufactured by Inlays, Inc, or approved alternate. See drawings for additional details.

C. Deck safety signage
1. Place in deck ceramic tile "No Dive", "Deep Water" & Max. Depth" tile safety markings in decks adjacent to pool. Verify current regulations on exact wording prior to ordering and installing markers. See drawings for additional details

D. Stair, Bench, & Change of Slope Safety Stripe
1. Alternate Bid: Tile shall be Black / Ebony D311. 1"x1". Non-slip. All tiles shall set in and grouted with Portland cement per manufacturer's recommendation. Tiles as manufactured by Dal-Tile Keystones collection or approved alternate.

E. Toddler Bench / Dividing Wall Tile
1. Tile shall be Navy D189. 1"x1". Non-slip. All tiles shall set in and grouted with Portland cement per manufacturer's recommendation. Tiles as manufactured by Dal-Tile Keystones collection or approved alternate.

F. Control Joints
1. Below water joints: Control joints below water shall be furnished and installed by the Pool Contractor only. All services shall be applied only in most favorable weather conditions.
2. The Pool Contractor shall use a Thiocaulk Sealant, 2 part polysulfate, meeting all of the specifications of the manufacturer for swimming pool installation, and a companion primer shall be used on clean surfaces only in as manufactured by Sika, product Sika-Flex #412, or approved alternate.
3. The Pool Contractor shall verify current dates on all product packages and sandblasting all joints before applying primers.
4. **Pool Contractor shall install 3" strip of ceramic tile along both edges of pool joints for the entire length of the joint.** Tile shall closely match pool finish.

2.26 CHEMICAL CONTROLLERS

A. The water chemistry control system shall provide continuous monitoring and control of sanitizers, oxidizers, pH, ORP, Total Alkalinity, free chlorine, total chlorine, combined chlorine, temperature, system flow rate, total dissolved solids (TDS), turbidity, chemical inventory levels, surge tank and backwash holding tank water levels, system pressures, strainer vacuum and

water chemistry balance calculations. The controller shall feature a programmable Fireman Cycle feature, which automatically turns off the Heater, UV and Ozone/Auxiliary systems prior to shutting off the recirculation pump. The controller shall abort VFD turndowns upon declining water chemistry, and increase the circulation rate to satisfy minimum flow requirements of a heater, UV and/or ozone system. All high-voltage wiring shall be performed in a separate NEMA 4X enclosure that precludes access to the controller electronics. The control system shall optionally provide automatic control of the filtration system including backwash operation. Remote access shall be provided through EZConnect, without the need for port forwarding or a VPN. Installation of the system shall be per the manufacturer's specification and no exceptions shall be allowed. A factory trained/authorized representative shall provide training to the owner.

B. Controller supplier to provide remote monitoring software for a desktop client capable of remote access over a local Ethernet connection, without internet connection. Software shall be installed on a local Windows based computer provided by the owner.
   1. The software shall display the following inputs for each pool:
   a. pH Level
   b. ORP (mV)
   c. Temperature (C deg)
   d. Flow Rate (LPM)
   e. Conductivity (mhos/cm)
   f. CL/Br (ppm)

C. The software shall be capable of the following outputs for each pool:
   a. pH Control
   b. Chlorine control
   c. Heater control
   d. UV Control

D. Controller software shall also have the following features:
   a. Readings, set points, and alarms that are easily monitored
   b. Alarm / Status messages
   c. Relay status, with feed mode
   d. Emergency Off capability.
   e. Mechanical tab for other parameters
   f. Allow settings to be modified from operator’s console.

E. Basis of Design: BECS Technology BECSYS5 chemical controller Model 1100267-OS1TPORBX

2.27 BACKWASH SITE GLASS

A. Backwash sight glass must be /have
   1. 1.5in diameter
   2. Cast brass body with threaded connection
   3. Plexiglass window
   4. Heavy duty neoprene seal
   5. Basis of Design: SR Smith Part #: A41198-0

2.28 THERMOMETER

A. Thermometer shall be a solar powered industrial glass thermometer:

   1. Case: Constructed of high-impact ABS

2. Display: 3/8” LCD digits, wide ambient temperature range
3. Power: Solar
4. Range: -50/300deg F
5. Accuracy: 1% of reading or 1 deg
6. Stem: Brass
7. Basis of Basis: Wika Model: D010300WI Ti.D01

2.29 SUMP PUMPS

A. Sump shall be a submersible dewatering pump with following features:
   1. Non-clogging vortex impeller.
   2. Durable cast construction. Cast iron switch case, motor and pump housing, base and impeller. No sheet metal parts to rust or corrode. All cast iron class 25-30 25000# tensile strength.
   3. Stainless steel screws, bolts, float rod, handle, guard and arm and seal assembly
   4. Shaft Seal - Carbon & ceramic rotary face seal, with stainless steel wetted parts.
   5. Maximum temperature for sewage or dewatering 130°F (54°C).
   6. All models pass 2 inch spherical solids.
   7. Backwash tank, pump pit, and slide pump pit: Automatic with float operated, submersible (NEMA 6) mechanical switch.
   8. Pool Underdrain Manhole and Pool Drain Manhole: Manual operation. On/off control via Sump pump duplex controller.
   9. Balance Tank: Manual operation. On/Off controlled with tethered float switches.
   10. Corrosion resistant powder coated epoxy finish.
   11. Voltage: 115V & 200V
   12. Basis of Design:
      a. Backwash Tank, Pump Pit (Filter Building) & Pump Pits (Exterior): Zoeller Sump Pump Model M292, .5HP 115V, Auto with integral float switch.
      b. Balance Tank: Zoeller Sump Pump Model N292, .5HP 115V, Manual with tethered float switches.

2.30 FLAP VALVE

A. Flap valves will have the following features:
   1. Flap valve shall have cast iron body and cover.
   2. The seat and disc ring shall be bronze, and the hinge pin and cotter pins shall be stainless steel.
   3. The valve shall be constructed with a 10-degree offset from vertical to ensure positive closure.
   4. The flange shall be drilled using an ANSI 125# template.
   5. All iron parts shall be coated in TNEMEC 2-part epoxy with 3-4 mils dry film thickness to prevent rusting or corrosion.

2.31 DIVERSION VALVE

A. Float operated modulating valve shall be designed for submerged service in a vertical configuration.

B. The housing body shall be fabricated using Sch. 80 PVC pipe with Sch. 80 PVC van stone flanges. The internal wafer shall be 12 gauge T304L material and positioned with 1/8" clearance around the perimeter. The body shall also incorporate an interior stop plate constructed of PVC to define the allowable range of arm motion. Close fitting Delrin bushings shall be included on the shaft penetrations of the body to provide a seal against water loss and air entrance.
C. The valve shaft shall be T304L material 1" in diameter. Float arms shall securely fasten to shaft using T316SS nuts with washers to provide adjustability. Arms shall be ½" (12mm) diameter all thread rod T316SS with length as required
D. Ball floats shall be constructed of T304L stainless steel and be 7" in diameter with internal weighting. Floats shall also be adjustable using T316SS nuts with washers as previously described. Provide two (2) float arms as shown on the drawings.

2.36 FRP LADDERS

A. Performance Requirements

1. Ladder and cage systems shall meet the requirements set forth in OSHA 1910.23 and 1926.1053, local building codes and industry standards as applicable.
2. Basis of design: Strongwell SAFRAIL Fiberglass Ladder Systems

B. Materials

1. The side rails and cage straps shall be fiberglass reinforced pultruded polyester with OSHA safety yellow pigment. As an option, an industrial grade polyurethane yellow coating may be applied to the finished ladder and cage. Other colors are available as an option.
2. The side rails shall be 2” (51mm) or 2.375” (60mm) square tube with a wall thickness of .156” (4mm) or greater. The rungs shall be pultruded 1.25” (31.75mm) diameter FRP fluted tube.
3. Cage hoops shall be manufactured by the open mold hand lay-up process with a width of 3” (76mm) and thickness of 1/4” (6.4mm) minimum at the top and bottom and 2” (51mm) x 1/4” (6mm) at the intermediate hoops. The cage shall be interconnected with 2” (51mm) x 3/16” (5mm) pultruded straps spaced 9” (230mm) on center around the hoop.

C. Fabrication Requirements

1. All joints and rungs shall be riveted. The hoops shall be attached to the rails in a manner which provides hand clearance throughout the length of the ladder.
2. Ladders shall be shop assembled, and as an option may be pre-drilled and prepared for field attachments of standoff clips.
3. The ladder cages shall be shipped assembled or as an option may be shipped unassembled for field assembly using rivets or bolts.

D. Workmanship

1. If required, all cut or machined edges, holes and abrasions shall be sealed with a resin compatible with the resin matrix used in the structural shape.

E. Installation

1. All FRP ladder sections shall be installed as shown on the approved shop drawings.

2.37 FRP GRATING

A. General

1. Grating shall be shipped from the manufacturer, palletized and banded with exposed edges protected to prevent damage in shipment.
2. Each piece shall be clearly marked showing manufacturer's applicable drawing number.
3. Basis of Design: Strongwell T-3300 2"

B. Design

1. Walkway and platform grating panels shall be 2 inches deep.
2. The bearing bars shall be joined into panels by passing continuous length fiberglass pultruded cross rods through the web of each bearing bar. A continuous fiberglass pultruded bar shaped section shall be wedged between the two cross rod spacers mechanically locking the notches in the cross rod spacers to the web of the bearing bars. Continuous adhesive bonding shall be achieved between the cross rod spacers and the bearing web and between the bar shaped wedge and the two cross rod spacers locking the entire panel together to give a panel that resists twist and prevents internal movement of the bearing bars. Each stair tread shall utilize a box-shaped nosing on its lead edge to enclose cross rods and ensure a smooth vertical edge.
3. The top surface of all panels shall have a non-skid grit affixed to the surface by an epoxy resin followed by a baked-on top coat of epoxy resin.
4. Surface should have a Wear Index of less than 1.0 when tested to ASTM D4060 (Before and after 750 hours of UV exposure per ASTM D4329 cycle A).
5. Panels shall be fabricated to the sizes shown on the drawings.
6. Hold down clamps shall be type 316L stainless steel clips. Use 2 at each support with a minimum of 4 per panel.
7. Color shall be yellow
8. All bearing bars that are to be exposed to UV shall be coated with polyurethane coating to provide additional UV protection.

C. Products

1. The Pultruded FRP grating and stair treads shall be fabricated from bearing bars and cross rods manufactured by the pultrusion process. The glass fiber reinforcement for the bearing bars shall be a core of continuous glass strand

rovings wrapped with continuous strand glass mat. With the exception of grating and stair treads manufactured using phenolic resin, a synthetic surface veil fabric shall encase the glass reinforcement.

2. Fiberglass Grating

a) Fiberglass grating shall be made from a chemical resistant, fire retardant polyester resin system to meet the flame spread rating of 25 or less in accordance with ASTM E-84 testing, the flammability characteristics of UL 94 V0 and satisfies the self-extinguishing requirements of ASTM D-635. UV inhibitors are added to the resin to reduce UV attack.

2.38 FRP HANDRAILS

A. Design

1. The FRP standard railing system, including connections, shall be designed to meet the configuration and loading requirements of OSHA 1910.29 and IBC with a minimum 2.0 factor of safety.
2. Guardrail height is 42” (1067mm) from the top of walkway to the top of the guardrail.
3. Guardrail installation method shall be as indicated on plans.
4. Basis of Design: Strongwell SAFRAIL Fiberglass railing system
]

B. Material

1. The rails and posts shall be (select as appropriate):
   a. 2” x 2” x .156” (51mm x 51mm x 4mm) square tube
2. The pultruded parts shall be made with a fire retardant resin that achieves a flame spread rating of 25 or less in accordance with ASTM test method E84, flammability characteristics of UL 94 V0 and meet the self-extinguishing requirement of ASTM D635. The resin matrix shall be polyester and shall contain a UV inhibitor. The color shall be yellow.

C. Fabrication of Standard Railing System

1. The fiberglass standard railing system shall be fabricated into finished sections by fabricating and joining together the pultruded square tube using glass-reinforced thermoset components; epoxy bonded and connected as shown in the fabrication details. Railing sections shall be fabricated to the size shown on the approved fabrication drawings and shall be piece marked with a water proof tag.
2. The fiberglass standard railing system shall be fabricated into finished sections by fabricating and joining together the pultruded square tube using molded ABS components; epoxy bonded and connected as shown in the fabrication details. Railing sections shall be fabricated to the size shown on the approved fabrication drawings and shall be piece marked with a water proof tag.

D. For Side Mount

1. Post shall be constructed with a pultruded bottom plug. Length shall be sufficient to extend a minimum of 1" (25mm) beyond the uppermost bolt hole to prevent crushing of post tubing. Bolt holes shall provide clearance of 1/16" (1.6mm) for 1/2" (12.7mm) diameter bolts/studs. On square tubes, holes shall be on longitudinal center line of post, 1" (25mm) from bottom of post (minimum) and not less than 3" (76mm) apart on center. Posts shall be fastened with stainless steel anchor bolts or studs, 1/2" (12.7mm) diameter.
2. Post locations shall be no greater than 18" (450mm), nor less than 9" (230mm) from horizontal or vertical change in handrail direction. For square tubes, post centers shall be no greater than 72" (1830mm) apart on any straight run or rail, or 48" (1220mm) apart on any inclined rail section.

E. Other Attachment Methods

1. Base mount, embedded and removable are also types of mounting procedures for railing pending design and approval by the Design Engineer.

F. Installation of Handrail Sections

1. The fabricated railing sections shall be supplied complete with fittings by the FRP manufacturer. The components used to join fabricated sections together may be shipped loose, to be epoxied and riveted, if required, together, if required in the field by the contractor.
2. The fabricated handrail sections shall be installed as shown on the approved shop drawings. The handrail sections shall be accurately located, erected plumb and level. The sections shall be fastened to the structure as shown on the approved shop drawings.

2.39 FRP STRUCTURAL SHAPES

A. Material

1. Structural shapes and plate shall be made from premium polyester. A synthetic surface veil fabric shall encase the glass reinforcement. FRP shapes shall achieve a flame spread rating of 25 or less in accordance with ASTM test method E-84, the flammability characteristics of UL 94 V-0 and the self-extinguishing requirements of ASTM D635. All structural shapes shall contain a UV inhibitor.
2. Pultruded profiles shall satisfy the visual requirements of ASTM D4385.

B. Process

1. Manufactured by the pultrusion process.

C. Basis of Design: Strongwell FRP Structural Shapes

2.40 UNIVERSAL DOUBLE SAFETY GATE

A. Universal double safety gate will have the following features:

1. Universal hinge design with left or right hand swing.
2. Automatic gate closure via gravity.
3. Withstand 400lbs impact test at ambient.
4. Molded parts made from UV-resistant polyurethane.
5. Color: safety yellow
6. Open swing of 112 degrees with a maximum rise of 14”
7. Design for attachment to square tube

B. Basis of Design: Intrepid Industries, Universal Double Bar Safety Gate Model UDFG-37

2.41 MANHOLE STEPS

A. Manhole steps shall have the following features:
   1. Epoxy coated ½”ASTM A615 Gr 60 steel
   2. Mechanical lock for concrete applications
   3. High Impact Copolymer Polypropylene which has been proven non-corrosive in sewer environments. Conforms to an ASTM D-4101 specific number
   4. Contoured to fit the hand for comfort and a Sure Grip.
   5. Sturdy Tread Design with Side Molded Slip-Resistant Wings.
   6. Step Size: 13 ¾”x6”

B. Basis of Design: American Step Company, Model ML-13

2.42 SAFETY BOARD

A. Contractor shall provide and install custom made safety board containing Personal protection equipment, first aid kit, MSDS sheets for chemical, and fire extinguisher.
B. Safety board to be installed in chemical room.
C. See pool drawings for additional details.

2.43 FIRE EXTINGUISHERS

A. General purpose:
   1. General purpose fire extinguishers shall be an ABC dry chemical, 20lbs with a discharge time of 30 seconds and a range of 15-21 ft.
   2. Provide mount bracket for fire extinguishers.
   3. See plans for locations and quantity.
   4. Basis of design: Amerex Model A411

B. Chemical Room:
   1. Chemical room fire extinguishers shall be an pressurized water, 2.5 gallons with a discharge time of 55 seconds and a range of 45-55 ft.
   2. Provide mount bracket for fire extinguishers.
   3. See plans for locations and quantity
   4. Basis of design: Amerex Model 240

2.44 EMERGANCY SHOWER / EYEWASH STATION

A. Emergency Shower / Eyewash station will have the following features:

1. Shower head and Eyewash bowl: 10" (254mm) diameter yellow impact-resistant plastic or 10-3/4" (273mm) corrosion resistant stainless steel.
2. Shower Valve: Chrome-plated brass 1" IPS stay-open ball valve. Operated by stainless steel pull rod with triangular handle. S19-310FSS is all stainless steel.
3. Standard Sprayhead Assembly: Chrome-plated brass sprayhead with twin, soft flow, eyewash heads and protective sprayhead covers. The integral flow control assures safe, steady flow under varying water supply conditions from 30–90 PSI. S19-310FSS is all stainless steel.
4. Eyewash Valve: Chrome-plated 1/2" IPS stay-open ball valve. Hand operated by a large, highly visible safety yellow PVC push handle. S19-310FSS is all stainless steel.
5. Pipe and Fittings: 1-1/4" galvanized steel protected with BRADTECT™ safety yellow coating. S19-310FSS is all stainless steel.
6. Water Supply: 1-1/4" IPS.
7. Complies with American National Standard Z358.1-2004
8. Universal Identification Sign and Inspection Tag Included
9. One-Year Warranty
10. Provide emergency thermostatic mixing valve.

B. Basis of Design: Bradley Combination Drench Shower / Eyewash Unit Model S19-310 and Bradley Emergency Fixture Thermostatic Mixing Valves S19-2100.

PART 3 – EXECUTIONSITE EXAMINATION

A. Refer to all site and site preparation specifications within this document and on the structural plans. Request geotechnical testing if conditions and materials are not acceptable or there is a doubt of suitability for pool work. Start of this work indicates acceptance of the soils and substrate as acceptable and satisfactory.

3.2 POOL STRUCTURE

A. Any annotations and drawings of the swimming pool structural plan sheets, must be followed exactly. In case of contradiction between structural plan sheets and specifications in other parts of these documents, the structural plan sheets shall govern.
B. The Pool Contractor shall place permanent batter boards located around the perimeter of the pool structure. The Pool Contractor shall verify that the batter boards placement represents the exact location and elevation of the pool structure in this work. Machine and hand excavate as required. Correct any geophysical problems caused by this work.
C. The Contractor shall place a clean crushed rock base to provide proper subdrainage below the pool floor structure. The Contractor shall place in this rock base a pool structure dewatering/under drain piping system. The system shall be piped and installed per applicable drawings and specifications. The Contractor shall not use this dewatering system during construction. The piping shall be clean at all times.
D. Any minor voids which may occur due to over excavation or from cave-in, etc., shall be filled with lean mixture of gunite or shotcrete or concrete before any reinforcing steel is placed. The Pool Contractor shall notify the Engineer where any minor

deformations in the excavation caused by cave-ins, subsurface water conditions, or earth of adequate bearing capacity have occurred. These irregularities shall be repaired as required and filled with bank run gravel, crushed rock, or a lean mixture of gunite or shotcrete as directed by the Engineer.

E. The Pool Contractor shall verify the under drain system was installed within the clean drainage fill base below the pool floor as shown on the Pool drawings. The pool under drain system shall consist of a 4 inch diameter perforated PVC, schedule 40 pipe installed around the perimeter of the pool area with a collection header adjacent to the main pool drain at the deepest portion of the pool. A geotextile filter fabric shall be installed between the LVC soils or subgrade soils and the drainage fill to encapsulate the drainage fill material.

F. The Pool Contractor shall construct a header completely around the pool, to form a bond beam at the top of the pool wall, which is monolithic portion of the pool shell, formed to the dimensions as specified in the structural drawings. A taught cutting wire shall be anchored to the header to assist verification of the dimensional integrity of the gunite or shotcrete structure during construction and to assist in constructing a straight wall. A 1/2" plus, 0” minus tolerance will be allowed in the straightness of the vertical pool walls at the time of placement of C.I.P., Gunite or shotcrete. All structural walls have a minimum thickness as noted on the wall reinforcing schedule. Hand of placement or mortar to true up walls will not be permitted. Before Gunite or shotcrete has set, the walls shall be within the dimensional requirements of the structure. Standard race course lengths must be maintained in areas applicable.

G. The Pool Contractor shall place, before commencing the Gunite, shotcrete, or C.I.P. work, all special pool fittings and gutter anchorages that are required to be embedded in concrete or C.I.P., Gunite or shotcrete and shall be responsible for positioning in accordance with the drawings.

H. The wall and floor reinforcing steel shall be securely wired together and shall be lapped not less than 40 diameters or 2 feet minimum, whichever is greater, and placed in a workmanlike manner. The Engineer shall inspect this work before concrete or Gunite or shotcrete work.

I. The Engineer shall be notified after concrete design mixes are approved and 14 days prior to the placement of concrete or Gunite or shotcrete. The Pool Contractor shall furnish radius templates of the principal radii of the structure and demonstrate the proper wall thicknesses are being provided within the cutting lines. The Engineer shall approve or disapprove the work prior to the concrete or Gunite, shotcrete, or C.I.P. placement. The main drain piping shall be tested during this inspection and during concrete placement.

J. The pool structural concrete design requires the placement of the poured floor before C.I.P., Gunite or shotcrete of the walls.

K. Concrete mixes for poured in place and C.I.P., Gunite or shotcrete shall be as shown on structural drawings and specifications.

L. Gunite sand shall consist of clean, hard, sharp particles and the moisture content per structural plans. Gunite proportions shall be per structural plans, mixed dry in a batch mixing machine for a period of not less than one minute after materials have been added. Hydration shall occur at the nozzle of the cement gun using just enough water so that no slump shall occur in the Gunite. Surfaces upon which the Gunite or shotcrete is to be apply shall be shot at right angles to the surface, starting at the

bottom in continuing upward. Concrete shall be built up in layers of thickness that will not slump, allowing sufficient time between the placing of layers for initial set to take place. All loose, fine aggregates or rebound shall be removed from the surface the Gunite or shotcrete before placing succeeding layers to avoid sand pockets, and whenever possible, the first layer shall entirely cover the reinforcing steel in order to secure it in the proper position. Any sand pockets which may occur shall be immediately cut out and filled with Gunite or shotcrete.

M. The design mixes shall be submitted to the Engineer 14 days before placement. All ACI cold and hot weather concrete work recommended practices apply to pool structure and grout placement. All concrete, gunite, and shotcrete work shall be wet cured.
N. The pool concrete floor and C.I.P., Gunite or shotcrete walls shall be finished at time of placement to a smooth steel troweled finish. Walls and floor shall be of uniform, flat plane, with smooth radius, and without perceptible contour variations.
O. The stainless steel gutter system is grouted in the place using a non-expansive grout and shall be continuously supervised, wet-burlap-cured with vapor barrier covering not less than three days after placement.
P. Only experienced forming, gunmen, and nozzlemen shall be employed, and satisfactory written evidence of five years of such experience shall be furnished to the Engineer prior to commencing Gunite or shotcrete work. It is the intent of this specification that the dry-gun of Gunite or shotcrete will be employed for the pool well construction.
Q. The Gunite or shotcrete surface shall be placed in a workmanship like manner to achieve a true flat plane and smooth radius surfaces for finish application, without patching, plastering, or surface grinding. Shoddy workmanship or improper care will require work to be removed and replaced properly.
R. At no point in any pool structure shall the water depth be less than specified. Depth tolerance of minus 0 inches or plus 1 inch shall be maintained.
S. The Pool Contractor shall upon completion of pool construction and prior to filling with water, obtain a Certificate of Survey by a Missouri licensed surveyor specifying actual length, width, diagonals, depths, and vertical dimensions of all swimming pool areas including diving area.

3.3 RECIRCULATION SYSTEM

A. The entire open channel gutter section shall be anchored to the pool structure, thus forming a continuous parameter section as shown on the plans.
B. Filler metal shall be used on all weld joints, whether the sections butt together are not, so as to result in uniform appearing raised welds in each joint. Raised welds shall not be ground. After the weld is cooled, a second pass may be made with the arc puddling and smoothing the original weld if required.
C. All welds shall be smooth and neat with no sharp edges.
D. The stainless steel gutter components shall be cleaned and polished as required to present a substantially uniform finish. Each weld seam, as completed, after cooling to approximately 300 degrees, shall be vigorously brushed with a stainless steel brush. Blending of all surfaces should be done with a Scotch Brite Flat Wheel or equal. Areas requiring blending, which are inaccessible with the power wheel, shall be hand

blended with a 3M Scotch Brite Pad. The strength of the raised the weld shall not be reduced by grinding. After all stainless steel welding, brushing, blending and testing, the welds on the stainless steel components must be cleaned as contained in the directions for the stainless steel gutter system installation by the manufacturer. Observe all applicable safety precautions. The finished surfaces shall appear bright and shiny without stains or discolor.

E. All installation is to be performed by a welder with at least five years experience in field welding stainless steel recirculation systems. The Pool Contractor shall submit the installer's experience, factory certified, in writing to the Engineer's office for approval prior to ordering the recirculation system. All work to be performed in accordance with the manufacturer's technical bulletins. The welder shall submit a sample for standard and quality to be used.
F. At the discretion of the Engineer, the Pool Contractor shall drill and tap up to 10 locations in the stainless steel system. Tappings shall be for 1/8 inch NPT stainless steel plugs. All chips and tailings from this procedure shall be provided to the Engineer for metallurgical testing to verify the composition of the stainless steel. Carbon content shall not exceed 0.046.

3.4 POOL PIPING/MAIN DRAIN

A. The Pool Contractor shall furnish and install the piping systems as shown on the pool plan drawings. The elevations and piping slopes shall be carefully controlled to avoid air entrapment and provide winterization drainage, with valving, to all lines.
B. All buried pool piping for pool recirculation system shall be schedule 40 pipe and schedule 40 fittings and schedule 80 pipe and schedule 80 fittings under pool slab. Mechanical joints shall be used at the pool structure, foundations/grade beams, and when connecting to pool equipment. All piping shall be NSF and AWWA listed for use. All flange fittings shall use 1/8 inch full face rubber gaskets. Link Seal shall be used when pipe is penetrating concrete structures, and stainless steel forming niches are not used.
C. The pool's main drain line also flows by gravity to a manhole as a winterization drain. The main drain line is a solid PVC pipe and does not connect to the soil dewatering perforated line beneath the pool. The above piping provides for the rainfall removal from within the pool structure and subsurface water beneath the pool structure is removed by dewatering lines.
D. All pool piping shall be placed with 6 inch bedding and 6 inch cover of clean 1/4-3/8 rock. All trench work and backfill shall comply with specifications. Thrust blocks shall be used at elbows over 30°.
E. Pool piping shall have mechanical joints at all structures and all rigid equipment. Piping shall be free-floating in sleeves at all floor slabs, pool decks, foundations, grade beams, etc. Vacuum cleaning piping shall be of "reamed" pipe ends with sanitary "Ys" and sweep bends, 12 inch minimum radius.
F. The Pool Contractor shall before placing any pipe furnish the Engineer a piping shop drawing with the elevation of the flow line of all piping, determining the elevations of low points, high points, and clearance between crossing piping.
G. All piping below structures, concrete decks, or sidewalks, etc., shall be pressure tested to 15 psi for 6 hours prior to and during placement of concrete. Piping shall be

observed, photographed, and recorded by the Contract's Superintendent as to date and time of day at beginning and end of pressure tests. Any pressure loss shall be immediately communicated to the Engineer. All piping must pass pressure testing before proceeding with construction.

H. All main drain niches over 8 inches shall be prefabricated stainless steel. All frames for main drain shall be white in color with white grading/cores.
I. Cast iron fittings shall be baked epoxy lined and used only where called for in these specifications or on the pool plans. Steel or black iron shall not be used.
J. Pool valves shall be installed as shown on the pool valve schedule on the pool plans and as specified. Pool Contractor shall install additional valves as required to meet the intent of the design.

3.5 AUTOMATIC CHEMICAL CONTROL

A. The Pool Contractor shall furnish and install complete automatic chemical control systems consisting of control cabinets, sensors, and accessories to continuously monitor the free active chlorine sanitizer, PPM, O. R. P., temperatures, and pH levels in the water of the pool.
B. The automatic chemical feed systems manufacturer shall guarantee in writing that the systems are installed and operating in accordance with written instructions given and accepted by the Owner and that all systems will perform in complete accordance with the specifications.
C. The Pool Contractor shall furnish and install all chemical feed equipment according to the codes, regulations, and manufacturer's instructions governing the installation of this equipment and usage.
D. The Pool Contractor shall utilize as required sodium bisulfate, bicarbonate of soda, muriatic acid, sodium hypochlorite, calcium chloride, and chlorine as specified. These chemicals shall be supplied by the Pool Contractor for use during start up in any additional chemicals that may be required are to be provided. Purchase of the start up supply and one month supply of chemicals shall be by Pool Contractor and must be coordinated with the Owner.

3.6 POOL DECK ACCESSORIES

A. The Pool Contractor shall assemble and install all the swimming pool deck equipment and accessories. All shall be installed and finished in accordance with the manufacturer's instructions, coordinated with other trades, and as shown on plans and specifications.
B. Assemble and install all safety equipment and lifeguard cheers.
C. The Pool Contractor shall install and verify function of all swimming pool safety and lifesaving equipment.

3.7 POOL FINISHES

A. The swimming pools shall not be interior finished until all deck work, all mechanical installations, all general, electrical, and mechanical work on the project has been completed and the area around the pool has been swept and thoroughly cleaned. All

pool lines and water service lines shall be flushed clean before any pool finishing is started. All pool chemicals and test equipment must be on hand for start up.

B. Interior surfaces of the pools shall be thoroughly cleaned of dust, oil, paint, and other foreign materials before application of any surface coatings.
C. The Pool Contractor shall apply Paint or Diamond Brite finish pool surfaces according to the manufacturer's recommendations. A manufacturer's representative must visit site prior to application and instruct Pool Contractor's personnel prior to work.
D. Concrete walls and floors shall be at least 21 days old before finishing. Do not apply to damp surfaces. Protect from blowing debris. Any work with debris and final finish shall be refinished.
E. Depth markers – The depth markers shall be provided and installed flush in the pool deck according to the plan and details shown on the drawings. Numerals shall be set in and grouted with pure white Portland cement. Wet cure all depth markers immediately after placement for a period of not less than five days.
F. All pool perimeters shall have adjacent to the stainless steel gutter system, depth and safety markings. These tile depth markers shall be immediately after placement for a period of not less than five days. These tile depth markers shall be installed such that water will not pound. Poorly placed markers shall be removed and replaced. Tiles shall be set in a bed of pure white Portland cement grout. No lime or other additives will be approved.
G. Pressure sensitive depth markers shall be installed on the vertical stainless steel face of the return line. Utilize heat applied depth markers of material designed for such service. These shall be placed to correlate with the deck depth markers.

3.8 POOL PIPING FINISHES

A. The Pool Contractor is responsible to verify the current color code requirements and for the pool piping to have proper paint finishes on all materials and equipment. Pool Contractor shall properly repair any factory finishes which have been damaged.

3.9 POOL START UP PROCEDURE

A. All pool equipment shall be checked to be sure it is properly connected and ready for start up, and the pool interior finish has been properly hydrated. Notify Engineer as soon as start up training can be started.
B. Verify with all subcontractors involved with the start up procedure are available prior to scheduling start up.
C. Verify that all pool systems have been thoroughly cleaned and are ready for start up.
D. Begin filling of swimming pool using manual fill valve.
E. Follow manufacturer's guidelines and recommendations in starting pool filter, recirculation, and heating systems. Follow manufacturer's guidelines and recommendations in start up of chemical and automatic control systems. The Pool Contractor shall determine when the pool equipment is functioning normally and the water is being automatically controlled and chemical operational balance is being achieved. Thereafter, notify appropriate contractors to start and calibrate heating systems. Notify the Engineer. Request all applicable regulatory inspections.

F. After complete start up of all swimming pool systems, contact the Engineer to schedule training sessions of the Owner. The Pool Contractor shall conduct all training sessions and coordinate training personnel from various manufacturers participating in training sessions. It is the responsibility of a Pool Contractor to provide sufficient operation and maintenance training of the Owners personnel. Engineer may, at his sole discretion, require additional and/or more specific training if deemed necessary.

END OF SECTION

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 131510 – WATERSLIDES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Waterslides: (See Plans for details.)
1. 32” Enclosed / Open Speed slide
2. 54” Open Flume Raft Slide

1.02 RELATED SECTIONS

A. Section 03300: Concrete

1.03 DESCRIPTION

A. Work Included

Special note: The drawings and specifications provided by Aquatic Design Consultants, Inc. are provided as guidelines to ensure bidding is fair by all slide manufacturers. Each slide manufacturer is fully responsible for design of their complete slide including the slide structures, ride surfaces, ride slopes/angles, rider safety, water depths and runout distances at the end of ride, stair systems, structural foundations, etc. Aquatic Design Consultants, Inc. is in no way participating in the design of the complete slide or any slide related components. Aquatic Design Consultants, Inc. is only designing a water pumping system to provide water to the slide based on flow rate requirements supplied by the slide manufacturer. Aquatic Design Consultants, Inc. will design the water basin that receives riders from the slide, based on water depth and runout lengths provided by the slide manufacturer. It is the responsibility of the slide manufacturer to review the plans prepared by Aquatic Design Consultants, Inc. and alert the same of any required changes to the pump or receiving water basin design.

Furnish and install fiberglass water slides and special effects as indicated on the Drawings, specified herein, and as necessary for proper completion including, but not necessarily limited to:

1. Minimum Qualification requirements
2. Design and Engineering Requirements
3. Insurance Requirements
4. All fiberglass flume components.
5. All flume structural support systems.
6. Tower, platforms, stairs, railings and related supports.
7. Installation supervision, ride testing and certification.
8. Labor to complete the installation of the waterslides, supports and Tower(s).
9. Operations and Maintenance manuals.
10. On site training of entire Swimming Pool Staff.
11. Proper Signage.

B. Related work:
1. All demolition and repairs to decks, fences and landscaping.
2. All electrical works, buildings, permits, and modifications if any to the pool walls and waterslide areas. All necessary utilities required for all waterslide areas and all special effects areas(if applicable)specified by manufacturer.

3. Installation and supply of mechanical and electrical equipment, including but not limited to waterslide pumps, controls and switches, electrical connections and wiring, and related piping clear to starter tubs. Drainage, ballast tanks, filtration, pumps etc for RunOut and splashdown pools if applcable. Grating if applicable.
4. Inner tubes, rafts and/or matts for applicable waterslides.

C. Concrete foundations:
1. Concrete foundation design shall be completed by the slide manufacturer. Foundation design must be completed prior to bid and supplied to contractor installing the slide foundations so that all bids are accurate. Refer to Geotechnical Report supplied with bid package.
2. Anchor bolts for the slide foundations shall be hot dip galvanized and supplied by the slide manufacturer.

D. Materials:
1. The Family Slide Tower and stairways, structural steel supports and fiberglass shall be installed by the slide manufacture.

E. Color:
1. Color shall be integral to the fiberglass. Fiberglass color shall be selected from a minimum of 40 colors supplied by the waterslide manufacturer. Colors may be different inside and outside if desired.

F. Approved Slide Manufacturers:

Splashtacular, Inc. 888-844-5334
Vortex International, 877-586-7839
Whitewater West Industries, Ltd. 614-857-9200
Avalanche Waterslides 816-896-8915

1.04 QUALITY ASSURANCE

A. Qualifications of Suppliers and Personnel
1. The water slide flume supplier shall have not less than (5) years experience in the design and fabrication of similar fiberglass water slides. The supplier shall provide appropriate Performance and Labor/Material payment bonds as required.
2. The water slide erection supervisor shall not have less than five (5) years experience in the erection of fiberglass water slides and all special effects systems
3. Product quality is of utmost importance. The supplier shall submit evidence of written Quality Assurance Program a minimum of 10 days after bid date in order to be considered as qualified at the sole discretion of the Aquatics Designer.
4. Supplier shall provide proof of insurance 10 days after bid date illustrating a minimum of $1,000,000 general and product liability as well as an additional $5,000,000 excess umbrella liability per occurrence. Supplier shall also provide proof of worker's compensation and employer's liability coverage with policy limits of $1,000,000 per line item of coverage and proof of errors and omissions liability claims made coverage in the amount of $1,000,000 each claim.
5. Dimensions and footing layout and design will vary between manufacturers. Those items shown on Plans and specified are intended to establish minimum standards.
    a) For bidding purposes, equipment supplier shall anticipate deviations from items shown on plans and specified herein, and submit his or her bid accordingly.
    b) Necessary design deviations shall be the responsibility of the equipment supplier and shall be made to fit manufacturer's specific requirements.

B. Codes and Standards

1. In addition to complying with the waterslide manufacturers specified requirements, comply with pertinent recommendations contained in:
   a. Waterslide flumes shall comply with "WWA Considerations for Operation Safety", 1989 and updates, as published by the World Waterpark Association.
   b. American Institute of Steel Construction. AISC Steel Construction Manual. 15th edition, 2017
   c. American Concrete Institute. ACI 318-14 Building Code Requirements for Structural Concrete. 2014
   d. American Society of Civil Engineers. ASCE 7-16 Minimum Design Loads for Buildings and Other Structures. 2017
   e. International Code Council. 2021 International Building Code
   f. American Institute of Steel Construction. Steel Design Guide 1: Base Plate and Anchor Rod Design. 2nd Edition. 2006
   g. American Concrete Institute. ACI 301-10 Structural Concrete for Buildings. 2010
   h. American Concrete Institute. ACI SP-066(04 Detailing Manual. 2004
   i. ASTM F2376 Standard Practice for Classification, Design, Manufacture, Construction and Operation of Water Slide Systems.
   j. Governing Building Title 16-Part 1207 - Safety Standard For Swimming Pool Slides.
2. Where provisions of pertinent codes and standards conflict with this specification, the more stringent shall govern.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

E. Design waterslides under direct supervision of a Professional Structural Engineer experienced in design of this work.

1.05 SUBMITTALS

A. Engineered drawings
1. Within thirty (30) days after award of contract, and before any materials are delivered to the job site, submit the following drawings to the Aquatics Designer for approval:
   a) Slide path design with X. Y, Z (elevation) coordinates.
   b) Flume component details, including interface at slide entry and exit.
   c) Flume structural support system details.
   d) Foundation plans and details as required for flume structural support. Foundations shall be concrete spread footing and pedestal design. Top of pedestal shall be above finish grade.
   e) Mechanical schematic.
   f) Schematic for slide and pool wall interface.
2. Show all welds, both shop and field by the currently recommended symbols of the American Welding Society.
3. All shop drawings shall be certified and sealed by a Professional Engineer.
4. The slide manufacturer shall certify to the Owner that the depth, width and length of the receiving pool (s) are acceptable and compatible with safety standards for the manufacturer's designed product.
5. The slide manufacturer shall certify in writing on the shop drawings that no fillers of any kind will be used to manufacture the fiberglass flumes.

6. The slide manufacturer shall certify to the Owner that the specified minimum width and length of the fiberglass flumes as described in PART 2, Section 2.01 WATERSLIDE RIDES, Paragraph D. item 1, line a. has been satisfied

1.06 GUARANTEE/WARRANTY

A. All work of this section shall be warranted against all defects of material and/or application for a period of two (2) years from date of acceptance. Any failure that may occur within this warranty period, due to defective installation and/or materials, shall upon written notification of such failure be immediately repaired or replaced.

1.07 ALTERNATE BID ITEM

A. Base Bid: Complete slide installation as shown on the plans.

B. Alternate Bid: Deduct slide structure and footing and pump. Install the plunge area, the 3 main drains, the piping from the main drains to the pump pit, installation of the pump pit with grating, electrical conduit from electrical room to the pump pit, and an additional light pole for PA speaker and security light.

PART 2 - PRODUCTS

2.01 WATERSLIDE RIDES

A. Fiberglass Laminate Materials:

1. Gelcoat:
   Interior gelcoat shall be high quality isophtalic polyester with U.V. anhibitors. 18 to 20 mils thick ride surface, 20 mils exterior coating. Translucent fiberglass shall also have exterior UV protection clear coat. Follow instructions in Gel Coat Application Procedure ISO PP 025.0 and Control Spray Procedure ISO PP020.0
2. Resins:
   Thixotropic promoted low profile polyester resin with alternate layers of continuous roving chop and 18 oz. woven roving. No fillers shall be allowed in the fiberglass laminate materials.
3. Structure:
   Fiberglass lamination with sandwich panel centerline reinforcement. Standard flume section shall be 3/16” thick, minimum weight 20 oz. per square foot. Flanges shall be minimum 1/4” thick and extend at least 4-3/4” from the slide surface, “L” type. Verify Gel Coat thickness using a mil gauge as described in Mil Gauge Procedure ISO PP 095.0.
4. Confirm proper cure level on the gel coat following the guidelines in Barcol Impressor Procedure ISO PP090.0.
5. Apply chopped glass reinforcement according to customer specified thickness using Spray Up Procedure ISO PP030.0 and Control Spray Procedure ISO PP020.0.
6. Verify laminate thickness using a mil gauge as described in Mil Gauge Procedure ISO PP095.0.
7. Verify proper cure on the part per guidelines in Barcol Impressor Procedure ISO PP 090.0. Using guidelines in De-Molding Procedure,ISO PP 075.0, remove the completed part from the mold.
9. Trim edges and perform required cut outs per customer specifications.
10. Inspect part to verify compliance to customer specifications and apply required quality sticker per Quality Inspection Procedure ISO PP145
11. No fillers to be used anywhere in the process.

B. Joints, Connections and Seams:

1 Flume to flume joints shall be fastened with 3/8" stainless steel bolts, washers (2 per bolt), and self-locking nuts.

2. Flume to support system connections shall be made with galvanized steel hardware, and shall be connected separately from water slide section connections to the exterior flange of the flume.

3. All connections shall be external to flume interior. No connection, hardware or penetration shall be made to flume interior.

4. Fiberglass joint connections shall be made using waterproof non-shrink caulking with suitable adhesion to fiberglass. Silicone sealants will not be permitted. Caulking shall be supplied by the slide manufacturer.

5 Fiberglassing over seams within the riding surface is not permitted. Sanding within the slide surface should be minimized to maintain adequate gel coat thickness and gloss. Any sanded areas shall be polished to a high gloss until undetectable.

C. Color:

Color shall be integral to the fiberglass. The color shall be selected by the engineer and owner from a minimum of 40 colors supplied by the waterslide manufacture. Gelcoat color chart. Color may be different inside and outside, at no additional charge, and if desired on the open flume as well as the closed slide.

D. Waterslide Configurations:

1 Ride configurations include: See plans for ride details.

E. Required Components

1. Entry tray shall be pre-plumbed for water injection down stream of the rider entry point. Rider entry area shall be a non-skid surface. Risers sections are required on open flume slides for ride safety and to control water loss and shall be provided on all curved flume sections. Risers shall be integral to the flume.

2. Riser ends to provide a smooth transition at the beginning and ending of each riser shall be provided integral to the flume section.

3. The flume shall be perpendicular to the pool wall for at least ten feet from its end and shall not slope greater than one foot vertical in last ten feet.

4. Pool entry sections shall provide a smooth finished end piece, which provides safe pool entry and masks any hardware or connection to the pool. Entry flume section shall terminate between six inches below and two inches above the water level. Entry flume section shall have a skirt returning to pool wall.

5. Factory pre-drilling of sections.

6. Waterproof joint sealant as described.

7. Stainless steel assembly hardware.

F. Flume Structural Support System:

1. Structural steel support columns, arms and cross bracing as required by the design to support all base bid flumes and connection to base bid columns required for future or alternate flume shall be supplied in base bid. All steel components shall be hot dip galvanized one coat of prime with a factory-applied epoxy coating. Tnemec Series 27 Typox at 3.0 to 5.0 dry mils per coat, two finish coats of Tnemec Series 73 Endura-Shield at 2.0 to 3.0 dry mills per coat and designed for bolt-up installation.

2. Connecting hardware and yokes as required by the design. Connecting hardware to attach the slide to structural components shall be 1/2" stainless steel, nuts, bolts, and washers. Yokes for connecting flumes to structural elements shall be 1/4" thick, 3" x 3" galvanized steel angle bent to match the exterior flume flange as a minimum standard.

3. Slide manufacturer shall design all concrete footings, foundations and columns as required for the water slide design. Slide manufacturer shall submit preliminary foundation layout plan showing quantities, dimensions and typical details.

G. Column Support System:
   1. A single or multiple column system shall be used.

H. Waterslide Tower and Stairway System:
   1. Tower columns, crossbracing, tension rods, stairway supports, stairway sections and handrailing shall be hot dipped galvanized with the exception of the stainless steel components (and painted as described above)and designed and pre-fabricated for bolt-up installation, no field welding allowed. Guardrailing balustrades shall be galvanized steel tubing.
   2. Manufacturer shall provide a hinged gate at the base of the waterslide tower.
   3. Prefabricated stairway sections shall include stringers, constructed of hot dip galvanized steel. Main tower (slides A,B,C) Stair treads shall be 60 inch wide and family slide F tower stair treads shall be only 36 inch wide , all being fabricated from Stainless Steel with turned up edges to eliminate sharp areas and to provide a clean look. Weep holes shall be provided for drainage. Anti-skid vinyl treads shall be secured to pans with stainless steel screws. Treads shall be 1 1/2" thick with a point load capacity of 3,770 pounds per inch. Owner will select from four colors.
   4. All platforms and landings shall be Stainless Steel and fabricated same as treads, including anti-skid vinyl inserts.
   5. Rail system shall be a minimum of 42 inches high at any point with the exception of the top landing which shall be a minimum of 50 inches high. Guardrailing and balustrades shall be galvanized steel. Handrails on both sides shall be Stainless Steel.

I. Structural Systems:
   1. Structural supports, tower and walkway systems shall be designed to safely support these facilities given the following design criteria:
      a. Seismic zone as required for Colby, Kansas.
      b. Wind speed (as required where slide is being installed)
      c. Snow load of (as required where slide is being installed) psf.
      d. Live load of 100 psf.
      e. Other criteria as may be required by local regulatory authorities.
   2. All concrete/footings shall have a minimum 28-day compressive strength of 4,000 psi.
   3. Pipe columns:
      All pipe columns shall meet the requirements of ASTM A-53, seamless, Grade B, minimum Fy = 35,000 psi
   4. Tubing:
      All rectangular or square tubing shall meet the requirements of ASTM A-500, Grade B.
   5. Bolts and nuts:
      a. High Strength Bolts:
         (1) All high strength bolts shall meet the requirements of ASTM A-325
         (2) Use high strength friction bolts for all bolted connections unless otherwise indicated.
         (3) Make bolt holes 1/16 inch larger than nominal bolt diameter.
      b. Anchor Bolts:

All anchor bolts shall meet the requirements of ASTM A-36.

J. Steel Protection:

1. All steel shall be hot dip galvanized for maximum corrosion protection. After galvanizing, all steel components shall be abrasive sweep blasted in accordance with SPS 7.0. All steel shall be coated with one coat of Tnemec Epoxy primer at 3.0 to 5.0 dry mils. Finish coat of paint shall be Tnemec Series 1075 Endura Shield at a thickness 3.0 to 5.0 dry mils. Stainless Steel materials will not require hot dip galvanized. All steel will be etched by sand blasting prior to prime and painting. Process will be completed in factory.

K. Safety Signage

A. Water slide manufacturer shall provide 2 signs for each waterslide listing safety rules and riding instructions. Sign shall be a rigid plastic or aluminum material and suitable for exterior installation.

L. Platform Covers

1. The upper platforms and slide entry sections shall be protected from sun by a domed stainless steel pipe frame covered with acrylic fabric or woven vinyl impregnated polyester yarn. Fabric shall be attached to pipe frame using brass gromets and white rope. Bottom of shade shall be 7 foot 6 inches above entry Tubs. Fabric colors to be selected by Owner.

M. Training and Certification

A. Water slide manufacturer shall provide on-site training by a representative from the company as well as a certification letter.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the work of this Section, carefully inspect the installed work of other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that fiberglass slides and structural support systems my be fabricated and erected in strict accordance with original design,

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Engineer.
3. Do not proceed with fabrication or installation in areas of discrepancy until all such discrepancies are fully resolved.

3.02 FABRICATION

A. General

Fabricate all water slides and structural support systems in strict accordance with Shop Drawings and referenced standards.

B. Use of dissimilar metals in contact shall not be permitted.

3.03 INSTALLATION OF FOOTINGS AND FOUNDATIONS

A. Foundations shall be installed in strict accordance with the Shop Drawings. The waterslide manufacturer will supply galvanized anchor bolts. Install in accordance with manufacturer's structural drawings and instructions.

3.04 INSTALLATION & SUPPLY OF HYDRAULIC PACKAGE

A. Required Water Supply: See plans for required water supply.
B. The pumps shall be as shown on plans.
C. The pumps shall be installed with a strainer.
D. Pump discharge shall have both a flanged PVC check valve and Asahi butterfly valve.
E. The pump suction niches with frame and grate shall be custom fabricated to the same specification as the pool main drain. See pool plans and details.
F. The Engineer has sized this pump/motor/plumping configuration based on characteristics of water elements known by the Engineer at the time of design. It is the responsibility of the Contractor to verify with the manufacturer that the pump/motor/plumbing configuration will function properly for the given feature(s). The Contractor shall submit to Engineer hydraulic calculation/information prepared by the manufacturer verifying the proper performance of the given feature(s) before installation. Contractor shall include price of all equipment required for proper pump/motor/plumbing and feature operation in Bid. No additional compensation will be made for any future changes required for proper operation of equipment or aquatic feature(s).

3.05 WELDING

A. General
1. For details of joints, comply with requirements for AWS joints accepted without qualification tests.
2. Field welds will not be permitted.
3. Use E-70XX series electrodes.
4. Follow applicable sections of AWS specifications.

B. Types of Welds
Unless otherwise noted:
1. Make all fillet welds 1/4-inch minimum.
2. Make all butt welds full penetration welds.

3.06 ERECTION

A. General:
Erect all fiberglass water slides and structural support systems in strict accordance with the shop drawings and all pertinent regulations and standards.

B. Tolerance
Align all structural steel straight, plumb and level with a tolerance of 1 in 500.

C. Fiberglass Joints
All flange-to-flange connections shall be made utilizing the waterproof caulking supplied by the fiberglass manufacturer and shall be joined in such a way as to provide for a safe and matless ride. All joints shall be aligned for a completely smooth riding surface, that is, alignment must be within 1/64” and in no case shall the downstream side of the joint above the upstream side of the joint.

D. Steel Finishes
All steel components to be hot dipped galvanized more maximum corrosion protection. Any scarred surfaces shall be cleaned and cold galvanized with zinc rich paint.

3.07 CLEAN-UP

A. Upon completion of the work of this section, immediately remove all fiberglass, debris and rubbish occasioned by this work to the approval of the owner and at no additional cost to the owner.

3.08 OWNER INSTRUCTION

A. Manufacturer shall train Owner's personnel in the operation and maintenance of the waterslide at the job site during pool start-up.

End of Section

SECTION 133123 – PRE-ENGINEERED FABRIC SHADE STRUCTURES

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. A single fabric shade structure manufacturer shall be responsible for the design, wet-stamped engineering drawings, fabrication, and supply of the fabric shade structure specified herein.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete and post footings.

1.3 SUBSTITUTIONS

A. To qualify as an approved equal, please submit the following manufacturer, installer and product documentation at least ten days prior to the bid:

1. 2 full sets of fabric samples
2. Detailed material and performance specifications for ALL fabric, steel, hardware and cables used in shade structure
3. 2 full sets of powder coating color metal “chips”
4. List of at least 10 reference projects with similar scope and installations within 200 miles of bid location.
5. List of at least 10 customer references within 200 miles of bid location.
6. Proof of compliance with all quality assurance criteria, as per Section 1.6
7. Proof of installation competency and/or certification for type and size of structure specified.
8. List of all deviations from product specifications in section 2.1

B. No substitutions will be allowed after the deadline. Any approval of alternate manufacturers and structures shall be by addendum prior to the bid date and shall not be allowed without written notification.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal – Contractor provided Calculations and Submittal drawings shall include, at a minimum:

1. Calculations:
   a. References to building codes and design manuals used for calculations.
   b. Identification of lateral force resisting system.
   c. Formulas used for determining snow, wind, and seismic loads to specific project location.
   d. Three dimensional modeling input, model geometry, and analysis results.
   e. Member design results and controlling load combinations.
   f. Connection design for structural bolts, welds, plate thicknesses, and anchorage to the foundation.
   g. Foundation designs shall include the required combinations of gravity and lateral loads.

2. Submittal Drawings:
   a. Anchor Details
   b. Three dimensional views of frame.
   c. Member sizes and locations.
   d. Structural connection details, including bolt sizes, plate thicknesses, welding details, etc.
   e. Fabric Installation Details.

C. Samples for Initial Selection: Submit two full sets of fabric and powder coating samples for review and approval.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

A. Fabrication and erection are limited to firms with proven specific area experience in the design, fabrication, and erection of fabric shade structures, and such firms shall meet the following minimum requirements. No substitutions shall be allowed for the following:

1. A single shade structure manufacturer shall design, engineer and manufacture the shade structure.
2. All manufacturers shall have at least 20 years experience in the design, engineering, manufacture, and erection of fabric shade structures, engineered to requirements with similar scope, and a successful construction record of in-service performance.
3. All manufacturers shall provide proof with bid submittal of a minimum of $2,000,000 (ag) General/Public Liability insurance, $3,000,000 Professional Liability (PL) insurance, and additional $10,000,000 Umbrella/Excess Liability insurance.
4. The fabric shade structure contractor shall have a Corporate Quality Control program/manual, which describes their complete quality assurance program.
5. Manufacturer must be IAS (International Accredidation Service) Certified.

1.7 WARRANTY

A. The successful installer shall provide a 12-month warranty on all installation labor and materials.

B. A supplemental warranty from the manufacturer shall be provided for a period of 10 years (pro-rated) on fabric and 10 years (non-prorated) on the structural integrity of the steel, from date of shade invoice.

C. 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. Reference drawings for required fabric shade structure shapes, sizing, and configurations.

B. The structures shall be manufactured by Shade Structures, Inc., d/b/a USA SHADE & Fabric Structures, or approved equal.

C. Contact: Kendra Gibson
400 N. Washington Street Suite 224A
Farmington, MO 63640
(866) 701-9787
kendra@allinclusiverec.com

D. All structures designed per applicable building codes shown on drawings.

E. All fabric shade structures shall be designed and engineered to meet the minimum of 115mph “Ultimate” Wind Load, Risk Category II, Exposure C, and a Snow Load of 5 psf and Live Load of 5 psf. All fabric shade structures shall be engineered with a zero wind pass-through factor on the fabric.

F. Steel:

1. All steel members of the fabric 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 and manufactured in a IAS (International Accreditation Service) accredited facility for Structural Steel Fabrication under appropriate building code.
2. All connections shall have a maximum internal sleeving tolerance of .0625” using high-tensile strength steel sections with a minimum sleeve length of 6”.
3. All non-hollow structural steel members shall comply to ASTM A-36. All hollow structural steel members shall be cold-formed, high-strength steel and comply with ASTM A-500-10, Grade B. All steel plates shall comply with ASTM A-572, Grade 50.
4. All galvanized steel tubing shall be triple-coated for rust protection using an in-line electroplating coat process. All galvanized steel tubing shall be internally coated with zinc and organic coatings to prevent corrosion.

G. Bolts:

1. All structural field connections of the shade structure shall be designed and made with high-strength bolted connections using ASTM A-325, Grade B.
2. Where applicable, all stainless steel bolts shall comply with ASTM F-593, Alloy Group 1 or 2. All bolt fittings shall include rubber washers for water-tight seal at the joints. All nuts shall comply with ASTM F-594, Alloy Group 1 or 2.

H. Welding:

1. All shop-welded connections of the fabric 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 "pre-qualified" 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 requirements of appropriate building code.

I. Powder Coating:

1. Galvanized steel tubing preparation prior to powder coating shall be executed in accordance with solvent cleaning SSPC-SP1. Solvents such as water, mineral spirits, xylol, and toluol, which are to be used to remove foreign matter from the surface. A mechanical method prior to solvent cleaning, and prior to surface preparation, shall be executed according to Power Tool Cleaning SSPC-SP3, utilizing wire brushes, abrasive wheels, needle gun, etc.
2. Carbon structural steel tubing preparation prior to powder coating shall be executed in accordance with commercial blast cleaning SSPC-SP6 or NACE #3. A commercial blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, mill scale, rust, coating, oxides, corrosion, and other foreign material.
3. Powder coating shall be sufficiently applied (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.
4. Raw powder used in the powder coat process shall have the following characteristics:
    a. Specific gravity: 1.68 +/- 0.05
    b. Theoretical coverage: 114 +/- 4ft²/mil
    c. Mass loss during cure: <1%
    d. Maximum storage temperature: 80°
    e. Interpon 800® is a high-durability TGIC powder coating designed for exterior exposure. Tested against the most severe specifications, Interpon 800 gives significantly improved gloss retention and resistance to color change.

5. When the fabric shade structure(s) will be located within potentially corrosive environments such as (pools, reclaimed water irrigation, saltwater bodies, other standing bodies of water) hot dip galvanizing of Carbon steel or rust protection undercoat primer will be required on all structures at USA Shade's discretion. The rust protection primer shall be Sherwin-Williams® POWDURA® epoxy powder coating Z.R Primer and shall be applied to Carbon steel in accordance with the manufacturer's specifications. Primer should be fused only and then top coated with the selected powder coat to ensure proper intercoat adhesion. The primer's attributes shall be:
    a. Specific gravity (g/ml): 2.37
    b. Coverage at 1.0 mil (ft²/lb): 81.6
    c. Adhesion: ASTM D-3359 5B
    d. Flexibility: ASTM D-552 Pass 1/8"
    e. Pencil hardness: ASTM D-3363 H-2H
    f. Impact resistance (in.lb): ASTM D-2794 Dir & Rev, 120 in-lbs
    g. Salt spray resistance: ASTM B-117 2000 hours
    h. Humidity resistance: ASTM D-4585 2000 hours
    i. 60° Gloss: ASTM D-523 50 ~ 70
    j. Cure schedule (metal temp): 10min @ 200°C (390°F) 25min @ 135°C (275°F)
    k. Film thickness range (mils): 2.0 ~ 3.0

J. Tension Cable: Steel wire rope cable is determined based on calculated engineering loads. Standard cabling is galvanized.

1. 0.25" (nominal) galvanized 7x19 strand core wire rope shall be used for tension loads up to 4,500 lbs.
2. 0.375" (nominal) galvanized 7x19 strand core wire rope shall be used for tension loads up to 9,000 lbs.
3. 0.5" (nominal) galvanized 6x19 strand core wire rope shall be used for tension loads up to 13,500 lbs.

K. Fabric Roof Systems:

1. UV Shade Fabric:
   a. Shadesure® shade fabric is made of a UV-stabilized, high-density polyethylene (HDPE), asmanufactured by Multiknit® (Pty) Ltd. HDPE mesh shall be a heat-stentered, three bar Rachelknitted, lockstitch fabric with one monofilament and two tape yarns to ensure that the material will not unravel if cut. Raw fabric rolls shall be 9.8425 feet wide.
   b. Fabric Properties:
      1) ~ Life Expectancy: minimum 8 years with continuous exposure to the sun
      2) ~ Fading: minimum fading after 5 years (3 years for Red)
      3) ~ Fabric Mass: 5.31 oz/yd² ~ 5.6 oz/yd² (180gsm ~ 190gsm)
      4) ~ Fabric Width: 9.8425 feet (3m)
      5) ~ Roll Length: 164.04 feet (50m)
      6) ~ Roll Dimensions: 62.99 inches x 16.5354 inches (160cm x 42cm)
      7) ~ Roll Weight: +/- 66 lbs (+/- 30kg)
      8) ~ Minimum Temp: -13°F (-25°C)
      9) ~ Maximum Temp: +176°F (80°C)
   c. Fabric shall meet the following flame spread and fire propagation tests.
      1) ASTM E-84
      2) NFPA 701 Test Method 2

2. Stitching and Thread:
   a. All sewing seams are to be double-stitched.
   b. b. The thread shall be GORE® TENARA® mildew-resistant sewing thread, manufactured from 100% expanded PTFE (Teflon™). Thread shall meet or exceed the following:
      1) Flexible temperature range
      2) Very low shrinkage factor
      3) Extremely high strength, durable in outdoor climates
      4) Resists flex and abrasion of fabric
      5) Unaffected by cleaning agents, acid rain, mildew, salt water, and is unaffected by most industrial pollutants
      6) Treated for prolonged exposure to the sun
      7) Rot Resistant

3. Shade and UV Factors:
   a. Shade protection and UV screen protection factors shall be as follows:

Color	Shade %	UV Block %
Laguna Blue	92%	96%
Royal Blue	86%	94%
Navy Blue	90%	94%
Turquoise	83%	92%
Rainforest	89%	96%

Desert Sand	80%	92%
Black	95%	96%
Sunflower Yellow	70%	94%
Terracotta	84%	90%
Arizona	86%	91%
White	57%	86%
Silver	88%	93%
Red	91%	92%
Electric Purple	84%	90%
Zesty Lime	83%	92%
Cinnamon	88%	93%
Olive	93%	97%
Chocolate	92%	93%

PART 3 - EXECUTION

3.1 INSTALLATION

A. The installation of fabric shade structures shall be performed by manufacturer or manufacturer-approved contractor. All installation personnel must have experience in the erection of tensioned fabric structures.

B. The installation shall comply with the manufacturer's 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 Building Code ACI 318-14.
2. Concrete specifications shall comply in accordance with the Section 03300 Cast-in-Place Concrete, detailed as per plans, and shall be as follows:
   a. 28 Days Strength F'c = 2,500 psi
   b. Aggregate: HR
   c. Slump: 3 ~ 5 inch
   d. Portland Cement shall conform to C-150
   e. 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 the daily ambient temperature is to be below 55 degrees Fahrenheit.

TABLE 1

Temperature Range	**% Accelerator**	**Type Accelerator**
75~80 degrees F	1%	High Early (non calcium)
70~75 degrees F	2%	High Early (non calcium)
Below 70 degrees F	3%	High Early (non calcium)

D. Foundations

1. All anchor bolts set in new concrete shall comply with ASTM F1554 GR 55.
2. All anchor bolts shall be Hot-Dip Galvanized.
3. Footings and full rebar cages shall be drilled or dug, set, and poured as per manufacturer's specifications.

END OF SECTION 133123

220500 – COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS & INDUSTRY STANDARDS

A. 2018 International Mechanical Code

B. 2018 International Building Code

C. 2018 International Plumbing Code

D. 2017 National Electric Code

E. ADA – American Disabilities Act

F. ANSI – American National Standards Institute

G. ASHRAE – American Society of Heating Refrigerating and Air Conditioning Engineers

H. ASTM – American Society of Testing Materials

I. NFPA – National Fire Protection Association

J. NEMA – National Electrical Manufactures Association

K. OSHA – Occupational Safety and Health Act

L. UL – Underwriter's Laboratories

M. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

I. Contractor shall provide heat trace cable for all piping installed in areas subject to freezing temperatures.

J. All water lines serving flush valves shall be equipped with hammer arrestors. A single hammer arrestor shall be allowed to be installed on piping main serving a group of flush valves.

K. All pipe sizes indicated in this specification are nominal pipe sizes (NPS).

1.3 LOCAL CONDITIONS

A. Visit site and determine existing local conditions affecting work in contract.

B. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.4 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 22 are listed on “Schedule of Manufacturers” on plans.

1.5 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 22 shall include the following items.

1. Product data showing type, model and construction characteristics of product.

2. Layout drawings for any systems requiring interconnection of various system components.

3. All other documentation required to show compliance with the specifications.

B. The contractor shall provide a schedule of submittals indicating dates on which each submittal will be provided to design team for review. Schedule shall be submitted 10 working days in advance of delivery of first submittal for review.

C. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.6 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

B. The following additional items shall be guaranteed:

1. Piping shall be free from obstructions, holes or breaks of any nature.

2. Insulation shall be effective.

3. Proper circulation of fluid in each piping system.

C. The above guarantees shall include both labor and material; and repairs or replacements shall be made without additional cost to the Owner.

D. Any remedial work as a result of the above-mentioned items shall be performed promptly, upon written notice from the Architect or Owner.

1.7 INSTALLATION

A. All equipment in division 22 shall be installed according to manufacturer’s requirements and minimum code requirements. If an any case the plans or specifications are in conflict with either manufacturer’s requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

B. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

C. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

D. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

E. Install all equipment to facilitate service, maintenance and repair or replacement of components of both plumbing equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

1.8 TEMPORARY FACILITIES

A. Contractor shall provide temporary facilities as required for construction of the project. Temporary facilities shall include temporary water service and distribution, electrical power and lighting service, heating cooling and ventilation, telephone and data service, and sanitary facilities including drinking water.

B. Permanent HVAC equipment shall not be used to heat, cool or ventilate the facility during construction.

C. Whether during a renovation or a phased construction project, the contractor shall include all temporary facilities to maintain functionality and suitable space conditions in all areas of a building that are occupied by the owner while construction activities are underway.

D. The contractor shall provide temporary facilities as required to maintain a safe working environment and to protect all building materials and provide space conditions within range required for material installation.

E. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

F. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 – PRODUCTS

2.1 DIELECTRIC FITTINGS

A. Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for minimum working pressure as required to suit system pressures.

D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225 deg F.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300 psig minimum working pressure at 225 deg F.

2.2 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor's option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.

2. Schedule 40 Steel Pipe.

3. DUCTED RETURN ONLY – Schedule 40 PVC pipe.

2.3 ESCUTCHEONS

A. Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Options:

1. One-Piece, deep-drawn, box-shaped brass with polished chrome-plated finish.

2. One-Piece, Cast-Brass with set screw with polished chrome plated finish.

3. Split-Casting, Cast-Brass with concealed hinge and set screw and polished chrome plated finish.

2.4 GROUT

A. ASTM C 1107, grade B, nonshrink and nonmetallic, dry hydraulic-cement grout

B. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

C. Design Mix: 5000 psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

220519 – METERS AND GAUGES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION

A. Install connector plugs with socket extending one-third of pipe diameter and in a vertical position in piping.

B. Install connector plugs of sizes required to match thermometer connectors. Provide bushings if required to match sizes.

C. Provide extension of thermowells as required for access beyond piping insulation.

D. Install thermometers in thermowells and adjust position for readability.

E. Install meters and gauges adjacent to machines and equipment to allow service and maintenance of meters, gauges, machines and equipment.

F. After installation calibrate meters according to manufacturer's written instructions.

G. Install thermometers in the following locations:

1. Inlet and outlet of Water Heaters
2. Inlet and outlet of Heat Exchangers
3. Inlet and outlet of domestic hot-water storage tanks
4. Inlet and outlet of domestic water chiller

H. Install pressure gages in the following locations:

1. Water service entrance into building
2. Inlet and Outlet of pressure reducing valves
3. Suction and discharge sides of domestic water pumps

1.2 SCALE

A. Provide scale range of meters and gauges as required for flow rates indicated on drawings and schedules.

PART 2 – PRODUCTS

2.1 BIMETALLIC DIAL THERMOMETER

A. Thermometer shall have stainless steel case and stem, glass window, permanently etched scale markings on dial, dark metal pointer and bimetal coil temperature sensing element.

B. Provide probe suitable for insertion in connector plug with length as required for insertion into gauge connector plug.

C. Thermometer shall have accuracy of plus or minus one percent of scale range.

D. Provide each thermometer with separable well for installation pipe connections.

2.2 THERMOWELL

A. Thermowell shall be constructed in accordance with ASME B40.200 with pressure-tight, socket-type fitting made for insertion into piping tee fitting. Length shall match thermometer bulb or stem and extensions shall be provided to accommodate insulation.

B. Provide thermowell bushings as required to convert internal screw thread to size of thermometer connection.

2.3 PRESSURE GAUGES

A. Pressure gauge shall have stainless steel case and stem, glass window, permanently etched scale markings on dial, dark metal pointer and bourdon type pressure element assembly with copper alloy construction and brass tip.

B. Gauge shall be equipped with mechanical link between pressure element and connection to pointer.

C. Provide probe assembly suitable for insertion in connector plug.

D. Gauge shall have grade 'A' accuracy plus or minus one percent of middle half of scale range.

E. Gauges shall have pressure rating for each specific application.

F. Gauge shall be furnished with snubber rated for pressure of system.

2.4 CONNECTOR PLUGS

A. Provide connector plugs for all pressure gauges and thermometers rated for 500 psi and 200 degrees Farenheit. Plug shall be solid brass construction with two valve cores of neoprene.

220523 – VALVES FOR PLUMBING PIPING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Prior to installation, examine valve interior for cleanliness. Operate valves to ensure proper operation. Examine guides, seats, threads and flanges to ensure there are no conditions that could cause valve malfunction or leakage. Do no attempt to repair defective valves; replace with new valves.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance and equipment removal without system shutdown. Locate valves for easy access and provide separate support where necessary.

C. Install valves in position to allow full stem movement. Install valves in horizontal piping with stem at or above center of pipe.

D. Install chain wheels on operators for valves 4” and larger and more than 96 inches above finished floor. Extend chains to 60 inches above finished floor.

E. Install necessary valves within piping systems to provide required flow control and to allow isolation for inspection, maintenance and repair of each piece of equipment of fixture and on each main and branch service loop.

F. Valves 2” and smaller have solder, socket weld flanged or screwed end connections as required by associated piping materials unless otherwise noted. Valves 2.5” and larger shall have flanged or butt weld ends as scheduled.

G. Non-rising stem valves shall not be installed at any point in the piping systems unless space is restricted. If a restricted area is identified, contractor shall obtain A/E approval before installation of non-rising stem valve.

H. Valves shall be the same size as adjacent piping. Reduced valve size will not be allowed unless specifically noted.

I. Provide butterfly valves 6” and smaller with latch lock handles for shutoff service.

J. Install globe valves with pressure on top of disc unless prohibited by code. Globe valves requiring drainage for inspection, maintenance or winterization shall be installed with stem in horizontal position to allow complete drainage of piping.

K. Valve pressure and temperature ratings shall not be less than indicated and as required for system pressures and temperatures.

1.2 GENERAL VALVE APPLICATIONS

A. If valve applications are not noted, use the following:

1. Shutoff service: Ball, Butterfly or Gate valves
2. Throttling Service: Balance Valves or butterfly valves
3. Check Valve:
    a. Domestic Water 2” and smaller: Bronze Swing Check Valve (horizontal) or Spring Check Valve (vertical)
    b. Domestic Water 2.5” and larger: Iron Swing Check Valve

B. Valves shall be sized the same as upstream piping unless otherwise noted.

C. Actuator type valves:

1. Gear actuator for quarter-turn valves 8” and larger
2. Handwheel for valves other than quarter-turn types
3. Hand lever for quarter-turn valves 6” and smaller

D. Valves in Insulated Piping: (shall be provided with 2” stem extensions and the following)

1. Gate Valves shall be provided with rising stem

2. Ball Valves shall be provided with an extended operating handle of non-thermal-conductive material and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

3. Butterfly Valves shall be provided with extended neck

1.3 VALVE ENDS SELECTION

A. Select Valves with the following ends or types of connections:

1. Copper tube 2" and smaller: solder ends, threaded ends

2. Copper tube 2.5" and larger: flanged ends

PART 2 – PRODUCTS

2.1 BALL VALVES

A. Bronze Ball Valve: Class 150 valve. Valve shall conform to standard MSS SP-110. Body design shall be two piece, bronze with threaded ends, stainless steel ball and stem, Teflon seats and full porting. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

2.2 BUTTERFLY VALVES

A. Iron Single Flange Butterfly Valve (2.5" to 12"): Class 200 CWP rated. Valve shall conform to MSS SP-67, Type I. Body design shall be lug type suitable for bi-directional dead-end service at rated pressure without use of downstream flange. Body material shall be ASTM A 126, cast iron or ASTM A 536 ductile iron. Valve shall be equipped with EPDM seat, stainless steel stem and aluminum bronze disc.

B. Iron Single Flange Butterfly Valve (14" to 24"): 150 CWP rated. Valve shall conform to MSS SP-67, Type I. Body design shall be lug type suitable for bidirectional dead end service at rated pressure without use of downstream flange. Body material shall be ASTM A 126 cast iron or ASTM A 536 ductile iron. Valve shall be equipped with EPDM seat, stainless steel stem and aluminum bronze disc.

2.3 GATE VALVES

A. Iron Gate Valve: Class 125, OS&Y valve. Conform to standard MSS SP-70, Type I. Body material shall be ASTM A 126, gray iron with bolted bonnet. Valve shall be equipped with flanged ends, bronze trim, solid wedge disc and asbestos free packing and gasket. Valve shall be designed for repacking under pressure when fully opened and back-seated.

B. Bronze Gate Valve: Class 125, rising stem valve. Conform to MSS SP-80, Type 2. Body material shall be ASTM B 62 bronze with integral seat and union ring bonnet. Valve shall be equipped with threaded ends, bronze stem, solid wedge bronze disc, asbestos free packing and malleable iron hand wheel. Valve shall be designed for repacking under pressure when fully opened and back-seated. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

2.4 GLOBE VALVES

A. Bronze Globe Valve: Class 125 Valve. Conform to MSS SP-80, Type I. Body material shall be ASTM B 62 bronze with integral seat and screw in bonnet. Valve shall be equipped with threaded ends, bronze stem and disc and asbestos free packing. Valve shall be designed for repacking under pressure when fully opened and back-seated.

B. Iron Glove Valve: Class 125 Valve. Conform to MSS SP-85, Type I. Body Material shall be ASTM A 126, gray iron with bolted bonnet. Valve shall be equipped with flanged ends, bronze trim and asbestos free packing and gasket. Valve shall be designed for repacking under pressure when fully opened and back-seated.

2.5 BALANCE VALVES

A. Bronze Circuit Setter Balance Valve: Body material shall be bronze. Valve shall be equipped with precision machined orifice calibrated position indicator, meter connections with built in flanged check valves. Provide complete with polyurethane insulation cover. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

B. Iron Circuit Setter Balance Valve: Body material shall be cast iron. Valve shall be equipped with bronze disc with EPDM insert, stainless steel stem, asbestos free packing and gasket, EPDM seal ring and zinc plated stainless steel bushing.

2.6 SWING CHECK VALVES

A. Bronze swing Check Valve: Class 125 valve. Conform to standard MSS SP-80, Type 3. Valve shall have horizontal flow body design with threaded ends and bronze disc. Body material shall be ASTM B 62 bronze. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

B. Iron Swing Check Valve with Closure Control: Class 125 valve. Conform to standard MSS SP-71, Type I. Valve shall have full waterway design and shall be constructed with ASTM A 126 gray iron and bolted bonnet. Valve shall be equipped with flanged ends, bronze trim, asbestos free gasket and factory installed exterior lever and swing closure control.

2.7 AUTOMATIC FLOW CONTROL VALVES

A. Brass Flow Control Valve: Body material shall be brass with electroless nickel and steel wear surfaces. Valve shall be equipped with stainless steel spring, built in strainer, pressure and temperature ports, shut off valve with Teflon packing and polyurethane insulation cover. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

B. Iron Automatic Flow Control Valve: Body material shall be ductile iron with electroless nickel and steel wear surfaces with stainless steel spring and pressure and temperature ports.

220529 – HANGERS, SUPPORTS AND VIBRATION ISOLATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic restraint hangers and supports for piping and equipment. Obtain approval from authorities having jurisdiction where required by local requirements.

1.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers, supports, clamps and attachments to support piping properly from building structure. Do not attached to ceilings, equipment, ductwork, conduit or other non-structural elements such as floor or roof decking.

B. Hangers, supports, clamps and attachments shall comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacing specified within Division 22 piping sections. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

C. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length specified in Division 22 piping sections. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping as specified in Division 22 piping sections. Install concrete inserts before concrete is placed; fasten insert to forms. Where concrete with compressive strength less than 2,500 psi is indicated, install reinforcing bars through openings at top of inserts.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Provide two nuts on threaded supports to securely fasten the support.

E. Field fabricated heavy duty steel trapeze supports shall be fabricated from steel shapes selected for loads required. Weld steel in accordance with AWS D-1.1.

F. Install appropriate types of hangers and supports to allow control movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

G. Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

H. Install hangers to provide indicated pipe slopes and so that maximum deflection of piping allowed by ASME B31.9 is not exceeded.

I. Insulated piping:

1. Riser Clamps: Attach riser clamps, including spacers, to piping with riser clamps projecting through insulation. Do not exceed pipe stresses allowed by ASME B31.9. Do not use riser clamps to support horizontal, insulated piping. Seal insulation for hot piping and protect vapor barrier for cold piping as specified in Division 23 “HVAC Insulation”.

2. Insulation protection shield: Install insulation protection shield and high density insulation, sized for the insulation thickness used as specified in insulation schedule. Install a minimum 8” long section at each support point, top and bottom halves or the pipe of same thickness of insulation used.

J. Pre-engineered Support Strut Systems: Channel strut systems can be used at the Contractors option in lieu of individual hangers for horizontal pipes. Space channel strut systems at the required distance for the smallest pipe supported. Provide channel gauge and hanger rods per the manufacturer’s recommendations for the piping supported. Where strut systems are attached to walls, install anchor bolts per manufacturer’s recommendations.

1. Uninsulated copper pipe: Install with plastic galvanic isolators.

2. Insulated Tube or Pipe: Install with 360 degree insulation protection shields or pre-engineered thermal hanger shield inserts.

1.3 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B 31.9 and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ASME B 31.9 and with AWS Standards D1.1.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to control movement to compensators.

D. Anchor spacing: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

1.4 INSTALLATION OF PIPE ALIGNMENT GUIDES

A. Install pipe alignment guides on piping that adjoins expansion joints as required by expansion joint manufacturer and elsewhere as indicated on plans and specification sections to eliminate binding and torsional stress on piping systems. Where not otherwise indicated, install guides as required by ASME B 31.9. Anchor guides to building substrate.

1.5 EQUIPMENT SUPPORTS

A. Fabricate structural steel supports to suspend equipment from structure above or support equipment from floor. Place grout under supports for piping and equipment.

1.6 INSTALLATION OF VIBRATION ISOLATORS

A. Piping runs connected to equipment requiring vibration isolation shall be isolated from building structure at connection to equipment using isolators inserted in supporting piping rods.

B. All floor mounted equipment shall be erected on concrete equipment pads over the complete floor area of the equipment, unless otherwise specified.

C. Provide neoprene mounting sleeves for hold-down bolts to prevent any metal to metal contact.

D. All equipment shall be provided with lateral restraining isolators as required to limit horizontal motion to 0.25" maximum, under all operating conditions.

E. All equipment shall be installed on vibration isolators and shall have a minimum operating clearance of 2" between the bottom of the equipment or inertia base and the concrete equipment pad or bolt heads beneath the equipment unless indicated otherwise.

F. Piping or plumbing equipment shall be supported from building structure and not other equipment, pipes or ductwork.

G. All wiring connections to plumbing equipment on isolators shall be made with a minimum 18" long flexible conduit in a "U" shaped loop.

H. Elastomeric isolators that will be exposed to temperatures below 32 degrees F shall be fabricated from natural rubber instead of neoprene.

I. Springs shall be designed and installed so that ends of springs remain parallel and all springs installed with adjustment bolts.

J. Springs shall be sized to be non-resonant with equipment forcing frequencies or support structure natural frequencies.

1.7 MOUNTING OF CENTRIFUGAL PUMPS:

A. Pumps with their driving motor installed on slab on grade shall be bolted and grouted to equipment pads

B. Pumps with their driving motor installed on suspended slabs shall be bolted and grouted to a spring supported concrete inertia base reinforced.

C. Each concrete base (rectangular or "T" shape) for horizontally split pumps shall include supports and base elbows for the suction and discharge connections. Base elbows shall be bolted and grouted to the concrete foundation.

1.8 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Clean all welds and touch up paint to match factory finish of all materials or color and finish of adjacent materials when supports and adjacent elements are painted.

C. Adjust vibration isolators after piping system is at operating weight.

D. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

E. Adjust active height of spring isolators and adjust restraints to permit free movement of equipment within normal mode of operation.

PART 2 – PRODUCTS

2.1 STEEL PIPE HANGERS AND SUPPORTS

A. Comply with MSS SP-58 types 1-58 factory fabricated components. Hangers shall be pre-galvanized or hot dipped. Where non-metallic coatings area indicated provide plastic coating, jacket or liner.

B. Where hangers are installed in a corrosive environment or outdoors, hangers and supports shall be type 304 stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Trapeze hangers shall comply with MSS SP-69 and shall be type 59 shop or field fabricated pipe support assembly made from structural steel shapes with MSS SP-58 hanger rods, nuts, saddles and U-bolts.

2.3 THERMAL HANGER SHIELD INSERTS

A. Inserts shall have 100 PSI minimum compressive strength and shall be encased in sheet metal shield.

B. For trapeze and clamped systems, insert and shield shall cover entire circumference of pipe.

C. For clevis hangers, insert and shield shall cover lower 180 degrees of pipe.

D. Insert length shall extend 2” beyond sheet metal shield for piping operating below ambient air temperature.

2.4 EQUIPMENT SUPPORTS

A. Provide welded, shop or field fabricated equipment supports made from structural steel shapes.

2.5 PIPE STANDS

A. Pipe stands shall be shop or field fabricated assemblies made of manufactured corrosion resistant components to support roof mounted piping. Provide one piece plastic unit with integral rod roller, pipe clamps or V-Shaped cradle to support pipe. Pipe stand shall be suitable for roof installation without membrane protection.

2.6 VIBRATION ISOLATORS

A. Pads: Pads shall be arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized steel baseplates and factory cut to sizes that match requirements of supported equipment.

B. Mounts: Mounts shall be double deflection type with molded oil resistant rubber, hermetically sealed compressed fiberglass or neoprene isolator elements with factory drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Identify capacity range by color coding or other means.

C. Free Standing Spring Isolators: Free standing spring isolators shall be laterally stable, open spring isolators. Outside diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Minimum additional travel shall be 50 percent of the required deflection at rated load. Isolators shall be capable of supporting 200 percent of the rated load, fully compressed without deformation or failure. Provide factory drilled baseplates and top plates for bolting to equipment and structure.

D. Housed Spring Mounts: Housed spring isolators shall be equipped with ductile iron or steel housing. Mounts shall be equipped with vertically adjustable snubbers allowing 1/4" travel up or down before contacting a resilient collar. Base and top shall have factory drilled holes for bolting to equipment and structure.

E. Elastomeric Hangers: Elastomeric Hangers shall be single or double deflection type fitted with molded, oil resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Identify capacity range by color coding or other means.

F. Spring Hangers: Spring hangers shall be combination coil-spring and elastomeric insert hanger with spring and insert in compression. Frame shall be steel and shall be fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency. Outside spring diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Hanger shall be capable of supporting 200 percent of the rated load, fully compressed, without deformation or failure and shall be equipped with self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

G. Steel Equipment Base: Equipment Base isolators shall be constructed of factory fabricated welded structural steel. Bases shall have shape to accommodate supported equipment. Support brackets shall be factory welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support. Bases shall use steel shapes, plates, and bars complying with ASTM A 32/A 36M.

220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 VALVE IDENTIFICATION

A. Provide valve tag on every valve and control device in each piping system. Exclude check valves, valves within factory fabricated equipment units, plumbing fixtures and equipment and similar rough-in connections of end-use fixtures and units.

B. List each tagged valve in valve schedule for each piping system. And provide valve schedule to owner in operations and maintenance manuals.

1.2 PLUMBING EQUIPMENT IDENTIFICATION

A. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of plumbing equipment and each operational device as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
2. Meters, gauges, thermometers and similar units.
3. Pumps
4. Heat exchangers
5. Water heaters, tanks and pressure vessels.
6. Strainers, water treatment systems and similar equipment.

B. Where lettering larger than 1” height is needed for proper identification because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved sign at contractor’s option.

C. Lettering shall be minimum 1/4” high where viewing distance is less than 2’-0”; 1/2” high for distances up to 6’-0” and proportionately larger for greater distances. Secondary lettering shall be 2/3 to 3/4 of size of the principal lettering.

1.3 PIPING IDENTIFICATION

A. Install pipe markers on each piping system and include arrows to show normal direction of flow.

B. Install pipe markers where piping is exposed to view, concealed by only a removable ceiling system, installed in machine rooms, installed in accessible maintenance spaces and exterior non-concealed locations.

1. Within 5 feet of each valve and control device.
2. Within 5 feet of each branch, excluding take-offs less than 25 feet in length for fixtures or equipment connections; mark flow direction of each pipe at branch connection.
3. Within 5 feet where pipes pass through walls, floors or ceilings or enter non-accessible enclosures. Provide identification on each side of wall, floor or ceiling.
4. At access doors, manholes and similar access points which permit view of concealed piping.
5. Within 5 feet of major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing or 50’ along each piping run. Spacing shall be reduced to 25’ in congested areas of piping and equipment where there are more than two piping systems or pieces of equipment.

C. Provide identification on the following systems; domestic cold water, domestic hot water, domestic hot water recirculation, lawn irrigation, sanitary waste, storm water, vent and natural gas piping.

PART 2 – PRODUCTS

2.1 ENGRAVED LAMINATE SIGN

A. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thickness indicated, engraved with the engravers standard letter style of the sizes and wording indicated. Signs shall be black with white core except as otherwise noted and shall be punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

B. Thickness shall be 1/16” for units up to 20 square inches or 8” in length and 1/8” for larger units.

C. Signs shall be fastened with self-tapping stainless steel screws, except contact type permanent adhesive where screws cannot or should not penetrate the substrate.

2.2 PLASTIC VALVE TAGS

A. Provide manufacturer’s standard solid plastic valve tags with printed enamel lettering with system abbreviation in approximately 3/16” high letters and sequenced valve numbers approximately 3/8” high and with 5/32” hole for fastener

B. Tags shall be 1-1/8” square white tags with black lettering.

2.3 PAINTED IDENTIFICATION

A. Painting where allowed shall be performed using standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications. Minimum letter height shall be 1.25” high for ductwork and equipment and 0.75” high for access door signs and similar operational instructions.

B. Paint shall be exterior type, oil based, black paint.

2.4 PLASTIC TAPE PIPE MARKERS

A. Provide manufacturer’s standard color-coded pressure sensitive vinyl tame not less than 3 mils thick.

B. Tape width shall be 1.5” for pipes less than 6” in diameter and 2.5” wide for larger pipes.

C. Colors shall comply with ANSI A13.1 except where noted otherwise.

D. Lettering shall be manufacturer’s standard pre-printed nomenclature which best describes piping system in each instance, as selected by A/E in cases of variance with names shown or specified. Abbreviate system names only as necessary for each application length.

E. Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering or as a separate unit of plastic.

220700 – PLUMBING INSULATION

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Provide necessary materials and accessories for installation of insulation for plumbing and mechanical systems as specified and/or detailed on drawings. Insulation type, jacket, and thickness for specific piping systems or equipment shall be as listed in this specification section.

B. Products or their shipping cartons shall bear label indicating their flame and smoke ratings. Treatments of jackets or facings for impart flame and smoke safety shall be permanent. Use of water soluble treatments such as corn paste or wheat paste is prohibited. This does not exclude approved lagging adhesives.

C. Install insulation over clean dry surfaces with joints firmly butted together. Insulation at equipment, flanges, fittings, etc. shall have straight edges with box type joints with corner beads as required. Where plumbing and heating insulation terminates at equipment or unions, taper insulation at 30 degree angle to pipe with one coat finishing cement and finish same as fittings. Total insulation system shall have neat smooth appearance with no wrinkles, or folds in jackets, joint strips, or fitting covers. Seal butt joints at maximum intervals of 45 feet to prevent vapor barrier failures from being transmitted to adjoining insulations sections.

D. Undamaged insulation systems on cold surface piping and equipment shall perform their intended functions as vapor barriers and thermal insulation without premature deterioration or vapor barrier. Contractor shall take every reasonable precaution to provide insulation systems with continuous unbroken vapor barriers.

E. Products shall not contain asbestos, lead, mercury or mercury compounds.

1.2 QUALITY ASSURANCE

A. Flame/Smoke Ratings: Provide composite Plumbing insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1. Exception: Outdoor Plumbing insulation may have flame spread index of 75 and smoke developed index of 150.

B. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

C. Insulation installer shall advise contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

D. All exterior piping insulation shall be painted with ultraviolet-resistant paint. Color as selected by architect.

E. Provide an aluminum jacket over all exterior piping.

1.3 PIPING INSULATION INSTALLATION

A. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps.

C. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.

D. Maintain integrity of vapor-barrier jackets on cold pipe insulation, and protect insulation with shields to prevent puncture or other damage. Provide high density insulation of material as specified herein and of length equivalent to pipe shield. Provide pipe hangers sized for the pipe outside diameter plus insulation thickness. Seal butt joint between insulation and high density insulation with wet coat of vapor barrier lap cement.

1. Exception for vertical piping: Provide clamps sized for the outside diameter of the vertical pipe and extend clamp through insulation. Seal penetrations of insulation and vapor barrier with wet coat of vapor barrier lap cement.

E. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

F. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

G. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

H. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

1.4 EQUIPMENT INSULATION

A. Cold equipment (below ambient temperature):

1. Insulate drip pans under chilled equipment and roof drain bodies with either 1” elastomeric flexible insulation or 2” fiberglass for surfaces above 35 deg F or 3” fiberglass for surfaces 35 deg F or lower.

B. Hot equipment (above ambient temperature):

1. Insulate hot water storage tanks and expansion/compression tanks with 1” flexible elastomeric insulation.

C. Install equipment thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

D. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

E. Maintain integrity of vapor-barrier on equipment insulation and protect it to prevent puncture and other damage.

F. Do not apply insulation to equipment, breechings, or stacks while hot.

G. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.

H. Coat insulated surfaces with layer of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.

I. Cover insulated surfaces with all-service jacketing neatly fitted and firmly secured. Lap seams at least 2". Apply over vapor barrier where applicable.

J. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

K. Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.

L. Equipment Exposed to Weather: Protect outdoor insulation from weather by installation of weather-barrier mastic protective finish, or jacketing, as recommended by the manufacturer.

1.5 INSULATION APPLICATION SCHEDULE

A.	Domestic Cold Water (Up to 1.25”)	Elastomeric	0.5” Thickness
B.	Domestic Cold Water (Above 1.25”)	Elastomeric	1” Thickness
C.	Domestic Hot Water (Up to 1.25”)	Elastomeric	1” Thickness
D.	Domestic Hot Water (Above 1.25”)	Elastomeric	1.5” Thickness
E.	Domestic Hot Water Recirculation	Elastomeric	1” Thickness
F.	Vent Piping (Within 6’ of roof outlet)	Elastomeric	0.5” Thickness
G.	Roof Drain Piping	Elastomeric	0.5” Thickness
H.	Condensate Drain	Elastomeric	0.5” Thickness
I.	P-Traps Receiving Condensate Drainage	Elastomeric	0.5” Thickness
J.	Above grade Irrigation Piping	Elastomeric	0.5” Thickness

PART 2 - PRODUCTS

2.1 ELASTOMERIC INSULATION

A. Flexible Elastomeric insulation shall be closed-cell, sponge or expanded-rubber materials and comply with ASTM C 534, type I for tubular materials and type II for sheet products. Maximum insulation conductive value shall be 0.22

BTU-in/(h-sqft-°F). Insulation values shall comply with energy code minimum requirements. See common work results for current code edition.

2.2 FIBERGLASS INSULATION

A. Fiberglass insulation shall be mineral-fiber blanket insulation with mineral or fiber glass fibers bonded with a thermosetting resin and comply with ASTM C 553, type V, without factory applied jacket. Equip fiberglass piping with white jacket. Insulation values shall comply with energy code minimum requirements. See common work results for current code edition.

2.3 ADHESIVES AND TAPES

A. Insulating cements and adhesives shall be compatible with the insulation materials, jackets and substrates for bonding insulation to itself and to surfaces to be insulated.

B. Mastics shall be compatible with insulation materials, jackets, and substrates and shall comply with MIL-A-24179A Type II. Vapor-barrier mastic shall be water based suitable for indoor and outdoor use on below ambient services.

C. Tapes shall be white, vapor-retarder tape matching factory-applied jacket with acrylic adhesive and shall comply with ASTM C 1136.

D. All insulation finishes shall be compatible with the insulation product being finished and shall be in a color as selected by architect.

221100 – FACILITY PIPING AND SPECIALTIES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing, slope, expansion, and other design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and all branch connections.

C. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

D. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

E. Seal pipe penetrations through exterior walls using sleeves and sealer.

F. Seal pipe penetrations through underground exterior walls using sleeves and mechanical sleeve sealers.

G. Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire rated integrity.

H. Provide sleeves and seal pipes that pass through waterproof floors, non-fire rated walls, partitions and ceilings or concrete slab on grade.

I. Where pipes pass through foundation walls above strip footings or under strip footings, protect pipes from building load with cast iron soil pipe sleeves two pipe sizes larger than the pipe. Sleeves installed under the strip footing shall be encased in concrete.

J. Piping exposed to interior dry environment shall have a minimum of (1) primer and (1) finish coat of paint. Piping installed in exterior locations shall have a minimum of (1) primer and (2) finish coats of paint with total thickness of at least 5 mils. Finish coat colors in finish areas shall be as selected by architect.

1.2 CONNECTION TO UTILITY MAINS

A. Tap utility mains according to requirements of the local utility companies and of size and in location indicated.

1.3 WATER SERVICE ENTRANCE

A. Extend water distribution piping to connect to water service piping, of size and location indicated on plans.

B. Underground exterior water distribution piping to be a depth as required by local conditions, in accordance with authority having jurisdiction's requirements and at depth not less than 18" below grade.

C. Backflow prevention requirements shall be verified by contractor with local water utility.

D. Sleeve and caulk at penetrations through building floor for watertight installation.

E. Install shutoff valve at service entrance inside building; complete with strainer, pressure gauge, and test tee with valve.

1.4 ROUGH-IN FOR WATER METER

A. Install rough-in piping and specialties for water meter installation in accordance with utility company's instructions and requirements.

1.5 FIELD QUALITY CONTROL

A. Inspect Water Distribution Piping as follows:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the authority having jurisdiction.

2. During the progress of the installation, notify the plumbing official having jurisdiction at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.

a. Arrange for inspection of the piping system before concealed or closed in after system is roughed in and prior to setting fixtures.

b. Arrange for a final inspection by the plumbing official to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.

c. Whenever the plumbing official finds that the piping system will not pass the test or inspection, make the required corrections and arrange for re-inspection by the plumbing official.

d. Prepare inspection reports signed by the plumbing official and turn over to the Architect upon completion of the project.

B. Perform one of the following tests on all piping:

1. Air Test:

a. Test piping system with compressed air.

b. Minimum pressure values shall meet or exceed values listed in piping materials schedule.

c. Pressure readings shall be performed with gauges compliant with testing requirements of the International Plumbing Code.

d. After test pressure has been applied for at least specified time minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat test until there are no leaks.

2. Hydrostatic Test:

a. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.

b. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

c. Isolate expansion tanks and determine that hydronic system is full of water.

d. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

e. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

3. Procedures required by authority having jurisdiction that exceed requirements of tests listed above shall be performed by contractor to obtain system acceptance.

C. Inspect Waste & Vent Piping as follows:

1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.

2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.

a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.

b. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.

c. Reinspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspected by the plumbing official.

3. Piping System Test, Test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:

a. Test for leaks and defects all new drainage and vent piping systems and parts of existing systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.

b. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.

c. Rough Plumbing Test Procedure: Except for outside leaders and perforated or open jointed drain tile, test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.

d. Final Plumbing Test Procedure: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight. Plug the stack openings on the roof and building drain where it leaves the building, and introduce air into the system equal to a pressure of 1" water column. Use a "U" tube or manometer inserted in the trap of a water closet to measure this pressure. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.

e. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.

1.6 WATER PIPING AND SPECIALTIES INSTALLATION

A. Provide piping material for use as listed in piping materials schedule shown on plans.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

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 above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Select system components with pressure rating equal to or greater than system operating pressure.

G. Install groups of pipes parallel to each other spaced to permit application of insulation and servicing of valves.

H. Install drains, consisting of a tee fitting, NPS 0.75” ball valve and short NPS 0.75” threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

I. Install piping at uniform grade of 0.2 percent upward in direction of flow.

J. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

K. Install branch connections to mains using mechanically formed tee fittings in main pipe with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

L. Install unions in piping 2” and smaller, adjacent to valves, at final connections of equipment and at other locations noted on plans.

M. Install flanges in piping 2.5” and larger at final connections of equipment and elsewhere as indicated

N. Install strainers on inlet side of each control valve, pressure reducing valve, solenoid valve, in-line pump and at other locations noted on plans. Install 0.75” nipple and ball valve in blowdown connection of strainers 2” and larger. Match size of strainer blowoff connection for strainers smaller than 2”.

O. Identify piping as specified in Division 22.

P. Do not interrupt service to facilities occupied by owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to the following:

1. Notify Architect no fewer than two days in advance of proposed interruption of service.

2. Do not proceed with interruption of water-distribution service without Architects and owners written permission.

Q. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with Authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application. Do not install bypass piping around backflow preventers unless directed by local jurisdiction.

R. Connection to Utility Mains

1. Tap utility mains according to requirements of the local utility companies and of size and in location indicated.

1.7 WASTE & VENT PIPING AND SPECIALTIES INSTALLATION

A. Provide piping material for use as listed in piping materials schedule shown on plans.

B. Install piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

C. Install horizontal piping as high as possible allowing for proper slope and coordination with other components. Install vertical piping tight to columns or walls. Provide space to permit insulation applications where required, with 1-inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

D. Make changes in direction for drainage and vent piping using appropriate 45 degree wyes, combination wye and eighth bend, or long sweep, quarter, sixth, eighth, or sixteenth bends. Sanitary tees or quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn pattern combination wye and eighth bends where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes and fittings are connected, use proper sized standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.

E. Install underground building drains to conform with the plumbing code, and in accordance with the Cast Iron Soil Pipe Institute Engineering Manual. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

F. Install drainage piping pitched down at a minimum slope of 1/8 inch per foot unless otherwise required by International Plumbing Code. Install vent piping pitched to drain back by gravity to the sanitary drainage piping system.

G. Install backwater valves in sanitary building drain piping as indicated, and as required by the plumbing code. For interior installation, provide cleanout cover flush to floor centered over backwater valve cover and of adequate size to remove valve cover for service.

H. Install expansion joints on stacks or horizontal piping as indicated, and as required by the plumbing code.

I. Install above ground cleanouts in above ground piping and building drain piping as indicated, and:

1. as required by plumbing code;
2. at each change in direction of piping greater than 45 degrees;
3. at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping;
4. at base of each vertical soil and waste stack.

J. Install floor and wall cleanout covers for concealed piping, types as indicated.

K. Install floor cleanouts in below floor building drain piping at minimum intervals of 50' for piping 4" and smaller and 75' for larger piping.

L. Install exterior cleanouts as detailed on drawings.

M. Install frost-proof vent caps.

N. Installation of Floor Drains, Floor Sinks and Floor Troughs

1. Install floor drains, floor sinks and floor troughs in accordance with manufacturer's written instructions and in locations indicated.
2. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor. Set floor sinks and floor troughs flush with the level finish floor.
3. Refer to architectural documents for floor slope requirements and set floor drain elevation to match.
4. Provide P-traps for drains connected to the sanitary sewer.
5. Install floor drains, floor sinks and floor troughs in waterproof floors with waterproof membrane securely flashed with drain flashing clamp so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
6. Position drains so that they are level, accessible and easy to maintain.

O. Preparation of Foundation for Underground Sanitary Building Drains

1. Grade trench bottoms to provide a smooth, firm, and stable foundation, free from rock, throughout the length of the pipe.
2. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with clean sand or pea gravel to indicated invert elevation.
3. Pipe Beds:
   a. Cast Iron Soil Pipe: Shape bottom of trench to fit bottom of pipe for 90-degrees (bottom 1/4 of the circumference). Fill unevenness with tamped sand backfill. At each pipe joint dig bell holes to relieve the bell of the pipe of all loads, and to ensure continuous bearing of the pipe barrel on the foundation.. For piping with rock trench bottoms, provide sand pipe bed 6” underneath and around sides of pipe, including fittings.
   b. Provide backfill above top of pipe bed as required for field conditions. Refer to Division 22 Section "General Plumbing Requirements” for materials and methods for backfill.

P. Pipe Applications - Above Ground, Within Building

1. See piping materials schedule for piping and fitting materials.

Q. Pipe Applications - Below Ground, Within Building

1. See piping materials schedule for piping and fitting materials.

1.8 HANGERS AND SUPPORTS

A. Copper and Steel Pipe hangers shall be installed with the following maximum spacing and minimum rod sizes.

1. 0.75” Pipe - Max Span 5’ - Minimum Rod Size 3/8”
2. 1” Pipe - Max Span 6’ - Minimum Rod Size 3/8”

3. 1.25" Pipe - Max Span 7' - Minimum Rod Size 3/8"
4. 1.5" Pipe - Max Span 8' - Minimum Rod Size 3/8"
5. 2" Pipe - Max Span 8' - Minimum Rod Size 3/8"
6. 2.5" Pipe - Max Span 9' - Minimum Rod Size 1/2"
7. 3" Pipe - Max Span 10' - Minimum Rod Size 1/2"
8. 4" Pipe - Max Span 14' - Minimum Rod Size 5/8"
9. 5" Pipe - Max Span 16' - Minimum Rod Size 5/8"
10. 6" Pipe - Max Span 17' - Minimum Rod Size 3/4"
11. 8" Pipe - Max Span 19' - Minimum Rod Size 3/4"
12. 10" Pipe - Max Span 22' - Minimum Rod Size 7/8"
13. 12" Pipe - Max Span 23' - Minimum Rod Size 7/8"
14. 14" and larger Pipe – Max Span 25' – Minimum Rod Size 1"

B. Plastic piping hangers shall be spaced according to pipe manufacturer's written instructions for service conditions. Avoid point loading and space and install hangers with the fewest practical rigid anchor points.

C. Support vertical piping runs at roof, each floor and at 10 foot intervals between floors.

1.9 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt and debris from inside and outside of pipe and fittings before assembly.

C. Soldered joints: Apply ASTM B813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook." Using lead free solder allow complying with ASTM B 32.

D. 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.

E. 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 interior diameter. Join pipe fittings as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Do not used pipe of pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to ASW D10.12/D10.12M, using qualified processes and welding operators according to specified quality assurance requirements.

G. Flanged Joints: Select appropriate gasket material, size, type and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Plastic Piping Solvent Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following.

1. Comply with ASTM F402 for safe handling practice of cleaners, primers and solvent cements.
2. CPVC piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule 40, 80 and 120 according to ASTM D 2672. Join other-than-schedule number 40, 80 and 120 PVC pipe and socket fittings according to ASTM D 2855.
4. 4.PVC Non-pressure Piping: Join according to ASTM D 2855.

I. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions

J. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings

K. Mechanically Formed, Copper Tube Outlet Joints: Use manufacturer-recommended tool and procedure and brazed joints.

L. Pressure Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.

M. Copper Tubing: Solder joints in accordance with the procedures specified in AWS "Soldering Manual."

N. Cast-Iron Soil Pipe: Make hubless joints in accordance with the Cast-Iron Soil Pipe & Fittings Handbook, Chapter IV. Install Couplings as followings:

1. Coordinate requirement for heavy duty no-hub couplings with Owner and Architect for installation on sanitary piping 3” and larger. Coordinate with section 3 of this text and general notes.

2. Install hubless couplings complying with CISPI 310 on soil, waste and vent piping.

3. Install hubless couplings complying with CISPI 310 on and soil and waste piping 3” and smaller and all vent piping.

4. Install heavy duty hubless couplings on soil or waste stacks, soil and waste piping connections to soil or waste stacks and all soil and waste piping 5” and larger.

5. Install No-Hub fitting restraints on joints 5” and larger at:

a. Changes of direction from vertical to horizontal

b. Branches, including wyes and wye combination fittings 4” and larger

c. Horizontal changes of direction 22-1/2 degrees and greater

O. PVC DWV Pipe: Joining and installation of PVC drainage pipe and fittings shall conform to ASTM D2665.

P. ABS to PVC Transition Joints: When joining ABS to PVC components (such as an ABS building drain to PVC sewer pipe) make joints using solvent cements conforming to ASTM D3138.

Q. Cast Iron to PVC Below Grade: Join cast iron to PVC with underground shielded adapter couplings.

R. Gas Joint Construction

1. Welded Joints: Comply with the requirements in ASME Boiler and Pressure Vessel Code, Section IX.

2. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

a. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.

b. CAUTION: Remove stems, seats, and packing of valves, and accessible internal parts of piping specialties before brazing.

c. Fill the tubing and fittings during brazing with an inert gas (nitrogen or carbon dioxide) to prevent formation of scale.

d. Heat joints to proper and uniform temperature.

3. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

a. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Refer to NFPA 54, for guide for number and length of threads for field threading steel pipe.

b. Align threads at point of assembly.

c. Apply appropriate tape or thread compound to the external pipe threads.

d. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

e. Damaged Threads: Do not use pipe with threads which are corroded, or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

4. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

5. Fusion Welded: Joints shall be made by a qualified and approved operator in accordance with Title 49, CFR, Part 192.283 and be made in accordance with pipe manufacturer's recommendations.

6. Semi-rigid Corrugated Stainless Steel Tubing: Joints shall be made by a qualified and approved operator in accordance with pipe manufacturer's recommendations.

1.10 PIPE EXPANSION

A. Provide expansion joints, expansion loops, anchors and guides as required for proper control of expansion and contraction of piping. Piping from mains to equipment branches and risers shall be provided with swing, swivel joints or offsets to relieve stresses due to expansion or contraction of piping.

B. Provide pipe loops as shown on drawings or specified. Where pipe loop dimensions are not shown on plans they shall be as recommended by pipe manufacturer based on thermal expansion.

C. Expansion Joints Specified below shall comply with the following:

1. Install expansion joints of sizes matching sizes of piping in which they are installed

2. Install packed type expansion joints with packing suitable for fluid service

3. Install metal bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturer's Association, Inc."

4. Install rubber packless joints according to FSA-NMEJ-702.

5. Install grooved joint expansion joints to grooved-end steel piping.

D. Expansion loops shall comply with the following:

1. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

E. Alignment guide anchors specified below shall comply with the following:

1. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

2. Install two guides on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

3. Install anchors at locations required to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of location and stresses to connected equipment.

1.11 TRAP SEALS

A. Install trap seals in accordance with manufacturer's written instructions and in locations indicated.

B. Make watertight seal using an adhesive type caulk along bottom of trap seal, if required by the manufacturer.

C. Employ a test plug for testing and remove before normal floor drain use. Clean inside of drain tailpiece and install trap seal after testing.

D. Do not touch elastomeric plug or allow contact with primer or solvent cement.

1.12 ADJUSTING AND CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired prior to use.

2. Use the purging and disinfecting procedure proscribed by the authority having jurisdiction or, in case a method is not prescribed by that authority, the procedure described in either AWWA C651, or AWWA C652, or as described below:

a. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.

b. Fill the system or part thereof with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.

c. Drain the system or part thereof of the previous solution and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.

d. Following the allowed standing time, flush the system with clean, potable water until chlorine residual is lowered to incoming city water level.

e. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

3. Prepare disinfection reports signed by the authority having jurisdiction and turn over to the Architect upon completion of the project.

A. Fill the system. Check compression tanks to determine that they are not air bound and that the system is completely full of water.

B. Before operating the system, perform these steps:

1. Close drain valve, hydrants, and hose bibbs.

2. Open valves to full open position.

3. Remove and clean strainers.

4. Check pumps for proper direction of rotation. Correct improper wiring.

5. Lubricate pump motors and bearings.

PART 2 – PRODUCTS

2.1 PIPING

A. Copper Tube:

1. Provide hard temper copper water tubing conforming to ASTM B 88. Tubing shall be type K, L or M as listed in schedule.

2. Tubing joints shall be soldered or brazed as indicated in schedule.

B. DWV Copper Tube:

1. Type M DWV copper tubing shall conform to ASTM B 306, type DWV.

C. ACR Copper Tubing:

1. Provide hard temper nitrogenized copper refrigerant tubing conforming to ASTM B 88. Tube shall be L or K as listed in schedule.

2. Tubing shall be brazed or grooved joints manufactured to copper tube dimensions. Flaring tubing ends to accommodate alternate sized couplings is not allowed.

D. Steel Pipe:

1. Steel pipe shall conform to ASTM A53 and shall be black steel with plain ends. Type, grade and wall thickness shall be as indicated in piping materials schedule.

E. Plastic Pipe:

1. PVC Plastic pipe shall conform to ASTM D 1785. Piping shall be schedule 40 or schedule 80 as listed in schedule.

2. CPVC Plastic pipe shall conform to ASTM F 438 for schedule 40 pipe and ASTM F 439 schedule 80 pipe.

F. Polyethylene (PE) Pipe:

1. Conform to ASTM D 2239, with SIDR numbers 5.3, 7, 9 or 11.5 with PE compound number required to achieve required system working pressure.

2. U-Bend Assembly shall be factory fabricated with embossed depth stamp every 36” from U-Bend.

G. PEX Tube

1. Provide as listed in schedule with crimped joints.

H. Cast-Iron DWV: CISPI 301 and ASTM A888, no-hub pipe.

I. PVC DWV Pipe: Schedule 40 pipe meeting ASTM D1785 and ASTM D2665 with “solid wall” PVC meeting ASTM D1784 with cell class 1245-B.

J. Underground Shielded Adapter Couplings: ASTM C1173 with neoprene adapter gasket with stainless steel shield and stainless steel hose clamp.

2.2 FITTINGS

A. Provide piping fittings for use as listed in piping materials schedule shown on plans.

B. Wrought Copper Fittings:

1. Provide wrought solder joint copper tube fitting conforming to ANSI B 16.22

C. Nickel Copper Alloy Steel Welding Fittings:

1. Provide nickel copper alloy steel welding fittings conforming to ANSI B16.9 and ASTM A234.

D. Steel piping fittings:

1. Wrought Steel Fittings:

a. Provide carbon steel fittings conforming to ASTM A 234/A 2345M with wall thickness to match adjoining pipe.

2. Wrought Cast and Forged Steel Flanges:

a. Fittings shall conform to ASME B 16.5 including bolts nuts and gaskets of material group 1.1. End connections shall be butt welded and facings shall be raised face type.

3. Welded Fittings

a. Fittings shall conform to ASTM A 234, seamless or welded, for welded joints.

i. 1.25” and smaller shall be socket type

ii. 1.5” and larger shall be butt weld type

E. Cast Bronze Fittings:

1. Cast bronze fittings shall be solder joint type conforming to ANSI B 16.18.

F. Plastic piping Fittings:

1. PVC Plastic Pipe

a. Socket type fittings conforming to ASTM D 2466 for schedule 40 and ASTM D 2467 for schedule 80.

2. CPVC Plastic Pipe

    a. Socket type fittings conforming to ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.

G. Polyethylene (PE) fittings:

1. Molded PE fittings conforming to ASTM D 2683 or ASTM D 3261 made with PE resin and socket or butt fusion type made to match PE pipe dimensions and class.

H. Cast-Iron DWV Fittings: CISPI 301 and ASTM A888, no-hub fittings.

    a. Couplings and compression gaskets, NSF Certified: ASTM C564 and CISPI 310.

    b. Heavy duty couplings and compression gaskets: ASTM C1540 and meeting FM 1680.

I. PVC DWV Pipe: Schedule 40 fittings meeting ASTM D1785 and ASTM D2665.

    a. Fittings: DWV pattern meeting ASTM D2665 with solvent cement socket joints.

    b. Solvent: ASTM D2564

2.3 JOINING MATERIALS

A. Pipe flange gasket materials shall be suitable for chemical and thermal conditions of piing system contents. Provide 1/8” maximum thickness, nonmetallic, flat, asbestos free material conforming to ASME B 16.21.

B. Flange bolts and nuts shall conform to ASME B18.2.1 and shall be carbon steel unless otherwise noted.

C. Plastic pipe flange gasket bolts and nuts shall be type and material recommended by piping system manufacturer.

D. Solder filler metals shall conform to ASTM B 32 and shall be lead free alloys that include water flushable flux according to ASTM B 813.

E. Brazing filler metals shall conform to AWS A 5.8 BCuP series and shall be copper phosphorus alloys for joining copper with copper or Bag-1 silver alloy for joining copper with bronze or steel.

F. Welding filler materials shall comply with ASW 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 Pipe:

1. CPVC piping cements shall conform to ASTM F 493.

2. PVC piping solvent cements shall conform to ASTM D 2564. Include primer complying with ASTM F 656.

H. Gasket material thickness, material and type shall be suitable for fluid to be handled and working temperatures and pressures.

2.4 TRANSITION FITTINGS

A. Plastic to Metal Transition Fittings:

1. Provide one piece fitting with one threaded brass or copper insert and one Schedule 80 solvent-cement-joint end.

B. Plastic to Metal Transition Unions:

1. Provide MSS SP-107 union. Include brass or copper end, schedule 80 solvent cement joint end, rubber gasket and threaded union.

2.5 DIELECTRIC FITTINGS

A. Fittings shall be combination fitting of copper alloy and ferrous materials with threaded solder joint plain or weld neck end connections that match piping system materials.

B. Insulating material shall be suitable for system fluid, pressure and temperature

C. Dielectric unions:

1. Provide factory fabricated union assembly with pressure and temperature rating suitable for system operating range.

D. Dielectric Flanges:

1. Provide factory fabricated companion flange assembly with pressure and temperature rating suitable for system operating range.

E. Dielectric Coupling:

1. Provide galvanized steel coupling with inert and non-corrosive thermoplastic lining and threaded ends. Coupling shall have pressure and temperature rating suitable for system operating range.

F. Dielectric Nipples:

1. Provide electroplated steel nipple with inert and noncorrosive, thermoplastic lining, plain, threaded or grooved ends. Nipples shall have pressure and temperature rating suitable for system operating range.

2.6 EXPANSION TANK

A. Tank shall be welded steel rated for 125 PSI working pressure and 240 degree F maximum operating temperature. Tank shall be factory tested with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII Division I.

B. Diaphragm shall be securely sealed into tank to separate air charge from system water to maintain required expansion capacity.

C. Tank shall be equipped with Schrader valve, stainless steel air charge fitting with EPDM seats.

2.7 PACKLESS EXPANSION JOINTS

A. Metal Compensator: Expansion joints shall have 2-ply phosphor bronze bellows, brass shrouds and end fittings for copper piping systems and 2-ply stainless steel bellows, carbon steel shrouds and end fittings for steel piping systems. Expansion compensators shall have internal guides, anti-torque device and removable end clip for proper positioning.

2.8 EXPANSION LOOPS

A. Provide pipe expansion loop constructed of main pipe material. Acceptable methods include use of elbows in a U or Z shape as defined by ASHRAE or ASME; or a detailed stress analysis may be utilized to define areas of expansion.

2.9 ALIGNMENT GUIDES AND ANCHORS

A. Provide steel, factory fabricated alignment guide with bolted two-section outer cylinder and base for attaching to structure; with two section guiding spider for bolting to pipe.

B. Anchors shall be mechanically fastened with tension and shear capacities appropriate for application.

2.10 DRAINAGE WASTE AND VENT SPECIALTIES

A. Cleanouts

1. Floor Cleanouts

a. For Hard Flooring areas provide a cast iron level cleanout assembly with round, adjustable, scoriated, nickel bronze top, and no hub outlet.

b. For Carpeted Flooring areas provide a cast iron floor level cleanout assembly with round, adjustable, scoriated, nickel bronze top and carpet clamping frame, and no-hub outlet.

2. Wall Cleanouts

a. For finished areas provide cast iron cleanout tee and cast iron countersunk plug with chrome round cover and screw.

b. For unfinished areas provide cast iron cleanout tee and cast iron countersunk plug.

B. Floor Drains

1. See plumbing fixture schedule for drain type.
2. All floor drains in finished areas shall have nickel-bronze strainers except at showers where they shall be chrome-plated strainers.
3. Provide each drain that does not have an integral “P” trap with a cast iron “P” trap in connecting piping.
4. See architectural plans for floor drain top elevations and floor drainage.

C. Downspout Nozzles

1. Provide cast bronze body downspout nozzle with loose wall flange.

D. Floor Sinks

1. See plumbing fixture schedule for drain type.
2. See architectural plans for floor sink top elevations and floor drainage.

2.12 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers

1. Provide 1”-3” vacuum breaker as required to match connected piping.
2. Vacuum Breaker shall have a bronze body with threaded connections and bronze finish and be constructed to ASSE 1001 standard.

B. Hose-Connection Vacuum Breakers

1. Vacuum Breaker shall be nonremovable and have a bronze body with manual drain. It shall be threaded for connection to garden hose and be constructed to ASSE1001 standard.

2.13 THERMOSTATIC MIXING VALVES

A. Mixing valves shall be thermostatically controlled with 125psig pressure rating and be constructed to ADDE 1017 standard. It shall have a Bronze body with corrosion-resistant interior components and a rough bronze finish with threaded connections. Valve shall include manual temperature control, check stops on hot and cold water supplies, and adjustable temperature control handle.

2.14 TRAP GUARDS

A. Smooth, soft, flexible, elastomeric PVC material molded into shape of duck's bill, open on top with curl closure at bottom. The flow of wastewater allows duck’s bill to open and adequately discharge to floor drain through its interior. The duck’s bill closes and returns to original molded shape after wastewater discharge is complete. Or, smooth, soft, flexible, elastomeric PVC material with a flapper closure. The flow of wastewater allows flapper to open and adequately discharge to floor drain through its interior. The flapper closes and returns to original molded shape after wastewater discharge is complete.

2.15 STRAINERS

A. Y-Pattern Strainers

1. Strainers shall have a minimum pressure rating of 125psig (unless otherwise indicated).
2. 2” and smaller strainers shall have a Bronze body, a stainless steel screen with round perforations, threaded end connections and a drain.
3. 2.5” and larger strainers shall have a Cast Iron body with epoxy coated FDA approved liner, a stainless steel screen with round perforations, flanged end connections and a drain.

2.16 HOSE BIBBS

A. Hose Bibbs shall have a bronze body, replaceable Bronze seat, threaded or soldier-joint inlet, garden hose thread outlet, 125psig pressure rating, integral vacuum breaker and rough bronze finish with keyed operation unless otherwise noted on drawings. Each hose bibb shall be provided with its own operating key.

B. *Recessed* hose bibbs shall be provided as described above and installed in a chrome plated recessed box with operating key.

2.17 WALL HYDRANTS

A. Freeze-proof Wall Hydrants: Wall Hydrants shall have a 125psig operating pressure rating and be designed to ASME A112.21.3M standard for exposed outlet, self-draining operation. Hydrants shall be provided with casing and operating rod of length to match wall thickness and include wall clamp. Hydrants shall have a concealed outlet with integral vacuum breaker and garden hose threads and they shall be installed in a deep, flush mounting box with cover. Cover and hydrant shall have polished nickel bronze finish.

2.18 SHOCK ABSORBER

A. Arresters shall be copper tube with piston and designed to ASSE 1010 or PDI-WH 201 standards. Sizes shall be determined by application.

2.19 FIRE HYDRANTS

A. Fire Hydrants: Fire Hydrants shall be subject to compliance with standard requirements, provide a product meeting the requirements of the local jurisdiction having authority and local Fire Department.

2.20 FIRE DEPARTMENT CONNECTIONS

1. Connections shall have cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high brass sleeve; and round escutcheon plate. Coordinate all requirements with local fire department.

2.21 VALVE BOXES

A. Water Meter Boxes

1. Boxes shall have cast-iron body and cover for water meter, with lettering in cover as required by local authority; and with slotted, open-bottom base section of length to fit over service piping. Base section may be cast-iron, PVC, clay, or other pipe.

A. Concrete Vaults

1. Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.

a. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.

b. Manhole: Traffic rated, iron cover with 24” diameter unless otherwise indicated.

2. Vault shall be equipped with means to drain water as noted on plans. When not indicated on plans, contractor shall provide outlet and drainage path as required for drainage of vault.

B. Protective Vaults

1. Freeze-Protection Enclosures:

a. Insulated enclosure designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of 40 deg F when external temperatures reach as low as minus 34 deg F.

b. Standard: ASSE 1060.

c. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.

d. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

i. Housing: Reinforced aluminum or fiberglass construction.

ii. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.

iii. Drain opening for units with drain connection.

iv. Access doors with locking devices.

v. Insulation inside housing.

vi. Anchoring devices for attaching housing to concrete base.

vii. Electric heating cable or heater with self-limiting temperature control as shown on drawings.

2. Weather-Resistant Enclosures:

a. Uninsulated enclosure designed to protect aboveground water piping, equipment, or specialties from weather and damage.

b. Standard: ASSE 1060.

c. Class III: For equipment or devices other than pressure or atmospheric vacuum breakers.

d. Class III-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

i. Housing: Reinforced aluminum or fiberglass construction.

ii. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.

iii. Drain opening for units with drain connection.

iv. Access doors with locking devices.

v. Anchoring devices for attaching housing to concrete base.

3. Enclosure Bases:

a. 4-inch- or 6-inch minimum thickness precast concrete, of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping.

221123 – PUMPS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 DELIVERY, STORAGE AND HANDLING

A. Store pumps in a dry location.

B. Retain protective covers for flanges and protective coatings during storage.

C. Protect bearings and couplings against damage from sand grit and other foreign matter.

D. Comply with pump manufacturer's written rigging instructions.

1.2 INSTALLATION REQUIREMENTS

A. Pumps shall be installed to allow access for maintenance including removal of motors, impellers, couplings and accessories.

B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

C. Suspend in-line pumps independent of piping. Install continuous thread hanger rods and elastomeric hangers of sufficient size to support pump weight. Fabricate brackets or supports as required.

D. Associated valves shall be the same size as piping connected to pumps.

E. Install suction and discharge pips sizes equal to or greater than diameter of pump nozzles.

1.3 BOOSTER PUMP INSTALLATION REQUIREMENTS

A. Install packaged booster pump level on concrete bases with access for periodic maintenance including removal of pumps, motors, impellers, couplings and accessories.

B. Install packaged pumps on spring vibration isolators.

C. Support connected domestic water piping so weight of piping is not supported by packaged booster pumps.

D. Engage a factory authorized service representative to perform pump startup service.

PART 2 – PRODUCTS

2.1 IN-LINE CIRCULATION PUMPS

A. Provide pump as shown in pump schedule. Pump shall be designed for horizontal, maintenance free operation suitable for water temperature of system served. Pump shall have ceramic shaft supported by carbon bearings. Bearings shall be lubricated by circulating fluid. Pump body shall be lead free bronze or stainless steel body. Where check valve is specified or detailed on plans, contractor shall have option of providing field installed check valve or optional check valve furnished with pump. Pump motor shall be non-overloading type.

223300 – ELECTRIC DOMESTIC WATER HEATERS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Provide concrete bases/housekeeping pads as shown on drawings sized for commercial water heaters.

1.2 QUALITY ASSURANCE

A. Electrical components shall be listed and labeled as defined in NFPA 70, article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

B. ASHRAE compliance: applicable requirements in ASHRAE/IESNA 90.1

C. Listing and Labeling: Provide water heaters that are listed and labeled.

1. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

D. Provide water heaters and safety relief valves that comply with ASME Boiler and Pressure Vessel Code and that bear the appropriate code symbols.

E. Provide rated water heaters, safety relief valve, gas train and accessories that comply with the state boiler code in effect.

F. The drawings indicate types and capacities of water heaters and are based on specific descriptions and manufacturers indicated. Water heaters having equal performance characteristics by other manufacturers may be considered provided that deviations in capacities, dimensions, operation, or other characteristics are minor and do not change the design concept or intended performance as judged by the Architect. Burden of proof for equality of water heaters is on the proposer.

G. Perform the following field tests and inspections:

1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.

2. Operational test: After electrical circuitry has been energized, confirm proper operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

H. Remove and replace water heaters that do not pass tests and inspections and retest as specified above

1.3 WATER HEATER INSTALLATION

A. Install water heaters on concrete equipment bases. Set and connect units in accordance with manufacturer's written installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer’s recommended clearances. Orient so controls and devices needing servicing are accessible.

B. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial, water-heater, relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

C. Install thermometers on water heater outlet piping.

1.4 EXPANSION TANK INSTALLATION

A. Support expansion tank from structure. Do not hang expansion tank from piping.

B. Charge expansion tank bladder with air to a pressure equal to the domestic water static pressure.

1.5 CONNECTIONS

A. Piping installation requirements are specified in other Sections of Division 22. The Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping adjacent to equipment arranged to allow servicing and maintenance.

2. Connect hot and cold water piping to units with shutoff valves and unions. Connect hot water circulating piping to unit with shutoff valve, check valve, and union. Extend relief valve discharge to closest floor drain.

    a. Where water heater piping connections are dissimilar metals, make connections with dielectric fittings or dielectric unions.

    b. Install vacuum relief valve in cold water inlet piping.

    c. Install drain as indirect waste to spill into open drain or over floor drain.

    d. Install drain valve at low point in water piping, for water heaters not having tank drain.

3. Connect oil piping to oil burner with shutoff valve and union in supply, and check valve and union in return. Arrange piping to allow unit servicing.

B. Electrical Connections:

1. Power wiring is specified in Division 26

2. Field-installed disconnects are specified in Division 26

3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

PART 2 PRODUCTS

2.1 COMMERCIAL STORAGE ELECTRIC WATER HEATERS

A. Electric, screw-in or bolt-on immersion type heating elements.

B. Glass-lined steel tank, with anode rods and drain valve.

C. Adjustable surface mounted thermostat.

D. Temperature and Pressure Relief Valve: ASME rated and labeled.

E. Vacuum Relief Valve: ANSI Z21.22.

F. Where required by building management system provide normally closed dry contacts for enabling and disabling water heater with front end building automation system

G. Provide water heater accessories as required to execute design shown on drawings:

1. Water heater stands

2. Water heater mounting brackets

3. Drain Pans

2.2 ELECTRIC TANKLESS WATER HEATER

A. See water heater schedule for unit capacities and accessories. Heater and body element shall be glass reinforced. Element shall be replaceable. Unit shall be equipped with replaceable filter in the inlet connector. Heating element shall be iron free nickel chrome plated.

2.3 THERMAL EXPANSION TANKS

A. Provide size and number as indicated; construct of welded carbon steel ASME labeled for 150 psig working pressure, 375 deg F maximum operating temperature. Separate air charge from system water to maintain design expansion capacity, by means of a FDA approved butyl rubber diaphragm securely sealed into tank. Provide taps for pressure gauge and air charging fitting, and drain fitting. Support vertical tanks with steel legs or base. Tank, with taps and supports, shall be constructed, tested, and labeled in accordance with ASME Pressure Vessel Code, Section VIII, Division 1.

224000 – PLUMBING FIXTURES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Provide plumbing fixtures and trim, fittings, other components, and supports as specified on the drawings and below.

B. Install supports for plumbing fixtures in accordance with categories indicated, and of type required:

1. Carriers for following fixtures:

a. Wall-hanging water closets.

b. Wall hanging lavatories

c. Wall hanging electric water coolers and drinking fountains.

d. Wall-hanging fixtures supported from wall construction.

2. Chair carriers for the following fixtures:

a. Wall-hanging urinals.

b. Wall-hanging lavatories and sinks.

c. Wall-hanging drinking fountains and electric water coolers.

3. Heavy-duty chair carriers for the following fixtures:

a. Fixtures where specified.

4. Reinforcement for the following fixtures:

a. Floor-mounted lavatories required to be secured to wall.

b. Floor-mounted sinks required to be secured to wall.

c. Recessed, box-mounted electric water coolers.

d. Wall mounted and mop sink faucets.

e. Urinal flush valve solid pipe ring supports.

1.2 SPARE PARTS

A. Deliver spare parts to Owner. Furnish spare parts described below matching products installed, packaged with protective covering for storage, and identified with labels clearly describing contents.

B. Faucet Washers, Cartridges and O-rings: Furnish quantity of identical units not less than 5 percent of amount of each installed with a minimum of 1

C. Flushometer Repair Kits: Furnish quantity of identical units not less than 10 percent of amount of each flushometer installed with a minimum of 1

D. Provide individual metal boxes or a hinged-top wood or metal box having separate compartments for each type and size of above extra materials.

E. Water Closet Tank Repair Kits: Furnish quantity of identical flush valve units not less than 5 percent of amount of each type installed with a minimum of 1.

I. Waterless Urinal Sealant & Cartridges: Furnish quantity of sealant and manufacturer approved cleaner per waterless urinal not less than amount for one year of operation per the manufacturer's recommended maintenance schedule. For cartridge type waterless urinals, furnish quantity of cartridges per waterless urinal not less than the amount for one year of operation per manufacturer's recommended maintenance schedule.

1.3 QUALITY ASSURANCE

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

C. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings and controls.

D. Operate and adjust disposers, hot water dispensers, and controls. Replace damaged and malfunctioning units and controls.

E. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves and flush valves having controls, to provide proper flow and stream.

F. Adjust all flush valve diaphragms as required to ensure single closing action is achieved without inducing any vibration or water hammer in supply piping system.

G. Replace washers of leaking and dripping faucets and stops.

H. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.

I. Adjust faucet wrist blade handles perpendicular to the spout while in the closed position.

J. Set the shower valve temperature limit stop to 110deg F. Perform work after the shower head is installed and the domestic water heater is in operation. Allow the hot water to run for 5 minutes minimum or until temperature reaches equilibrium. Allow cold to run for 5 minutes minimum or until temperature reaches equilibrium.

1.4 INSTALLATION OF PLUMBING FIXTURES

A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturers' written installation instructions, roughing-in drawings, and referenced standards.

B. Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals.

C. Install floor-mounted, back-outlet water closets with fittings and gasket seals.

D. Install wall-hanging, back-outlet water closets with support manufacturer's tiling frame or setting gauge.

E. Install wall-hanging, back-outlet urinals with gasket seals.

F. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.

G. Fasten floor-mounted fixtures and special fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.

H. Fasten wall-mounted fittings to reinforcement built into walls.

I. Fasten counter-mounting-type plumbing fixtures to casework.

J. Secure supplies behind wall or within wall pipe space, providing rigid installation.

K. Install stop valve in an accessible location in each water supply to each fixture.

L. Install trap on fixture outlet except for fixtures having integral trap.

M. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons where required to conceal protruding pipe fittings.

N. Seal fixtures to walls, floors, and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant in accordance with sealing requirements specified in joint sealant specification section. Match sealant color to fixture color.

O. Install insulation kits on ADA compliant sink and lavatory waste, continuous wastes, hot and cold water supplies where indicated on the drawings and as required by the ADA.

P. Shower Heads: Shower head and hand showers shall be installed so that water discharges parallel to shower door/curtain unless otherwise noted. Coordinate locations with architectural plans. Contractor shall notify A/E in the event of a conflict between architectural details and door opening.

1.4 CONNECTIONS

P. Piping installation requirements are specified in other sections of Division 22. The Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other sections of Division 22.

2. Install piping connections indicated between appliances and equipment specified in other, direct connected to plumbing piping systems.

PART 2 – PRODUCTS

2.1 PLUMBING FIXTURES

A. See Plumbing Fixture Schedule on plans for all product requirements.

2.2 PLUMBING FIXTURE SUPPORTS

A. ASME A112.6.1M, categories and types as required for wall-hanging fixtures specified, and wall reinforcement.

B. Support categories are:

1. Carriers: Supports for wall-hanging water closets and fixtures supported from wall construction. Water closet carriers shall have an additional faceplate and coupling when used for wide pipe spaces. Provide tiling frame or setting gauge with carriers for wall-hanging water closets.

2. Chair Carriers: Supports with steel pipe uprights for wall-hanging fixtures. Urinal chair carriers shall have bearing plates.

3. Chair Carriers, Heavy Duty: Supports with rectangular steel uprights for wall-hanging fixtures.

4. Reinforcement: 2-inch by 4-inch wood blocking between studs or 1/4-inch by 6-inch steel plates attached to studs, in wall construction, to secure floor-mounted and special fixtures to wall.

C. Support Types: Provide support of category specified, of type having features required to match fixture.

D. Provide supports specified as part of fixture description, in lieu of category and type requirements above.

2.3 INSULATION KITS

A. Insulation kits for lavatory and sink waste and supplies of vinyl plastic with reusable fasteners and openings for access to supply stop handles.

230500 – COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS

A. 2018 International Mechanical Code

B. 2018 International Building Code

C. 2018 International Plumbing Code

D. ADA – American Disabilities Act

E. ANSI – American National Standards Institute

F. ASHRAE – American Society of Heating Refrigerating and Air Conditioning Engineers

G. ASTM – American Society of Testing Materials

H. NFPA – National Fire Protection Association

I. NEMA – National Electrical Manufactures Association

J. OSHA – Occupational Safety and Health Act

K. UL – Underwriter's Laboratories

L. SMACNA – Sheet Metal Air Conditioning National Association

M. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

I. Contractor shall provide heat trace cable for all condensate drains located in attics, through exterior walls or any other areas subject to freezing temperatures.

J. Contractor shall provide heat trace cable for all piping installed in areas subject to freezing temperatures.

K. All pipe sizes indicated in this specification are nominal pipe sizes (NPS).

1.3 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 23 are listed on “Schedule of Manufacturers” on plans.

1.4 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 23 shall include the following items.

1. Product data showing type, model and construction characteristics of product

2. Layout drawings for any systems requiring interconnection of various system components

3. All other documentation required to show compliance with the specifications.

B. The contractor shall provide a schedule of submittals indicating dates on which each submittal will be provided to design team for review. Schedule shall be submitted 10 working days in advance of delivery of first submittal for review.

C. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.5 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

1.6 INSTALLATION

A. All equipment in division 23 shall be installed according to manufacturer’s requirements and minimum code requirements. If an any case the plans or specifications are in conflict with either manufacturer’s requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

B. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

C. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

D. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements. Contractor shall coordinate scope of work with fire sprinkler system installation where applicable to ensure no sprinkler piping is installed in a fashion that will limit installation height of ductwork.

E. Install all equipment to facilitate service, maintenance and repair or replacement of components of both mechanical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

1.7 EXECUTION REQUIREMENTS

A. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

1.8 TEMPORARY FACILITIES

A. Contractor shall provide temporary facilities as required for construction of the project. Temporary facilities shall include temporary water service and distribution, electrical power and lighting service, heating cooling and ventilation, telephone and data service, and sanitary facilities including drinking water.

B. Permanent HVAC equipment shall not be used to heat, cool or ventilate the facility during construction.

C. Whether during a renovation or a phased construction project, the contractor shall include all temporary facilities to maintain functionality and suitable space conditions in all areas of a building that are occupied by the owner while construction activities are underway.

D. The contractor shall provide temporary facilities as required to maintain a safe working environment and to protect all building materials and provide space conditions within range required for material installation.

E. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

F. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 – PRODUCTS

2.1 HOUSEKEEPING PADS

A. All equipment shall be installed on concrete housekeeping pads. Pad shall extend beyond equipment perimeter 4” and shall elevate equipment off of finish floor 4”.

B. Contractor shall have option to provide prefabricated housekeeping pad or pour pad in place.

2.2 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor’s option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.
2. Schedule 40 Steel Pipe.
3. DUCTED RETURN ONLY – Schedule 40 PVC pipe.

2.3 DIELECTRIC FITTINGS

A. Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for minimum working pressure as required to suit system pressures.

D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225 deg F.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300 psig minimum working pressure at 225 deg F.

2.4 GROUT

A. ASTM C 1107, grade B, nonshrink and nonmetallic, dry hydraulic-cement grout

B. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

C. Design Mix: 5000 psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

230529 – HANGERS, SUPPORTS AND VIBRATION ISOLATION FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic restraint hangers and supports for piping and equipment. Obtain approval from authorities having jurisdiction where required by local requirements.

1.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers, supports, clamps and attachments to support piping properly from building structure. Do not attached to ceilings, equipment, ductwork, conduit or other non-structural elements such as floor or roof decking.

B. Hangers, supports, clamps and attachments shall comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacing specified within Division 23 piping sections. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

C. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length specified in Division 23 piping sections. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping as specified in Division 23 piping sections. Install concrete inserts before concrete is placed; fasten insert to forms. Where concrete with compressive strength less than 2,500 psi is indicated, install reinforcing bars through openings at top of inserts.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Provide two nuts on threaded supports to securely fasten the support.

E. Field fabricated heavy duty steel trapeze supports shall be fabricated from steel shapes selected for loads required. Weld steel in accordance with AWS D-1.1.

F. Install appropriate types of hangers and supports to allow control movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

G. Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

H. Install hangers to provide indicated pipe slopes and so that maximum deflection of piping allowed by ASME B31.9 is not exceeded.

I. Insulated piping:

1. Riser Clamps: Attach riser clamps, including spacers, to piping with riser clamps projecting through insulation. Do not exceed pipe stresses allowed by ASME B31.9. Do not use riser clamps to support horizontal, insulated piping. Seal insulation for hot piping and protect vapor barrier for cold piping as specified in Division 23 “HVAC Insulation”.

2. Insulation protection shield: Install insulation protection shield and high density insulation, sized for the insulation thickness used as specified in insulation schedule. Install a minimum 8” long section at each support point, top and bottom halves or the pipe of same thickness of insulation used.

J. Pre-engineered Support Strut Systems: Channel strut systems can be used at the Contractors option in lieu of individual hangers for horizontal pipes. Space channel strut systems at the required distance for the smallest pipe supported. Provide channel gauge and hanger rods per the manufacturer’s recommendations for the piping supported. Where strut systems are attached to walls, install anchor bolts per manufacturer’s recommendations.

1. Uninsulated copper pipe: Install with plastic galvanic isolators.

2. Insulated Tube or Pipe: Install with 360 degree insulation protection shields or pre-engineered thermal hanger shield inserts.

1.3 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B 31.9 and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ASME B 31.9 and with AWS Standards D1.1.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to control movement to compensators.

D. Anchor spacing: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

1.4 INSTALLATION OF PIPE ALIGNMENT GUIDES

A. Install pipe alignment guides on piping that adjoins expansion joints as required by expansion joint manufacturer and elsewhere as indicated on plans and specification sections to eliminate binding and torsional stress on piping systems. Where not otherwise indicated, install guides as required by ASME B 31.9. Anchor guides to building substrate.

1.5 EQUIPMENT SUPPORTS

A. Fabricate structural steel supports to suspend equipment from structure above or support equipment from floor. Place grout under supports for piping and equipment.

1.6 INSTALLATION OF VIBRATION ISOLATORS

A. Mount mechanical equipment on vibration isolators as specified. Isolator manufacturer shall supply all unit isolators, complete rails, fan and motor bases as required, except for isolation system supplied for equipment by equipment manufacturer

B. Wherever rotational speed is the disturbing frequency (i.e. fans and pump impellers) the lowest such speed in the system shall be used. Isolation devices shall be selected for uniform deflections accounting for distribution of equipment weight.

C. Piping runs connected to equipment requiring vibration isolation shall be isolated from building structure at connection to equipment using isolators inserted in supporting piping rods.

D. Contractor shall have option to use isolation equipment custom designed by equipment manufacturer provided that the proposed equipment meets or exceeds all standards outlines in this specification.

1.7 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Clean all welds and touch up paint to match factory finish of all materials or color and finish of adjacent materials when supports and adjacent elements are painted.

C. Adjust vibration isolators after piping system is at operating weight.

D. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

E. Adjust active height of spring isolators and adjust restraints to permit free movement of equipment within normal mode of operation.

PART 2 – PRODUCTS

2.1 STEEL PIPE HANGERS AND SUPPORTS

A. Comply with MSS SP-58 types 1-58 factory fabricated components. Hangers shall be pre-galvanized or hot dipped. Where non-metallic coatings area indicated provide plastic coating, jacket or liner.

B. Where hangers are installed in a corrosive environment or outdoors, hangers and supports shall be type 304 stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Trapeze hangers shall comply with MSS SP-69 and shall be type 59 shop or field fabricated pipe support assembly made from structural steel shapes with MSS SP-58 hanger rods, nuts, saddles and U-bolts.

2.3 THERMAL HANGER SHIELD INSERTS

A. Inserts shall have 100 PSI minimum compressive strength and shall be encased in sheet metal shield.

B. For trapeze and clamped systems, insert and shield shall cover entire circumference of pipe.

C. For clevis hangers, insert and shield shall cover lower 180 degrees of pipe.

D. Insert length shall extend 2” beyond sheet metal shield for piping operating below ambient air temperature.

2.4 EQUIPMENT SUPPORTS

A. Provide welded, shop or field fabricated equipment supports made from structural steel shapes.

2.5 ROOF EQUIPMENT RAILS

A. Rooftop equipment rails shall be constructed with 18 gauge galvanized steel unitized construction with an integral base plate, continuous welded corner seams, pressure treated wood nailer, counterflashing and screws. Rails shall be internally reinforced as required to support equipment loading. Rails shall be furnished with height as required to support equipment a minimum of 8” above top of finished roof elevation.

2.6 PIPE STANDS

A. Pipe stands shall be shop or field fabricated assemblies made of manufactured corrosion resistant components to support roof mounted piping. Provide one piece plastic unit with integral rod roller, pipe clamps or V-Shaped cradle to support pipe. Pipe stand shall be suitable for roof installation without membrane protection.

2.7 VIBRATION ISOLATORS

A. Pads: Pads shall be arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized steel baseplates and factory cut to sizes that match requirements of supported equipment.

B. Mounts: Mounts shall be double deflection type with molded oil resistant rubber, hermetically sealed compressed fiberglass or neoprene isolator elements with factory drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Identify capacity range by color coding or other means.

C. Free Standing Spring Isolators: Free standing spring isolators shall be laterally stable, open spring isolators. Outside diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Minimum additional travel shall be 50 percent of the required deflection at rated load. Isolators shall be capable of supporting 200 percent of the rated load, fully compressed without deformation or failure. Provide factory drilled baseplates and top plates for bolting to equipment and structure.

D. Housed Spring Mounts: Housed spring isolators shall be equipped with ductile iron or steel housing. Mounts shall be equipped with vertically adjustable snubbers allowing 1/4” travel up or down before contacting a resilient collar. Base and top shall have factory drilled holes for bolting to equipment and structure.

E. Elastomeric Hangers: Elastomeric Hangers shall be single or double deflection type fitted with molded, oil resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Identify capacity range by color coding or other means.

F. Spring Hangers: Spring hangers shall be combination coil-spring and elastomeric insert hanger with spring and insert in compression. Frame shall be steel and shall be fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency. Outside spring diameter shall be not less than 80 percent of the compressed height of the spring at

rated load. Hanger shall be capable of supporting 200 percent of the rated load, fully compressed, without deformation or failure and shall be equipped with self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

G. Steel Equipment Base: Equipment Base isolators shall be constructed of factory fabricated welded structural steel. Bases shall have shape to accommodate supported equipment. Support brackets shall be factory welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support. Bases shall use steel shapes, plates, and bars complying with ASTM A 32/A 36M.

230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 VALVE IDENTIFICATION

A. Provide valve tag on every valve, cock and control devices in each piping system. Exclude check valves, valves within factory fabricated equipment units, HVAC terminal devices and similar rough-in connections of end-use fixtures and units.

B. List each tagged valve in valve schedule for each piping system. And provide valve schedule to owner in operations and maintenance manuals.

1.2 MECHANICAL EQUIPMENT IDENTIFICATION

A. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
2. Meters, gauges, thermometers and similar units.
3. Fuel burning units including boilers, furnaces, heaters, stills and absorbtion units.
4. Pumps, compressors, chillers, condensers and similar motor driven units.
5. Heat exchangers, coils, evaporators, cooling towers, heat recovery units and similar equipment.
6. Fans, blowers, primary balancing dampers mixing boxes and air terminal units.
7. Packaged HVAC units.
8. Duct heaters and terminal heating and cooling units.
9. Tanks and pressure vessels.
10. Strainers, filters, humidifiers, water treatment systems and similar equipment.

B. Where lettering larger than 1” height is needed for proper identification because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved sign at contractor’s option.

C. Lettering shall be minimum 1/4” high where viewing distance is less than 2’-0”; 1/2” high for distances up to 6’-0” and proportionately larger for greater distances. Secondary lettering shall be 2/3 to 3/4 of size of the principal lettering.

1.3 PIPING IDENTIFICATION

A. Install pipe markers on each piping system and include arrows to show normal direction of flow.

B. Install pipe markers where piping is exposed to view, concealed by only a removable ceiling system, installed in machine rooms, installed in accessible maintenance spaces and exterior non-concealed locations.

1. Within 5 feet of each valve and control device.
2. Within 5 feet of each branch, excluding take-offs less than 25 feet in length for fixtures or terminal heating and cooling units; mark flow direction of each pipe at branch connection.
3. Within 5 feet where pipes pass through walls, floors or ceilings or enter non-accessible enclosures. Provide identification on each side of wall, floor or ceiling.
4. At access doors, manholes and similar access points which permit view of concealed piping.
5. Within 5 feet of major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing or 50’ along each piping run. Spacing shall be reduced to 25’ in congested areas of piping and equipment where there are more than two piping systems or pieces of equipment.

PART 2 – PRODUCTS

2.1 ENGRAVED LAMINATE SIGN

A. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thickness indicated, engraved with the engravers standard letter style of the sizes and wording indicated. Signs shall be black with white core except as otherwise noted and shall be punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

B. Thickness shall be 1/16” for units up to 20 square inches or 8” in length and 1/8” for larger units.

C. Signs shall be fastened with self-tapping stainless steel screws, except contact type permanent adhesive where screws cannot or should not penetrate the substrate.

2.2 PLASTIC VALVE TAGS

A. Provide manufacturer’s standard solid plastic valve tags with printed enamel lettering with system abbreviation in approximately 3/16” high letters and sequenced valve numbers approximately 3/8” high and with 5/32” hole for fastener

B. Tags shall be 1-1/8” square white tags with black lettering.

2.3 PAINTED IDENTIFICATION

A. Painting where allowed shall be performed using standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications. Minimum letter height shall be 1.25” high for ductwork and equipment and 0.75” high for access door signs and similar operational instructions.

B. Paint shall be exterior type, oil based, black paint.

2.4 PLASTIC TAPE PIPE MARKERS

A. Provide manufacturer’s standard color-coded pressure sensitive vinyl tame not less than 3 mils thick.

B. Tape width shall be 1.5” for pipes less than 6” in diameter and 2.5” wide for larger pipes.

C. Colors shall comply with ANSI A13.1 except where noted otherwise.

D. Lettering shall be manufacturer’s standard pre-printed nomenclature which best describes piping system in each instance, as selected by A/E in cases of variance with names shown or specified. Abbreviate system names only as necessary for each application length.

E. Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering or as a separate unit of plastic.

230593 – TESTING AND BALANCING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 QUALITY ASSURANCE

A. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. The independent testing, adjusting, and balancing agency shall be certified by National Environmental Balancing Bureau (NEBB) or the Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. The project shall be staffed at all times by qualified personnel.

C. Balance all air system individual terminal devices and branch lines to +/- 10 percent and main ducts and air handling equipment to +/- 5 percent of specified airflow.

D. Balance water systems to +/- 5 percent of specified airflow.

1.2 PROJECT CONDITIONS

A. Systems shall be fully operational prior to beginning procedures.

1.3 SEQUENCE AND SCHEDULING

A. Test, adjust and balance the air systems before hydronic, steam and refrigerant systems.

1.4 PRELIMINARY PROCEDURES

A. In the event that the test and balance contractor is independently contracted with the owner, the division 23 contractor shall assist the test and balance contractor in performing all of these procedures. No extras shall be paid for additional labor or materials required to perform these procedures. Test and balance contractor shall in all cases ensure that these procedures are met to a satisfactory level to perform his work.

B. Before operating the air system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of air handling equipment, supply, return and exhaust outlets, and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.
6. Check volume and fire dampers for correct and locked position and temperature control system for complete installation before starting fans.
7. Verify volume dampers are installed at locations needed for balancing the air systems.
8. Prepare test report sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
9. Determine best locations in main and branch ductwork for most accurate duct traverses.
10. Place outlet dampers in the full open position.
11. Lubricate all motors and bearings.
12. Check fan belt tension

13. Check fan rotation.

C. Before operating the hydronic system, perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices and balancing valves and fittings are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
3. Remove and clean all strainers
4. Examine hydronic systems and determine if water has been treated and cleaned.
5. Check pump rotation
6. Clean and set automatic fill valves for required system pressure.
7. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
8. Check air vents at high points of systems and determine if all are installed and operating freely or to bleed air completely.
9. Set temperature controls so all coils are calling for full flow.
10. Check operation of automatic bypass valves.
11. Check and set operating temperatures of chillers to design requirements.
12. Lubricate all motors and bearings.

1.5 PERFORMING TESTING AND BALANCING

A. Perform testing and balancing procedures on each system identified in accordance with the detailed procedures outlined in the referenced standard.

B. Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate adjustment performance of procedures.

C. Patch insulation, ductwork and housings using materials identical to those being removed.

D. Seal ducts and piping and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers and similar controls and devices to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Energize motors, verify proper operation of motor, drive system and wheel/impeller. Adjust to indicated RPM. Replace motor pulley or impeller as required to achieve design conditions.

H. Test and adjust mechanical systems for sound and vibration in accordance with the detailed instructions of the referenced standards.

1.6 REPORTS

A. Reports shall be submitted on standard AABC or NEBB forms.

B. Reports shall include Initial, Design and Final readings of the following parameters:

1. Fan Airflow
2. Diffuser and Grille Airflow
3. Outside Airflow
4. External Static Pressure (Supply, Return and Exhaust)

5. Total Static Pressure
6. Motor Amps (Each Phase)
7. Motor Volts (Each Phase)
8. Fan Speed Setting
9. Motor Sheave Diameter/Bore
10. Sheave Centerline Distance
11. Belt Quantity, Make and Size
12. Fan Sheave Make
13. Fan Sheave Diameter/Bore
14. Fan RPM
15. Motor HP
16. Motor RPM
17. Discharge Air Temperature from each piece of Mechanical Equipment.
18. Discharge Air Relative Humidity from each piece of Mechanical Equipment.
19. Outside Air Temperature at Time of Test
20. Outside Air Humidity at Time of Test
21. Sample Space Temperature at Time of Test (minimum 15% of Zones)
22. Sample Space Humidity at Time of Test (minimum 15% of Zones)
23. Pump RPM
24. Pump Flow Rates
25. Equipment Water Flow Rates
26. Pump Inlet and outlet Pressures
27. Total Pump Head
28. Water temperatures in all piping systems.

230901 – STAND ALONE CONTROL DEVICES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Control devices shall be installed plumb and level.

B. Mechanical contractor shall provide all wiring required for installation of thermostats. Conduits and backboxes shall be provided by electrical contractor. It is responsibility of mechanical contractor to coordinate required conduit paths with E/C.

C. Contractor coordinate desired occupancy schedule with owner and shall program thermostat as desired.

D. Contractor shall provide training for owner on programming and use of thermostat.

PART 2 – PRODUCTS

2.1 PROGRAMMABLE THERMOSTAT

A. Thermostat shall be 7-day programmable type

B. Thermostat shall be suitable for staging of equipment shown on plans.

C. Provide dual fuel capable thermostat for heat pump systems with gas or electric auxiliary heating source.

D. Thermostat shall be equipped with touch screen, backlit, LCD display.

E. Thermostat shall be equipped with access limiting functions to prevent tampering.

F. Programming including clock setting and all set points shall be retained in thermostat memory upon loss of power.

G. Thermostat shall be equipped with compressor lockout protection

H. Thermostat shall be compatible with averaging sensors as shown on plans with the ability to assign priority to any connected sensor as desired.

2.2 REMOTE AVERAGING SENSOR

A. Sensor shall be suitable for indoor use.

B. Sensor shall be wired unless otherwise noted on plans.

C. Operating range shall be suitable for use.

2.3 TAMPER RESISTANT THERMOSTAT GUARD

A. Thermostat guard shall be constructed with plastic except in high impact areas, and equipped with a solid wall mounting plate.

B. Cover shall be lockable.

C. In high impact areas thermostat guard shall be constructed with steel. Color shall match wall color. Provide high impact thermostat guards where noted on plans.

232113 – HVAC PIPING AND SPECIALTIES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 PIPING INSTALLATIONS

A. Provide piping material for use as listed in piping materials schedule shown on plans.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

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 above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve services

F. Install piping free from sags and bends

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install groups of pipes parallel to each other spaced to permit application of insulation and servicing of valves.

K. Install drains, consisting of a tee fitting, NPS 0.75” ball valve and short NPS 0.75” threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

L. Install piping at uniform grade of 0.2 percent upward in direction of flow.

M. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

N. Install branch connections to mains using mechanically formed tee fittings in main pipe with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

O. Install unions in piping 2” and smaller, adjacent to valves, at final connections of equipment and at other locations noted on plans.

P. Install flanges in piping 2.5” and larger at final connections of equipment and elsewhere as indicated

Q. Install strainers on inlet side of each control valve, pressure reducing valve, solenoid valve, in-line pump and at other locations noted on plans. Install 0.75” nipple and ball valve in blowdown connection of strainers 2” and larger. Match size of strainer blowoff connection for strainers smaller than 2”.

R. Identify piping as specified in Division 23 Section “Identification for HVAC Piping and Equipment”.

1.2 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gauges and thermometers at coil inlet as outlet connections.

1.3 PIPE EXPANSION

A. Provide expansion joints, expansion loops, anchors and guides as required for proper control of expansion and contraction of piping. Piping from mains to equipment branches and risers shall be provided with swing, swivel joints or offsets to relieve stresses due to expansion or contraction of piping.

B. Provide pipe loops as shown on drawings or specified. Where pipe loop dimensions are not shown on plans they shall be as recommended by pipe manufacturer based on thermal expansion.

C. Expansion Joints Specified below shall comply with the following:

1. Install expansion joints of sizes matching sizes of piping in which they are installed
2. Install packed type expansion joints with packing suitable for fluid service
3. Install metal bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturer's Association, Inc."
4. Install rubber packless joints according to FSA-NMEJ-702.
5. Install grooved joint expansion joints to grooved-end steel piping.

D. Expansion loops shall comply with the following:

1. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

E. Alignment guide anchors specified below shall comply with the following:

1. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
2. Install two guides on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.
3. Install anchors at locations required to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of location and stresses to connected equipment.

1.4 REFRIGERANT SPECIFIC SYSTEM INSTALLATION REQUIREMENTS

A. Charge the system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 PSI.
4. Charge system with a new filter dryer core in charging line.

B. Refrigerant system Adjustment:

1. Adjust the thermostatic expansion valve to obtain proper evaporator superheat.
2. Adjust high and low pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
3. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions.
    a. Open shutoff valves in condenser water circuit.
    b. Verify that compressor oil level is correct.
    c. Open compressor suction and discharge valves.
    d. Open refrigerant valves except bypass valves that are used for other purposes.
    e. Check open compressor-motor alignment and verify lubrication for motors and bearings.
4. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

1.5 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.

2. Provide temporary restraints for expansion joints than cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

3. Flush hydronic piping systems with clean water, then remove and clean or replace strainer screens.

4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on all piping:

1. Hydrostatic Test:

a. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.

b. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

c. Isolate expansion tanks and determine that hydronic system is full of water.

d. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

e. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

2. Procedures required by authority having jurisdiction that exceed requirements of tests listed above shall be performed by contractor to obtain system acceptance.

C. Perform the following before operating the system:

1. Open manual valves fully.

2. Inspect pumps for proper rotation.

3. Set makeup pressure-reducing valves for required system pressure.

4. Inspect air vents at high points of system and determine if all are installed and bleed air completely.

5. Set temperature controls so all coils are calling for full flow.

6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.

7. Verify lubrication of motors and bearings.

D. After testing:

1. Adjust set point temperature of all HVAC equipment to system design temperatures. Temperatures shall be as listed on drawings or as directed by owner.

PART 2 – PRODUCTS

2.1 PIPING

A. Copper Tube:

1. Provide hard temper copper water tubing conforming to ASTM B 88. Tubing shall be type K, L or M as listed in schedule.

2. Tubing joints shall be soldered or brazed as indicated in schedule.

B. DWV Copper Tube:

1. Type M DWV copper tubing shall conform to ASTM B 306, type DWV.

C. ACR Copper Tubing:

1. Provide hard temper nitrogenized seamless copper refrigerant tubing conforming to ASTM B 88. Tube shall be L or K as listed in schedule.

2. Tubing shall be brazed or grooved joints manufactured to copper tube dimensions. Flaring tubing ends to accommodate alternate sized couplings is not allowed.

3. Type ACR soft copper tubing conforming to ASTM B 280 shall be allowed for connection between VRF air handlers nominal size 0 to 5 tons, and branch selector/controller boxes, as allowed by air handler manufacturer.

D. Steel Pipe:

1. Steel pipe shall conform to ASTM A53 and shall be black steel with plain ends. Type, grade and wall thickness shall be as indicated in piping materials schedule.

E. Plastic Pipe:

1. PVC Plastic pipe shall conform to ASTM D 1785. Piping shall be schedule 40 or schedule 80 as listed in schedule.

2. CPVC Plastic pipe shall conform to ASTM F 438 for schedule 40 pipe and ASTM F 439 schedule 80 pipe.

F. Polyethylene (PE) Pipe:

1. Conform to ASTM D 2239, with SIDR numbers 5.3, 7, 9 or 11.5 with PE compound number required to achieve required system working pressure.

2. U-Bend Assembly shall be factory fabricated with embossed depth stamp every 36” from U-Bend.

2.2 FITTINGS

A. Wrought Copper Fittings:

1. Provide wrought solder joint copper tube fitting conforming to ANSI B 16.22

B. Cast Iron Threaded Fittings:

1. Conform to ASME B 16.4 with classes as indicated on piping material schedule.

C. Nickel Copper Alloy Steel Welding Fittings:

1. Provide nickel copper alloy steel welding fittings conforming to ANSI B16.9 and ASTM A234.

D. Steel piping fittings:

1. Wrought Steel Fittings:

a. Provide carbon steel fittings conforming to ASTM A 234/A 2345M with wall thickness to match adjoining pipe.

2. Wrought Cast and Forged Steel Flanges:

a. Fittings shall conform to ASME B 16.5 including bolts nuts and gaskets of material group 1.1. End connections shall be butt welded and facings shall be raised face type.

E. Cast Bronze Fittings:

1. Cast bronze fittings shall be solder joint type conforming to ANSI B 16.18.

F. Plastic piping Fittings:

1. PVC Plastic Pipe

a. Socket type fittings conforming to ASTM D 2466 for schedule 40 and ASTM D 2467 for schedule 80.

2. CPVC Plastic Pipe

a. Socket type fittings conforming to ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.

G. Polyethylene (PE) fittings:

1. Molded PE fittings conforming to ASTM D 2683 or ASTM D 3261 made with PE resin and socket or butt fusion type made to match PE pipe dimensions and class.

2.3 JOINING MATERIALS

A. Pipe flange gasket materials shall be suitable for chemical and thermal conditions of piing system contents. Provide 1/8" maximum thickness, nonmetallic, flat, asbestos free material conforming to ASME B 16.21.

B. Flange bolts and nuts shall conform to ASME B18.2.1 and shall be carbon steel unless otherwise noted.

C. Plastic pipe flange gasket bolts and nuts shall be type and material recommended by piping system manufacturer.

D. Solder filler metals shall conform to ASTM B 32 and shall be lead free alloys that include water flushable flux according to ASTM B 813.

E. Brazing filler metals shall conform to AWS A 5.8 BCuP series and shall be copper phosphorus alloys for joining copper with copper or Bag-1 silver alloy for joining copper with bronze or steel.

F. Welding filler materials shall comply with ASW 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 Pipe:

1. CPVC piping cements shall conform to ASTM F 493.

2. PVC piping solvent cements shall conform to ASTM D 2564. Include primer complying with ASTM F 656.

H. Gasket material thickness, material and type shall be suitable for fluid to be handled and working temperatures and pressures.

2.4 TRANSITION FITTINGS

A. Plastic to Metal Transition Fittings:

1. Provide one piece fitting with one threaded brass or copper insert and one Schedule 80 solvent-cement-joint end.

B. Plastic to Metal Transition Unions:

1. Provide MSS SP-107 union. Include brass or copper end, schedule 80 solvent cement joint end, rubber gasket and threaded union.

2.5 DIELECTRIC FITTINGS

A. Fittings shall be combination fitting of copper alloy and ferrous materials with threaded solder joint plain or weld neck end connections that match piping system materials.

B. Insulating material shall be suitable for system fluid, pressure and temperature

C. Dielectric unions:

1. Provide factory fabricated union assembly with pressure and temperature rating suitable for system operating range.

D. Dielectric Flanges:

1. Provide factory fabricated companion flange assembly with pressure and temperature rating suitable for system operating range.

E. Dielectric Coupling:

1. Provide galvanized steel coupling with inert and non-corrosive thermoplastic lining and threaded ends. Coupling shall have pressure and temperature rating suitable for system operating range.

F. Dielectric Nipples:

1. Provide electroplated steel nipple with inert and noncorrosive, thermoplastic lining, plain, threaded or grooved ends. Nipples shall have pressure and temperature rating suitable for system operating range.

2.6 AIR CONTROL DEVICES

A. Air Vents: Manual air vents shall be equipped with bronze body, non-ferrous material for all internal parts, thumbscrew operator, 0.5” inlet connection, 1/8” discharge connection, 150 PSI CWP rating and 225 degree F maximum operating temperature.

B. Air Separator: Tangential type air separator shall be welded steel ASME constructed tank labeled for 125 PSI minimum working pressure and 375 degree F maximum operating temperature. Air collector tube shall be stainless steel constructed to release air into expansion tank.

C. Air Purger: Air purgers shall have one-piece cast iron tank with an integral weir constructed to decelerate system flow to maximize air separation. Maximum working pressure shall be up to 175 PSI and maximum operating temperature shall be up to 300 degrees.

D. Vacuum Breakers: Vacuum breakers shall have cast iron body, threaded end connections, stainless steel sealing ball, EPR O-Ring and pressure and temperature rating suitable for system operating range.

2.7 EXPANSION TANK

A. Tank shall be welded steel rated for 125 PSI working pressure and 240 degree F maximum operating temperature. Tank shall be factory tested with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII Division I.

B. Diaphragm shall be securely sealed into tank to separate air charge from system water to maintain required expansion capacity.

C. Tank shall be equipped with Schrader valve, stainless steel air charge fitting with EPDM seats.

2.8 PACKLESS EXPANSION JOINTS

A. Metal Compensator: Expansion joints shall have 2-ply phosphor bronze bellows, brass shrouds and end fittings for copper piping systems and 2-ply stainless steel bellows, carbon steel shrouds and end fittings for steel piping systems. Expansion compensators shall have internal guides, anti-torque device and removable end clip for proper positioning.

2.9 EXPANSION LOOPS

A. Provide pipe expansion loop constructed of main pipe material. Acceptable methods include use of elbows in a U or Z shape as defined by ASHRAE or ASME; or a detailed stress analysis may be utilized to define areas of expansion.

2.10 ALIGNMENT GUIDES AND ANCHORS

A. Provide steel, factory fabricated alignment guide with bolted two-section outer cylinder and base for attaching to structure; with two section guiding spider for bolting to pipe.

B. Anchors shall be mechanically fastened with tension and shear capacities appropriate for application.

233423 - POWER VENTILATORS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Field verify duct sizes, locations, and conditions for compliance with installation requirements prior to rough-in. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Install power ventilators level and plumb.

C. Secure roof-mounting fans to roof curbs with corrosion resistant hardware as recommended by manufacturer.

D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

E. Support suspended units from structure using threaded steel rods and rubber isolators.

F. Install units with clearances for service and maintenance.

G. Label units according to specification.

H. Make final duct connections with flexible connectors.

I. Install ducts adjacent to power ventilators to allow service and maintenance.

J. Electrical connection shall be done in accordance with local electrical code.

K. Perform the following field tests and inspections and prepare test reports upon request by A/E:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.

3. Verify that cleaning and adjusting are complete.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.

5. Adjust belt tension.

6. Adjust damper linkages for proper damper operation.

7. Verify lubrication for bearings and other moving parts.

8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.

9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.

10. Shut unit down and reconnect automatic temperature-control operators.

11. Remove and replace malfunctioning units and retest as specified above.

12. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

PART 2 – PRODUCTS

2.1 CEILING-MOUNTING VENTILATORS

A. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Material as scheduled, louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Disconnect Means
2. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
3. Isolation: Rubber-in-shear vibration isolators.
4. Provide additional accessories as scheduled.

238126 – SPLIT SYSTEMS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 EQUIPMENT REQUIREMENTS

A. Indoor units, outdoor units and evaporator coils shall all be by the same manufacturer, and performance shall be rated by the manufacturer in the configuration that is being supplied.

B. Unless otherwise noted below or in equipment schedule, equipment efficiencies shall meet or exceed requirements of local codes.

1.2 INSTALLATION REQUIREMENTS

A. Install units level and plumb.

B. Install evaporator fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Provide concrete housekeeping pad for installation of indoor and outdoor units

D. Install all piping and ductwork adjacent to equipment to allow service clearance

E. Install vent and outside air connections with cap and in an arrangement that will protect against the entry of birds, insects and dirt.

F. Connect ducts to ducted indoor units with flexible duct connection

PART 2 – PRODUCTS

2.1 OUTDOOR CONDENSING UNIT / HEAT PUMP

A. Provide unit capacities and accessories as shown in equipment schedule.

B. Casing shall be steel finished with baked enamel with removable panels for access to controls, weep holes for drainage and mounting holes in base.

C. Compressor shall be mounted on vibration isolation and shall be hermetically sealed. Compressor motor shall have thermal and current sensitive overload devices, start capacitor, relay and contactor.

D. Unit shall be equipped with removable coil guard.

E. Refrigerant coil shall be copper with aluminum fins.

F. Fan shall be aluminum directly connected to fan motor.

G. Heat pumps shall be equipped with reversing valve and low-temperature air cut-off thermostat with field adjustable temperature setting.

2.2 WALL/CEILING MOUNTED DUCTLESS INDOOR UNIT

A. Provide unit capacities and accessories as shown in equipment schedule.

B. Provide stainless steel or polymer drain pan. Mount coil over drain pan.

C. If specified with integral heater, provide finned tube electric heating element with high limit temperature switches.

D. Provide unit capacities and accessories as shown in equipment schedule.

E. Provide stainless steel or polymer drain pan. Mount coil over drain pan.

F. If specified with integral heater, provide finned tube electric heating element with high limit temperature switches

2.3 REFRIGERANT LINE-SETS

A. See piping specification for material requirements.

B. See insulation specification for insulation requirements.

C. Contractor shall size and route line-sets according to all manufacturers recommendations. Provide accumulators, line dryers and all accessories required for proper compressor operation based on equipment and line-set configuration.

2.4 CONDENSATE PUMP

A. Where condensate pump is indicated on plans, or required by piping routing shown on plans provide condensate pump integral to unit. Contractor shall have option to provide factory mounted or field installed condensate pump.

B. When unit is not available with integral condensate pump, provide pump with 120V, 1-phase cord and plug power supply, integral start/stop and high water safety switch, low profile design, overflow safety switch lead wires and built in wall mount tabs.

239000 – LOUVERS AND VENTS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Verify actual dimensions of openings by field measurements before fabrication.

B. Locate and place louvers and vents level, plumb and at indicated alignment with adjacent work.

C. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather tight connection.

D. Form closely fitted joints with exposed connections accurately located and secured.

E. Provide perimeter reveals and openings of uniform width for sealants and joint fillers as indicated.

F. 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 for refinish or replacement

G. Protect unpainted galvanized and non-ferrous 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.

H. Install concealed gaskets, flashings, joint fillers and insulation as louver installation progresses, where weather tight louver joints are required.

I. Provide louver finish as indicated on architectural plans and elevations.

PART 2 – PRODUCTS

2.1 FIXED, EXTRUDED ALUMINUM AND FORMED METAL LOUVERS

A. Louvers shall be 6” deep with extruded aluminum drainable blades, at 35 degree angle and spaced on 3.5” centers. Jambs shall be constructed with integral downspouts for carrying water from the blades to the louver sill. Screens shall be provided on the interior of the louver and shall consist of 0.5” mesh wire mounted in aluminum frame. Louvers shall pass 1100 FPM free area velocity with less than 0.19” water pressure drop and shall carry less than 0.1 ounces per square foot of water during a 15 minute period when tested in accordance with AMCA 500. Lovers shall bear the AMCA certified ratings.

2.2 BLANK OFF PANELS

A. Blank off panels shall be 1” thick insulated type with Aluminum sheet not less than 0.032” nominal thickness. Insulating core shall be rigid glass fiberboard insulation or extruded polystyrene foam. Trim perimeter edges of blank off panels with louver manufacturer’s standard frames. Corners shall be mitered with same finish as panels. Seal perimeter joints between panel faces and louver frames with gaskets of sealant. Panel finish shall be same finish applied to louver but black in color. Attach blank off panel with sheet metal screws.

2.3 BRICK VENTS

A. Brick vents shall be constructed with extruded aluminum louvers and frames not less than 0.125” nominal thickness, assembled by welding with mesh aluminum insect screening on inside face. Vents shall incorporate weep holes, continuous drip sill and integral waterstop on inside edge of sill. Vent shall be of load bearing design and construction.

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS

A. 2017 National Electrical Code, NFPA 70

B. 2018 International Building Code

C. 2018 International Plumbing Code

D. ADA – American Disabilities Act

E. ANSI – American National Standards Institute

F. ASTM – American Society of Testing Materials

G. NFPA – National Fire Protection Association

H. NEMA – National Electrical Manufactures Association

I. OSHA – Occupational Safety and Health Act

J. UL – Underwriter's Laboratories

K. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

1.3 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 26 are listed in "Schedule of Manufacturers" on plans.

1.4 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 26 shall include the following items.

1. Product data showing type, model and construction characteristics of product
2. Layout drawings for any systems requiring interconnection of various system components
3. All other documentation required to show compliance with the specifications.

B. The contractor shall provide a schedule of submittals indicating dates on which each submittal will be provided to design team for review. Schedule shall be submitted 10 working days in advance of delivery of first submittal for review.

C. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.5 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

1.6 INSTALLATION

A. All raceways and wiring shall be installed so that they are concealed from view unless otherwise noted. Exposed conduit shall be allowed at structural level in areas in which there is no ceiling installed. All conduit shall be routed perpendicular or parallel to building lines and structure.

B. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

C. Installation shall comply with NECA 1

D. Measure mounting heights indicated on plans to bottom of unit for suspended items and to center of unit for wall mounted items.

E. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

F. Install all equipment to facilitate service, maintenance and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

G. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

H. Contractor shall relocate all circuit breakers to balance electrical load between each panel phase.

I. All exposed conduit shall be painted to match surface installed adjacent to. Verify all paint colors with architect prior to installation.

1.7 TEMPORARY FACILITIES

A. Contractor shall provide temporary facilities as required for construction of the project. Temporary facilities shall include temporary water service and distribution, electrical power and lighting service, heating cooling and ventilation, telephone and data service, and sanitary facilities including drinking water.

B. Permanent HVAC equipment shall not be used to heat, cool or ventilate the facility during construction.

C. Whether during a renovation or a phased construction project, the contractor shall include all temporary facilities to maintain functionality and suitable space conditions in all areas of a building that are occupied by the owner while construction activities are underway.

D. The contractor shall provide temporary facilities as required to maintain a safe working environment and to protect all building materials and provide space conditions within range required for material installation.

E. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a

harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

F. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 – PRODUCTS

2.1 HOUSEKEEPING PADS

A. All equipment shall be installed on concrete housekeeping pads. Pad shall extend beyond equipment perimeter 4” and shall elevate equipment off of finish floor 4”.

B. Contractor shall have option to provide prefabricated housekeeping pad or pour pad in place.

2.2 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor’s option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.
2. Schedule 40 Steel Pipe.
3. DUCTED RETURN ONLY – Schedule 40 PVC pipe.

260519 – CONDUCTORS AND CABLES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Follow circuiting shown on drawings for lighting, power and equipment connections.

B. Shared neutrals and grounds are not allowed.

C. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

D. Route conductors in raceway continuous between outlets and junction boxes with no splices or taps pulled into conduits.

E. Terminate solid conductors at equipment terminal strips and other similar terminal points with insulated solderless terminal connectors. Terminate all stranded conductor terminal points with insulated solderless terminal connectors.

F. Neatly route tie and support conductors terminating at switchboards, motor control centers, panelboards, and audio-visual equipment with cable ties and clamps.

G. Use manufacturer approved pulling compound or lubricant where necessary. Do not exceed manufacturer's recommended maximum pulling tension and sidewall pressure values.

H. Use pulling means including fish tape, cable, rope and basked weave wire/cable grips that will not damage cable or raceway.

I. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

J. Identify and color code conductors and cables according to Division 26 "Identification for Electrical Systems."

K. Support Cables according to Division 26, "Hangers and Supports for Electrical Systems."

L. Tighten electrical connections and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B

M. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

N. Make fixture taps with self-stripping electrical tap connectors.

O. Install conductor at each outlet with at least 6" of slack.

P. Apply firestopping to electrical penetrations of fire rated floor and wall assemblies to restore original fire-resistance rating of assembly according.

Q. No conductors smaller than #12 AWG are allowed unless specifically noted on plans.

R. All circuits in patient care areas shall be equipped with redundant grounding patch in accordance with requirements of the National Electrical Code.

S. Conductor size shall be provided so that voltage drop in branch circuit does not exceed 3%. Conductor size shall be provided so that voltage drop in panel feeders does not exceed 2%. Combined voltage drop of branch circuit and panel feeders shall not exceed 5%. Conductor sizes shown on drawings represent the minimum conductor size. Increase size as required to comply with voltage drop requirements according to requirements of National Electrical Code.

T. In some cases, tick marks are omitted for clarity or in cases in which insufficient space is available to display on plans. If contractor cannot determine correct number of wires to be included in conduit, contact A/E for assistance.

1.2 CONDUCTOR APPLICATION

A. All conductors shall be installed in rigid raceway unless otherwise noted.

PART 2 – PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductors shall be Copper and shall comply with NEMA WC 70.

B. Conductors shall be rated for 600 volts at conductor temperatures not to exceed 105 degrees Celsius.

C. Conductors shall be UL listed.

D. Conductor insulation shall be THHN-THWN installed in raceway.

E. Conductors shall be solid for size #10 AWG and smaller and shall be stranded for #8 AWG and larger.

F. Multi-conductor cable shall comply with NEMA WC 70 for metal clad cable with ground wire.

G. In patient care areas, all metal clad cable shall be hospital grade and shall be equipped with separate ground.

H. Aluminum conductors complying with NEMA WC 70 may be used in lieu of copper conductors for panel feeders size #1/0 AWG and larger. Conductors substituted shall have the equivalent current carrying ampacity to copper conductors specified. Contractor shall adjust conductor size as required to account for additional voltage drop in aluminum conductors.

260533 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed Conduit: Rigid Steel Conduit.
2. Concealed Conduit Above Grade: EMT
3. Underground Conduit: RNC, Type EPC – 40 – PVC direct buried.
4. Connection to Vibrating Equipment (Including Transformers, and Hydraulic, Pneumatic, Electric Solenoid or Motor Driven Equipment): LFNC

B. Indoors:

1. Exposed, not subject to physical damage: EMT
2. Exposed, subject to physical damage: Rigid Steel Conduit
    a. Includes raceways in the following locations:
        i. Loading Dock
        ii. Corridors used for traffic of mechanized carts, forklifts and pallet handling units.
        iii. Mechanical Rooms
        iv. Bottom Feed panel board conduit entries.
3. Concealed in ceilings and interior walls and partitions: EMT
4. Connection to vibrating equipment (Including Transformers, and Hydraulic, Pneumatic, Electric Solenoid or Motor Driven Equipment):
    a. Dry locations: FMC
    b. Wet or Damp Locations: LFMC

1.2 BOXES ENCLOSURES AND CABINETS APPLICATION

A. Electrical Service Outlets (including plug receptacles, lamp receptacles, lighting fixtures and switches): 4” code gauge Sheet Metal Outlet Box

B. Light Fixture Boxes: 4” code gauge sheet metal outlet box with 0.375” inch or larger fixture stud in each outlet box to receive lighting fixture. Select covers with proper opening for device installed in outlet box.

C. Surface Mounted Exterior Boxes: Cast Metal Outlet Box

D. Surface Mounted boxes installed above kitchen floor: Cast Metal Outlet Box

1.3 OUTLET BOX AND RACEWAY INSTALLATION REQUIREMENTS

A. Use of utility or handy boxes shall only be allowed when box is flush mounted in masonry wall with dead end conduit entry from end or back.

B. Locate outlet boxes generally from column centers and finished wall lines. Install ceiling outlet boxes at suspended ceiling elevations.

C. Provide bracing straps spanning studs for support of all junction boxes installed in new walls.

D. Accurately locate lighting fixtures and appliance outlet boxes mounted in concrete or in plaster finish on concrete. Install outlet boxes in forms to dimensions taken from bench marks, columns walls or floors. Rough-in light fixtures and appliance outlet boxes to general locations before installation of walls and furring and reset to exact dimensions as walls and furring are constructed. Set outlet boxes true to horizontal and vertical finish lines of building. If outlet is shown to be installed in or on a column, outlet shall be centered on column.

E. Install outlet boxes accessible. Provide outlet boxes above piping or ductwork with extension stems or offsets as required to clear piping and ductwork.

F. When light fixtures are shown above a mirror, center fixture above mirror and install fixture with 2" of clearance between bottom of fixture and top of mirror.

G. Install boxes to maintain all fire ratings. In accordance with requirements of building code, Include fire rated sealing assemblies, putty pads and offset boxes where back to back.

H. Provide coverplates for all unused data devices.

I. All conduit elbows shall be long radius type. E/C shall review with A/E any instance in which a short radius elbow is required for coordination with field installation conditions.

J. All raceways, cables and boxes shall be recessed unless otherwise noted. Where shown in existing walls, contractor shall remove and replace wall finishes as required for installation or shall fish flexible cabling into wall cavity.

K. Unless otherwise noted, conduit connected to exterior building disconnect switches, C/T cabinets, meters, distribution panels, transfer switches and other equipment shall not be routed vertically and exposed on exterior of building. Route all conduit on interior of building concealed in wall. Notify A/E if construction type does not facilitate concealed conduit installation for clarification of routing.

1.4 UNDERGROUND HANDHOLES AND BOXES INSTALLATION REQUIREMENTS

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 0.5" sieve to #4 sieve and compacted to same density as adjacent undisturbed earth.

C. In paved areas, set elevation so that cover surface will be flush with finished grade. Set covers of enclosures in other areas at 1" above finished grade.

D. Install handholes and boxes with bottom below the frost line.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms and insulators as required for installation and support of cables and conductors as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.

F. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used.

PART 2 – PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. EMT (Electrical Metallic Tubing): Comply with ANSI C80.3

B. Rigid Steel: Comply with ANSI C80.1

C. FMC (Flexible Metal Conduit): Conduit shall be Zinc Coated Steel or Aluminum.

D. Fittings for conduit including all types and flexible and liquid tight, EMT, and cable shall comply with NEMA FB 1 and shall be listed for type and size raceway with which used and for application and environment in which installed.

1. Provide Steel, set screw or compression type conduit fittings.

2. Conduit fittings for hazardous locations shall comply with UL 886.

2.2 NON METALLIC CONDUIT AND TUBING

A. LFNC (Liquidtight Flexible Metal Conduit): Comply with UL 360.

B. RNC (Rigid Non-Metallic Conduit): Comply with NEMA TC2. Conduit shall be type EPC-40-PVC, unless otherwise noted.

C. Fittings for RNC shall comply with NEMA TC 3 and shall match conduit or tubing type and size to which applied.

D. Fittings for LFNC shall comply with UL 514B.

2.3 METAL WIREWAYS AND GUTTERS

A. Wireways shall be constructed of sheet metal sized and shaped as indicated in NEMA 250. Wireways shall be bear NEMA rating for application and location in which they are used. Include couplings offsets, elbows, expansion joints, adapters, hold down straps, end caps and other fittings to match and mate with wireways as required for complete system. Wireway cover shall be hinged type. Finish shall be manufacturer's standard enamel finish.

B. Items may be fabricated locally to same specifications as manufacturer's specified. Provide locally fabricated items free of burrs, sharp edges, un-reamed holes, exposed screw points or bolts and finished with one coat of suitable enamel inside and out, prior to mounting.

C. Provide sectional covers to maximize ease of removal.

2.4 BOXES, ENCLOSURES AND CABINETS

A. No sectional outlet boxes are allowed.

B. Raised Cover: Provide code gauge galvanized steel raised covers on outlet boxes installed in plaster finish. Set to plaster grounds with outside edge of cover flush with plaster finish.

C. Sheet Metal Outlet Boxes: Steel, sheet metal knockout outlet box, complying with NEMA OS 1. Provide required depth for service or device.

D. Cast Metal Outlet Boxes: comply with NEMA FB 1 provide cast type FS or FD box with device cover and gasket. Provide blank cover and gasket when used as a junction box. Provide required depth for service or device.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2. See application schedule for size.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Polymer Concrete Handholes and Boxes with Polymer Concrete Cover: Boxes shall be flared wall construction molded of sand and aggregate, bound together with polymer resin and reinforced with steel or fiberglass or a combination of the two. Cover shall be rated for traffic application in location of box shown on plans. When box is shown on plans to receive electrical equipment, such as wiring devices, lighting contactors, time switches, etc., provide channel strut mounting brackets as required for installation of devices shown. Enclosure cover shall be embossed as follows:

1. Line voltage wiring or conduit: "Electric"

2. Communications wiring or conduit: "Communication"

260553 – IDENTIFICATION FOR ELECTRICAL AND EQUIPMENT AND WIRING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

E. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

F. Non-metallic Color Coded Tape or Marker Tape: Secure tight to surface of conductor or cable with non-metallic tie wraps or adhesive, as specified, at a location with high visibility and accessibility; and, in all enclosures with exposed energized parts.

G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

H. Painted Identification: Prepare surface and apply paint according to Division 09 painting Sections.

1.2 ELECTRICAL EQUIPMENT IDENTIFICATION

A. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of electrical equipment and each operational device as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Distribution Panelboards
2. Branch Panelboards
3. Disconnect Switches
4. Enclosed Circuit Breakers
5. Transformers
6. Meter Centers
7. Lighting Contactors
8. Motor Starters
9. Variable Frequency Drives
10. Motor Control Centers
11. Lighting Control Panels
12. Time Switches

B. Where lettering larger than 1” height is needed for proper identification because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved sign at contractor’s option.

C. Lettering shall be minimum 1/4” high where viewing distance is less than 2’-0”; 1/2” high for distances up to 6’-0” and proportionately larger for greater distances. Secondary lettering shall be 2/3 to 3/4 of size of the principal lettering.

1.3 WIRING IDENTIFICATION

A. Install wiring tape on each conductor in accordance with the following color scheme.

1. 120/208V or 120/240V Systems

a. Phase A: Black

b. Phase B: Red

c. Phase C: Blue (Where Applicable)

d. Neutral: White

e. Ground: Green

2. 480/277V Systems

a. Phase A: Brown

b. Phase B: Orange

c. Phase C: Yellow

d. Neutral: White (Except as provided in section 200.6 of NFPA 70)

e. Ground: Green

PART 2 – PRODUCTS

2.1 ENGRAVED LAMINATE SIGN

A. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thickness indicated, engraved with the engravers standard letter style of the sizes and wording indicated. Signs shall be black with white core except as otherwise noted and shall be punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

B. Thickness shall be 1/16” for units up to 20 square inches or 8” in length and 1/8” for larger units.

2.2 PAINTED IDENTIFICATION

A. Painting where allowed shall be performed using standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications. Minimum letter height shall be 1.25” high for ductwork and equipment and 0.75” high for access door signs and similar operational instructions.

B. Paint shall be exterior type, oil based, black paint.

2.3 CABLE IDENTIFICATION MATERIALS

A. Color Coded Tape: Self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1” to 2” wide, colored as noted above.

B. Marker tapes: Vinyl or vinyl cloth, self-adhesive, wraparound type with circuit identification legend machine printed by thermal transfer or equivalent process.

2.4 UNDERGROUND WARNING TAPE

A. Provide bright colored, red, continuous printed, polyethylene tape compounded for permanent direct burial service and alkali and acid resistant. Provide embedded continuous metallic strip or core. Printed legend shall indicate type of underground line.

262416 – PANELBOARDS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Do not interrupt electric service to facilities occupied by owner or others unless coordinated with owner and architect.

B. Install panelboards and accessories according to NEMA PB 1.1

C. Mount top of trim 90” above finished floor unless otherwise noted.

D. Mount panel board cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install all overcurrent protective devices and controllers not already factory installed. Set field adjustable circuit breaker trip ranges.

F. Install filler plates in unused spaces.

G. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

H. Installation shall comply with NECA 1.

I. After substantial completion, but not more than 60 days after final acceptance, measure load balancing and make circuit changes.

1. Measure during period of normal system loading.

2. Coordinate scheduling of load balancing circuit changes with owner and perform changes outside normal occupancy/working schedule of the facility.

3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.

4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

J. Provide temporary heat to maintain temperature according to manufacturer’s written instructions.

1.2 BREAKER COORDINATION

A. All circuit breakers including load side branch breaker shall be selectively coordinated and rated for available fault current listed in panel schedule or calculated at feeder connection of panel. Series rating is not allowed.

B. All circuit breakers feeding equipment such as, transfer switches, HVAC equipment, owner installed process equipment, elevators or other building equipment shall be coordinated with requirements of equipment manufacturer to ensure proper coordination and fault protection.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures:

1. Enclosures shall be flush and surface type as shown on plans. Panels shall be rated for environmental conditions at installed locations.

2. Front shall be secured to box with concealed trim clamps. For surface mounted fronts, match box dimensions. For flush mounted fronts, overlap box.

3. Skirt for surface mounted panelboards shall be same gauge and finish as panelboard front with flanges for attachment to panelboard, wall and ceiling or floor.

4. Finishes:

a. Panels and Trim: Steel, factory finished with manufacturer's standard two coat, rust inhibitor primer and baked on finish.

b. Back boxes: Galvanized steel

c. Provide permanent fungicidal treatment for overcurrent protective devices and other components.

5. Inside panelboard provide directory card mounted in transparent card holder with typed circuit directory listing all circuit numbers and loads served.

B. Phase Neutral and Ground Buses:

1. Material Tin plated copper.

2. Equipment ground bus: Adequate for feeder and branch circuit equipment grounding conductors; bonded to box.

3. Isolated Ground Bus: Adequate for branch circuit isolated ground conductors; insulated from box.

4. Neutral bus: UL rated for nonlinear loads.

5. Rating: Bus structure shall be rated by heat tests conducted in accordance with UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat tests.

C. Conductor Connectors:

1. Material: Tin Pated Copper.

2. Main and Neutral Lugs: Suitable for connection to Copper or Aluminum Conductors

3. Feed Through Lugs: Suitable for use with Copper or Aluminum conductors. Locate at opposite end of bus from incoming lugs or main device.

4. Subfeed Lugs: Suitable for use with aluminum or copper conductors. Locate at same end of bus as incoming lugs or main device.

D. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers when shown with one or more main service disconnecting means and overcurrent protective devices.

E. Future Devices: Provide mounting brackets, bus connections, filler plates and necessary appurtenances required for future installation of devices.

F. Panelboard Short-Circuit Rating: Panelboard shall be fully rated for available fault current listed on plans or as calculated based on actual field installed conditions.

G. All panelboards and load centers shall be keyed alike.

H. Include tools and miscellaneous items required for overcurrent protective device test, maintenance and operation.

2.2 DISTRIBUTION PANELBOARDS

A. Provide distribution and power panelboards as indicated in the panelboard schedule and where shown on plans. Panelboards shall be equipped with thermal – magnetic, molded case circuit breakers of frame and trip ratings as shown on the schedule. Panelboard shall conform to NEMA PB-1, UL 67 and UL 50

B. Mains shall be circuit breaker or main lug only as indicated on plans.

C. Doors shall be secured with latch and tumbler lock.

D. Panelboard assembly shall be dead front with panelboard front removed. Main lugs or main breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers.

2.3 FUSIBLE PANELBOARD

A. Provide dead front panelboard with fusible switches and combination motor starters as indicated in schedule and where shown on plans. Panelboards shall conform to NEMA PB1-1957 and UL 67 for panelboards.

B. Main and branch fusible switches shall be horsepower rated, positive quick-make, quick-break type with external operating handle suitable for padlocking in 'off' position. Provide switches with cover interlock with defeater to prevent opening cover when switch is energized or closing switch with door open. Cover shall be suitable for padlocking. Fusible switch units shall be interchangeable without disturbing adjacent units, and shall be properly supported to prevent vibration and breakage during shipment. Switches shall be UL short circuit rated for at least 10,000 amperes. Fuse holder for 1 to 600 amperes shall be high pressure type for use with class R current limiting fuses.

C. Motor starters shall meet minimum requirements of safety switches and motor starters as defined in this specification division 26.

2.4 LIGHTING AND BRANCH CIRCUIT PANELBOARDS

A. Provide dead front panelboards as indicated in schedule with bolt-in or plug-on molded case circuit breakers. Panelboards shall comply with NEMA publication PB-1, UL67 and UL50.

B. Provide one spare 0.75" conduit for every three spares and/or blank spaces with a minimum of three spare conduits per panel. Terminate conduit above accessible ceiling unless indicated otherwise.

2.5 LOAD CENTERS

A. Provide dead front load centers as indicated in schedule and where shown on plans with bolt-in or plug-on molded case circuit breakers as listed in schedule. Load centers shall conform to UL standard 67 as type 1, class 2 and shall be UL listed.

B. Provide one spare 0.75" conduit for every three spares and/or blank spaces with a minimum of three spare conduits per panel. Terminate conduit above accessible ceiling unless indicated otherwise.

2.6 DISCONNECTION AND OVERCURRENT PROTECTIVE DEVICES

A. Circuit Breakers: Circuit breakers shall be rated for size and amperage indicated on plans. Breakers shall be standard construction. All circuit breakers shall be UL and CSA listed, IEC 157-1 rated, meet NEMA AB1 and federal specification W-C 375B/GEN when applicable. Molded case circuit breakers shall have over center toggle type mechanisms, providing quick make, quick break action. Breakers shall be calibrated for operation in an ambient temperature of 40°C. Each circuit breaker shall have trip indication by handle position and shall be trip free. Two and three pole breakers shall be common trip. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Circuit breaker frame sizes greater than 100 amperes shall have variable magnetic trip elements that are set by a single adjustment so that tripping characteristics are uniform in each pole. A push to trip button shall be provided on the cover for mechanically tripping the circuit breaker. The circuit breaker shall have reverse connection capability and be suitable for mounting and operating in any position. Unless otherwise indicated, branch circuit breakers rated for up to 100 amperes shall have 10,000 RMS short circuit amperes symmetrical interrupting capacity. Circuit breakers above 100 amperes shall have 42,000 RMS short circuit amperes capacity.

262726 – WIRING DEVICES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Comply with NECA 1, install devices at mounting heights as indicated on plans.

B. Install wiring devices after all wall preparation including painting is complete.

C. Do not strip insulation from conductors until just before they are spliced or terminated.

D. Strip insulation evenly around conductor using tools designed for that purpose.

E. Existing Conductors:

1. Cut back and pigtail or replace all damaged conductors.

2. Straighten conductors that remain and remove corrosion and foreign matter.

3. Pigtailing existing conductors is permitted provided the outlet box is large enough.

F. Replace all devices that have been in temporary use during construction of that show signs that they were installed before building finishing operations were complete.

G. Keep each wiring device in its package or otherwise protected before it is time to connect conductors.

H. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes allowing metal to metal contact.

I. Do not use oversized or extra deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

J. All light switches shown side by side shall be ganged together and mounted under single faceplate.

K. Contractor shall adjust all occupancy sensors, for time delay, sensitivity and occupancy/vacancy operation as directed by owner. Contractor shall include visit to site after occupancy of the building by owner to adjust sensors.

1.2 FIELD QUALITY CONTROL

A. In healthcare facilities prepare reports that comply with recommendations in NFPA 99.

B. Test straight blade convenience outlets in patient care areas for the retention force of the grounding blade according to NFPA 99. Retention force shall not be less than 4 oz.

PART 2 – PRODUCTS

2.1 COLOR

A. Receptacle and Switch color shall be white unless otherwise noted below or on plans.

B. Faceplates finish shall be stainless steel unless otherwise noted below or on plans.

C. Isolated ground receptacles shall be orange.

D. Receptacles connected to emergency power system shall be red.

E. Where new devices are installed adjacent to existing devices to remain, new device and faceplate colors shall match existing.

2.2 RECEPTACLES

A. Receptacles shall be rated for voltage and amperage as shown on drawings. Unless otherwise noted, receptacles shall be rated for 125 V and 20 A. For devices rated other than 125 V and 20 A provide equivalent grade construction as devices listed below.

B. Wiring devices shall comply with NEMA WD1, NEMA WD6 for configuration noted and UL 498.

C. Basis of Design:

1. Convenience receptacles: Hubbell HBL 5351 (single), CR 5352 (duplex)
2. Receptacles in Classrooms, Hotel Guest Rooms and Suites, Childcare Facilities and Dwelling Units: Tamper Resistant Hubbell HBL 8300SG (duplex)
3. USB Charger convenience receptacles: Hubbell USB20X2 (duplex)
4. Hospital-Grade, Convenience Receptacles: Hubbell HBL 8310 (single), HBL 8300H (duplex)
5. Isolated-Ground, Convenience Receptacles: Hubbell CR 5253IG (duplex)
6. Tamper Resistant Convenience Receptacles: Hubbell HBL 8300SG (duplex)
7. GFCI Convenience Receptacle: Hubbell GF 20 (duplex)
8. GFCI Hospital Grade Convenience Receptacle: Hubbell HGF 8300
9. Twist Lock Convenience Receptacles: Hubbell HBL 2310
10. Clock Hanger or TV: Hubbell HBL 5235
    a. Provide when receptacle is indicated for use for wall mounted TV or wall mounted clock.

2.3 SWITCHES

A. Switches shall be rated for 20 A, and 120/277 V.

B. Switches shall comply with NEMA W1 and UL 20.

C. Basis of Design:

1. Single Pole Switch: Hubbell CS 1221
2. Two Pole: Hubbell CS 1222
3. Three Way: Hubbell CS 1223
4. Four Way: Hubbell CS 1224
5. Pilot Light Switch: Hubbell 1221 PL
6. Keyed Switch: Hubbell HBL 1221L
7. Single Pole, Double throw Momentary Contact: Hubbell HBL 1557
8. Keyed Single Pole, Double Throw Momentary Contact: Hubbell 1557L

2.4 ELECTRIC TIMER SWITCH

A. Switch shall be rated for 20 A, and 120/277 V.

B. Switch shall be equipped with multiple run time option each controlled by separate push button ranging from ten minutes to a maximum of two hours.

2.5 WALL BOX DIMMERS

A. Dimmer switches shall be modular full wave, solid state units with integral quiet on-off switches with audible frequency and EMI/RFI suppression filters.

B. Control shall be continuously adjustable slider with single pole, or three way switching as required by circuiting shown on plans.

C. Incandescent Lamp Dimmers: Rated for 120/277 V, control shall follow square law dimming curve. On off positions shall bypass dimmer module. Dimmers shall be rated for 2000W.

D. Fluorescent Lamp Dimmers: Rated for 120/277V, Modular, compatible with dimmer ballasts and trim potentiometer to adjust low end dimming. Dimmer ballast combination shall be capable of consistent dimming with low end not greater than 20 percent of full brightness.

E. LED Lamp Dimmers: Rated for 120/277V, Compatible with LED driver or self-ballasted lamp specified in light fixture schedule.

2.6 OCCUPANCY SENSORS

A. Line Voltage Wall Switch Sensor: Dual Technology type, 120/277 V adjustable time delay up to 20 minutes, 180 degree field of view, with a minimum coverage area of 1200 square feet. Sensor shall be equipped with off override controls. Sensor shall be adjustable between occupancy and vacancy sensing operation.

B. Line Voltage Ceiling Sensor: Dual Technology type, 120/277 V adjustable time delay up to 20 minutes, 360 degree field of view, with a minimum coverage area of 1000 square feet.

C. Line Voltage Wall Sensor for Elevated Mounting Heights: Dual Technology type, 120/277 V adjustable time delay up to 20 minutes, 110 degree field of view with a minimum coverage area of 1200 square feet.

D. Low Voltage Ceiling Sensor: Dual Technology type, voltage compatible with power pack, 360 degree field of view with a minimum coverage area of 1000 square feet.

E. Low Voltage Wall Sensor for Elevated Mounting Heights: Dual Technology type, voltage compatible with power pack, 110 degree field of view with a minimum coverage area of 1200 square feet.

F. Power Pack for Low Voltage Occupancy Sensors: Rated for 20 A and 120 V/277 V, adjustable time delay up to 20 minutes. When quantity of occupancy sensors shown in space to control single power pack exceeds maximum rating of power pack, contractor shall provide additional power pack to accommodate quantity of occupancy sensors specified.

2.7 PENDANT CORD CONNECTOR DEVICES

A. Provide matching locking type plug and receptacle body connector with NEMA WD6 configuration shown on plans. Construction grade shall be heavy duty.

B. Body shall be nylon with screw open cable gripping jaws and provision for attaching external cable grip.

C. External cable grip shall be woven wire mesh type constructed of high strength galvanized steel wire strand matched to cable diameter and with attachment provision to corresponding connector.

2.8 CORD AND PLUG SETS

A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

B. Cord shall be rubber insulated, stranded copper conductors with type SOW-A jacket with green insulated grounding conductor and equipment rating ampacity plus a minimum of 30 percent.

C. Plug shall be nylon body with internal cable clamping jaws. Match cord and receptacle type for required connection.

2.9 WALL PLATES

A. Plate securing screws shall be metal with head color to match plate finish.

B. Material shall be as indicated in Color Section above.

C. When wall plates are furnished by device manufacturer. Color and material shall comply with requirements of this specification.

D. Weatherproof Wall Plates:

1. Weatherproof wall plates shall be “while-in-use” type.

2. Wall plates shall be expandable with 1” protrusion from wall while in collapsed position and 3.5” protrusion when expanded.

3. Wet location, Weatherproof while in-use cover plates shall comply with NEMA 250, type 3R requirements for weatherproof while in-use.

4. Wall plate shall be UL listed and compliant with NEC 406

265100 – LIGHT FIXTURES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL REQUIREMENTS

A. Provide fixtures complete with lamps and accessories required for hanging. Clean lamps, reflectors, lenses and fixture trims at time of final inspection. Mount recessed fixtures with trim flush to ceilings free of gaps or cracks.

B. Coordinate mounting of ceiling mounted light fixtures with other trades. Where additional ceiling or fixtures supports are required due to fixture location of weight they shall be provided by electrical contractor unless otherwise specified under ceiling specifications.

C. Provide 10 spare lamps for every 100 of each type and rating installed. Furnish at least one of each type.

D. For all light fixtures in food preparation areas, fixtures shall be provided with lensed covers or lamps that are coated and labeled as shatter resistant.

E. Coordinate ceiling types with architectural plans and provide recessed fixtures and mounting components as required for compatibility with ceiling type regardless of trim types specified on plans.

F. All light fixtures installed in fire rated ceiling shall comply with UL listing for rated assembly.

G. Fixture supports shall comply with NEC 410-15 and 410-16. Provide fixture securing clips as required.

H. All fluorescent and double ended lamp light fixtures shall be equipped with linear disconnecting means complying with NEC 410.73.

I. Contractor shall replace all lamps that are not operational or burn out within 30 days of substantial completion.

J. Dimming ballasts where required shall be two wire line voltage type compatible with wall box dimmer, or lighting control system as applicable. Provide all required wiring between ballast and wall switch regardless of number of wires indicated on plans.

K. Set fixtures plumb and square with ceilings and walls.

L. For fixtures installed in a grid ceiling, use a minimum of four ceiling support system rods or wires for each fixture. Locate fixtures not more than 6” from fixture corners.

M. For fixtures installed in grid ceiling of sizes less than ceiling grid, install fixtures as indicated on ceiling plan or center in ceiling tile and support fixtures independently with at least two metal channels spanning and secured to ceiling tees.

N. Adjust all aimable light fixtures per owner’s requirements.

O. Test all emergency light fixtures by interrupting power to ensure proper operation.

PART 2 – PRODUCTS

2.1 FIXTURES

A. See light fixture schedule on plans for fixture model number, mounting type, lamp type and equivalent manufacturers.

B. Fixture manufacturers shall be represented by factory authorized representative located in the state in which the project is to be constructed.

C. Fixtures shall be listed by UL or ETL for use in the United States. Fixtures that are tested to UL standards but not listed will not be accepted.

D. Door frames and other internal access shall be smooth operating free from light leakage under operating conditions, and designed to permit relamping without the use of tools unless otherwise noted for vandal resistant operation. Doors frames and other internal devices shall be hinged.

E. All light fixtures with a painted surface exposed in occupied area shall be painted after fabrication.

F. All exposed fasteners in exterior location fixtures shall be captive type fasteners constructed with 316 Stainless Steel.

2.2 LAMPS

A. Provide lamp type as indicated in schedule. When information is not listed in schedule, comply with the following specifications.

B. Metal Halide: Comply with ANSI C78.1372 with a minimum of CRI 65 and color temperature of 4000K.

C. Fluorescent Lamps:

1. Lamps shall be low mercury type and shall comply with EPA's toxicity characteristic leaching procedure test, yielding less than 0.2 mg of mercury per liter when tested according to NEMA LL1.

2. T8 Rapid Start: Minimum CRI shall be 85 with color temperature of 3500K and minimum average rated life of 20,000 hours

3. T5 Rapid Start: Minimum CRI shall be 85 with color temperature of 3500K and a minimum average rated life of 20,000 hours

4. T5 High Output Rapid Start: Minimum CRI shall be 85 with color temperature of 4000K and a minimum average rated life of 20,000 hours.

5. Compact Fluorescent: Minimum CRI shall be 85 with color temperature of 3500K and a minimum average rated life of 10,000 hours at 3 hours operation per start. Lamps shall be suitable for use with dimming ballasts.

D. Incandescent Lamps: Provide base to match fixture with wattage as specified on drawings, or equal to maximum allowable fixture wattage.

E. Led system: Led modules integral to light fixtures shall be tested and rated in compliance with IESNA LM-79 and IESNA LM-80. Luminaires shall be rated for 50,000 hours lamp life. Color temperature and CRI shall be as noted in light fixture schedule. LED Modules and driver shall be capable of replacement without replacement of entire luminaire.

F. Medium Base LED: Fixture shall have manufacturer's advertised incandescent wattage equivalent equal to maximum wattage of light fixture. Color temperature and CRI shall be as noted in light fixture schedule.

2.3 DRIVERS

A. Integral Driver: Driver shall be equipped with lamp end-of-life detection and shutdown circuit, sound rating A, total harmonic distortion of less than 20%, transient voltage protection IEEE C62.41, category A or better, ballast factor of 0.95 or higher, power factor of 0.95 or higher.

B. Dimmer controlled light fixture drivers: Dimming range shall be 100 to 5 percent of rated lamp lumens. Driver input watts shall be capable of being reduced to 20 percent of normal. Driver shall be certified by manufacturer for use with specific dimming control system and lamp type indicated.

C. Emergency Power Unit: Where indicated on plans, or required by design intent to meet code emergency lighting requirements, provide self-contained, modular, battery inverter unit, factory mounted or field mounted as required to operate lamps as described on schedule. Battery shall be sealed maintenance free nickel cadmium type. Charger shall be fully automatic, solid state, constant current type with sealed power transfer relay. Unit shall be equipped with factory or field installed electronic device to automatically initiate code required test of unit emergency operation at required intervals; test failure shall be annunciated by an integral flashing red LED.

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Removing existing trees and vegetation.
   2. Clearing and grubbing.
   3. Stripping and stockpiling topsoil.
   4. Removing above-grade and below-grade site improvements.
   5. Disconnecting, capping or sealing, and abandoning site utilities in place.
   6. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:
   1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities.
   2. Division 01 Section "Execution" for verifying utility locations and for recording field measurements.
   3. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.

1.2 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.3 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site, unless otherwise mentioned on the plans.

1.4 SUBMITTALS

A. Prior to commencing work the Contractor must submit photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record drawings, according to Division 01 Section "Contract Closeout."
   1. Coordinate with Owner to identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.5 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management."

1.6 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 and/or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property shall be obtained by Owner before beginning of said work.
   1. Do not proceed with work on adjoining property until directed by Owner.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."
   1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Locate and clearly flag trees and vegetation to remain or to be relocated.

D. 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. 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 Erosion Control Plan and Details and MDNR Land Disturbance Permit criteria. See plans for additional requirements.

B. Contractor shall be fully responsible for continued monitoring until such time the State Land Disturbance permit has been terminated.

C. Repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established in accordance with Owner provided inspections.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Contractor shall not proceed with installation of erosion and sedimentation control measures on adjacent properties not owned by the Owner until directed to do so by the Owner.

3.3 TREE PROTECTION

A. Mark and identify drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
   1. Do not store construction materials, debris, or excavated material within fenced area.
   2. Do not permit vehicles, equipment, or foot traffic within fenced area.
   3. Maintain fenced area free of weeds and trash.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
   1. Cover exposed roots with burlap and water regularly.
   2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
   3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
   4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Owner.
   1. Replace trees that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

3.4 UTILITIES

A. Contractor will arrange for disconnecting and sealing indicated utilities, as preapproved by the owner that serve existing structures before site clearing, when requested by Contractor.
   1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Contractor shall locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
   1. Arrange with utility companies to shut off indicated utilities.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect not less than 14 days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's written permission.

D. Excavate for and remove underground utilities indicated to be removed. Coordinate with Divisions 21, 22, 23, 26, 27, and 28 Sections.

3.5 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Completely remove or completely fill piping using flowable fill or grout.

B. Abandoned Manholes and Structures: Remove Structures completely

C. Backfill to grade according to Division 31 Section "Earth Moving."

3.6 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Completely remove stumps roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
4. Use only hand methods for grubbing within tree protection zone.
5. Contractor shall be responsible for removal of cleared/grubbed material. If material is to be burned onsite, Contractor shall obtain any required permits necessary.

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.

3.7 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.
B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and non-soil materials from topsoil, including trash, debris, rock, weeds, roots, and other waste materials.
C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Limit height of topsoil stockpiles as directed by Owner and/or authorities having jurisdiction.
   2. Do not stockpile topsoil within drip line of trees to remain.
   3. Dispose of excess topsoil as specified for waste material disposal.
   4. Stockpile surplus topsoil to allow for respreading. At completion of Mass Grading, stripped topsoil shall be redistributed in all areas not specified to receive other surfaces to a depth of 6 inches.

3.8 SITE IMPROVEMENTS

A. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.9 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Geotechnical Study prepared for this project. If conflicts arise between the Specifications and the Geotechnical Study, the Engineer shall be contacted prior to construction.

C. Regulatory authority's rules, regulations and specifications apply to this section.

1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and plantings.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks, pavements.
5. Subbase course for asphalt paving.
6. Excavating and backfilling for trenches within building lines.
7. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:

1. Division 01 Section "Unit Prices" for a schedule of unit prices.
2. Division 01 Section "Construction Facilities and Temporary Controls."
3. Division 31 Section "Site Clearing" for site stripping, grubbing, removal topsoil, and protective trees to remain.
4. Division 31 Section "Dewatering" for lowering and disposing of ground water during construction.
5. Division 31 Section "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.
6. Division 03 Section "Cast-in-Place Concrete" for granular course over vapor retarder.
7. Divisions 21, 22, 23, 26, 27, 28 Sections for excavating and backfilling buried mechanical and electrical utilities and buried utility structures.

1.3 UNIT PRICES

A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following.

1. 24 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 6 inches of minimum required dimensions of concrete cast against grade.
4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
5. 6 inches beneath bottom of concrete slabs-on-grade.
6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches Unit prices for rock excavation include replacement with approved materials.

1.4 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. Base Course: Layer placed between the subbase course and asphalt paving.
C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
D. Borrow Soil: Suitable soil imported from off-site for use as fill or backfill.
E. Drainage Course: Layer supporting the slab-on-grade used to minimize upward capillary flow of pore water.
F. Excavation: Removal of material encountered above subgrade elevations.
   1. Authorized Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
   3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
G. Fill: Soil materials used to raise existing grades.
H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by an independent geotechnical testing agency, according to ASTM D 1586.
I. 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.
J. Subbase Course: Course placed between the subgrade and base course for asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or walk.
K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

A. Product Data: For the following:
   1. Each type of plastic warning tape.
   2. Drainage fabric
   3. Separation fabric
B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.
C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.6 QUALITY ASSURANCE

A. Blasting: Is not allowed

B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
C. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated.
   1. Notify Owner not less than 14 days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's written permission.
   3. Contact utility-locator specified, as specified by Owner, for area where Project is located before excavating.
B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.
C. Dust Control -
   1. Minimize the amount of time the site is left cut or exposed, plan earth moving works so they are completed just prior to the time they are needed.
   2. Observe weather conditions and do not commence or continue earthmoving works if conditions are unsuitable.
   3. Reduce off-site hauling via balanced cut and fill procedures.
   4. Pre-water, if possible, the areas marked for disturbance and the material that is being moved.
D. Dust Control - Site Traffic Control:
   1. Provide directions and instructions relating to traffic movement within the site:
   2. Post signage, erect fencing and place barriers to direct traffic.
   3. Designate specific routes for hauling and access.
   4. Allocate off-site parking with on-site access only under special circumstances.
   5. Restrict public access onto the construction site when earthwork is exposed to traffic.
   6. Set and enforce a maximum speed limit, e.g. 10mph.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient suitable soil materials are not available from excavations.
B. Suitable Materials: As identified in the Geotechnical Report.
C. Unsuitable Materials: As identified in the Geotechnical Report.
D. Backfill and Fill: Suitable soil materials.
E. Base Course: MoDOT Type 5
F. Engineered Fill: As identified in the Geotechnical Report.
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 Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inchsieve and 0 to 5 percent passing a No. 8 sieve.
I. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.
K. Borrow Material: As identified in the Geotechnical Report.

2.2 GEOTEXTILES
A. As specified on the plans

2.3 CONTROLLED LOW-STRENGTH MATERIAL
A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:
1. Portland Cement: ASTM C 150, Type I.
2. Fly Ash: ASTM C 618, Class C or F.
3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch nominal maximum aggregate size.
4. Foaming Agent: ASTM C 869.
5. Water: ASTM C 94/C 94M.
6. Air-Entraining Admixture: ASTM C 260.
B. Produce low-density, controlled low-strength material with the following physical properties:
1. As-Cast Unit Weight: 30 to 36 lb/cu. Ft at point of placement, when tested according to ASTM C 138/C 138M.
2. Compressive Strength: 80 psi, when tested according to ASTM C 495.
C. Produce conventional-weight, controlled low-strength material with 80-psicompressive strength when tested according to ASTM C 495.

2.4 ACCESSORIES
A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 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 as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

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 earthwork operations.
B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
C. Provide erosion-control measures to prevent erosion of displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system, specified in Division 31 Section "Dewatering," to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Not allowed

3.4 EXCAVATION, GENERAL

A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
   a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
   a. 24 inches outside of concrete forms other than at footings.
   b. 12 inches outside of concrete forms at footings.
   c. 6 inches outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
   e. 6 inches beneath bottom of concrete slabs-on-grade.
   f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: As indicated.
C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
   1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.
B. If Architect determines that unsuitable soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
C. Proof-roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect/Engineer.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated suitable 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.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, damp proofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.

5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 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. Backfill trenches excavated under footings and within 18 inches of bottom of footings with concrete to elevation of bottom of footings.
D. 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.
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 utility pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.
G. Backfill voids with suitable soil while installing and removing shoring and bracing.
H. Place and compact final backfill of suitable soil to final subgrade elevation.
I. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
J. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 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 suitable soil material.
   2. Under walks and pavements, use suitable soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.
C. Place fill on subgrades free of mud, frost, snow, or ice.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within limits identified in the geotechnical report.
   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 suitable soil material that exceeds optimum moisture and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Mass Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades as indicated on plans.

3.17 SUBSURFACE DRAINAGE

A. Subsurface Drain: As specified on the plans

3.18 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Place base course material over subbase.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase and base course to required crown elevations and cross-slope grades.
4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
5. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. Under cast-in-place concrete slabs-on-grade, place drainage course on prepared subgrade and as follows:

1. When compacted thickness of drainage course is 6 inches or less, place materials in single layer.
2. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent (or as recommended in the Geotechnical Report) of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
    1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2500 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests per lift.
    2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
    3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 300 feet or less of trench length, but no fewer than 2 tests.
E. 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 to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
    1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
    1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus suitable soil and waste material, including unsuitable soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Cold milling of existing hot-mix asphalt pavement.
   2. Hot-mix asphalt patching.
   3. Hot-mix asphalt paving.
   4. Asphalt surface treatments.
   5. Pavement-marking paint.

B. Related Sections:
   1. Division 31 Section "Earth Moving" for aggregate subbase and base courses and for aggregate pavement shoulders.
   2. Division 32 Sections for other paving installed as part of crosswalks in asphalt pavement areas.
   3. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants and fillers at paving terminations.

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D8 for definitions of terms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
   1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
   2. Job-Mix Designs: For each job mix proposed for the Work.

B. Qualification Data: For qualified manufacturer.

C. Material Certificates: For each paving material from manufacturer.

D. Material Test Reports: For each paving material.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the DOT of state in which Project is located.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the DOT of state in which Project is located for asphalt paving work.
   1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

D. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
    a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
    b. Review condition of subgrade and preparatory work.
    c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
    d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
    1. Tack Coat: Minimum surface temperature of 40 deg F.
    2. Slurry Coat: Comply with weather limitations in ASTM D 3910.
    3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
    4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.
B. Coarse Aggregate: AASHTO T92 (50% loss max), AASHTO T85 (4% adsorption max) and sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof in accordance with MoDot Section 1002.3.
    1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
D. Mineral Filler: Rock or limestone dust, hydraulic cement, or other inert material meeting AASHTO T37 and conforming to the following gradation:
E. Passing No. 30 Sieve 100
F. Passing No. 50 Sieve 95-100
G. Passing No. 100 Sieve 90-100
H. Passing No. 200 Sieve 70-100

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 64-22
B. Asphalt Cement: ASTM D 3381 for viscosity-graded material.
C. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application. Grade SS-1 or SS-1H.
D. Fog Seal: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
E. Water: Potable.
F. Undersealing Asphalt: ASTM D 3141, pumping consistency.

2.3 AUXILIARY MATERIALS

A. Sand: AASHTO M 29, Grade Nos. 2 or 3.
B. Paving Geotextile: AASHTO M 288, nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.
C. Joint Sealant: ASTM D 6690 Type II hot-applied, single-component, polymer-modified bituminous sealant.
D. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N; colors complying with FS TT-P-1952.
    1. Color: White: Chip # 37925
    2. Yellow: Chip # 33538
E. Glass Beads: AASHTO M 247, Type 1.
F. Wheel Stops: Not used

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by MoDot.
    1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
    2. Provide mixes complying with composition, grading, and tolerance requirements in ASTM D 3515 for the following nominal, maximum aggregate sizes:
        a. Asphaltic Base Course: MoDOT Base
        b. Asphaltic Surface Course: MoDOT BP-1 or BP-2
B. Emulsified-Asphalt Slurry: ASTM D 3910, Grad SS-1 or SS-1H.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.
B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
    1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
    2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
    3. Excavate soft spots, unsuitable soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
C. Proceed with paving only after unsuitable conditions have been corrected.

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
   1. Mill to a depth of 1-1/2 inches.
   2. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
   3. Control rate of milling to prevent tearing of existing asphalt course.
   4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
   5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
   6. Transport milled hot-mix asphalt to asphalt recycling facility.
   7. Keep milled pavement surface free of loose material and dust.

3.3 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd..
   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
D. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
   1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.
B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/2 inch.
   1. Clean cracks and joints in existing hot-mix asphalt pavement.
   2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
   3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..
   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.6 PAVING GEOTEXTILE INSTALLATION

A. Section not used.

3.7 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
   1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
   2. Place hot-mix asphalt surface course in single lift.
   3. Spread mix at minimum temperature of 250 deg F.
   4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
   5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
   1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
   1. Clean contact surfaces and apply tack coat to joints.
   2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
   3. Offset transverse joints, in successive courses, a minimum of 24 inches.
   4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
   5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
   6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
   1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
   1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
   2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 ASPHALT CURBS

A. Section not used

3.11 ASPHALT TRAFFIC-CALMING DEVICES

A. Section not used

3.12 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
   1. Base Course: Plus or minus 1/2 inch.
   2. Surface Course: Plus 1/4 inch, no minus.
B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
   1. Base Course: 1/4 inch.
   2. Surface Course: 1/8 inch.
   3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.
C. Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8 inch of height indicated above pavement surface.

3.13 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. to existing asphalt pavement and allow to cure. With fine sand, lightly dust areas receiving excess fog seal.
B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.
   1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.14 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 28 days before starting pavement marking.
C. Sweep and clean surface to eliminate loose material and dust.
D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
   1. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal..

3.15 WHEEL STOPS
A. Section not used

3.16 PREFORMED TRAFFIC-CALMING DEVICES
A. Section not used

3.17 FIELD QUALITY CONTROL
A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.
   1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
   2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
      a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
      b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
E. Replace and compact hot-mix asphalt where core tests were taken.
F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.18 DISPOSAL
A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow milled materials to accumulate on-site.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Driveways and roadways.
   2. Parking lots.
   3. Curbs and gutters.
   4. Walkways.
   5. Unit paver base.

B. Related Sections include the following:
   1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
   2. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
   3. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Concrete Pavement Joint Plan: Contractor shall submit to the Engineer for approval proposed jointing plan. Plan shall be submitted no later than 4 weeks prior to concrete pavement placement. Plan shall include proposed location of all construction, isolation, and contraction joints.

C. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
   1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Admixtures.
   5. Curing compounds.
   6. Bonding agent or epoxy adhesive.

7. Joint fillers.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

D. Concrete Testing Service: The owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
   1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete producer.
      d. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Products: Subject to compliance with requirements, provide one of the products specified.
   3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves with a radius 100 feet or less.
B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
B. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
   1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
   1. Portland Cement: ASTM C 150, Type I, gray. Select class of aggregate from options in paragraph below or revise to suit Project. ASTM C 33 limits deleterious substances in coarse aggregate depending on climate severity and in-service location of concrete. Classes 4S, 4M, and 1N apply to pavements in severe, moderate, and negligible weathering regions, respectively. Retain option for documented service record data if damage caused by concrete expansion from alkali-silica or alkali-carbonate reactions may be anticipated.
B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source with documented MoDot inspection record.
   1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
C. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
   1. Aggregate Sizes: 1/2 to 3/4 inch nominal.
   2. Aggregate Source, Shape, and Color: As determined by the architect.
D. Water: ASTM C 94/C 94M.
E. Air-Entraining Admixture: ASTM C 260.
F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: When shown on the drawings provide Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.
   1. Available Products:
      a. Monofilament Fibers:
         1) Axim Concrete Technologies; Fibrasol IIP.
         2) Euclid Chemical Company (The); Fiberstrand 100.
         3) FORTA Corporation; Forta Mono.
         4) Grace, W. R. & Co.--Conn.; Grace MicroFiber.
         5) Metalcrete Industries; Polystrand 1000.
         6) SI Concrete Systems; Fibermix Stealth.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
C. Water: Potable.
D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
   1. Available Products:
      a. Axim Concrete Technologies; Cimfilm.
      b. Burke by Edeco; BurkeFilm.
      c. ChemMasters; Spray-Film.
      d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
      e. Dayton Superior Corporation; Sure Film.
      f. Euclid Chemical Company (The); Eucobar.
      g. Kaufman Products, Inc.; Vapor Aid.
      h. Lambert Corporation; Lambco Skin.
      i. L&M Construction Chemicals, Inc.; E-Con.
      j. MBT Protection and Repair, ChemRex Inc.; Confilm.
      k. Meadows, W. R., Inc.; Sealtight Evapre.
      l. Metalcrete Industries; Waterhold.
      m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
      n. Sika Corporation, Inc.; SikaFilm.
      o. Symons Corporation; Finishing Aid.
      p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
E. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.
   1. Available Products:
      a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.
      b. Burke by Edoco; Resin Emulsion White.
      c. ChemMasters; Safe-Cure 2000.
      d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
      e. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
      f. Euclid Chemical Company (The); Kurez VOX White Pigmented.
      g. Kaufman Products, Inc.; Thinfilm 450.
      h. Lambert Corporation; Aqua Kure-White.
      i. L&M Construction Chemicals, Inc.; L&M Cure R-2.
      j. Meadows, W. R., Inc.; 1200-White.
      k. Symons Corporation; Resi-Chem White.

l. Tamms Industries, Inc.; Horncure 200-W.
m. Unitex; Hydro White.
n. Vexcon Chemicals, Inc.; Certi-Vex Enviocure White 100.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
B. Color Pigment: Refer to the plans and manufactures specifications
C. Slip-Resistive Aggregate Finish: Section not used
D. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
E. 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 requirements, and as follows:
   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
F. Chemical Surface Retarder: Water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.
   1. Available Products:
      a. Burke by Edeco; True Etch Surface Retarder.
      b. ChemMasters; Exposee.
      c. Conspec Marketing & Manufacturing Co., Inc.; Delay S.
      d. Euclid Chemical Company (The); Surface Retarder S.
      e. Kaufman Products, Inc.; Expose.
      f. Metalcrete Industries; Surftard.
      g. Nox-Crete Products Group, Kinsman Corporation; Crete-Nox TA.
      h. Scofield, L. M. Company; Lithotex.
      i. Sika Corporation, Inc.; Rugasol-S.
      j. Vexcon Chemicals, Inc.; Certi-Vex Envioset.

2.8 PAVEMENT MARKINGS

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type II or AASHTO M 248, Type N.
B. Glass Beads: AASHTO M 247, Type 1.

2.9 WHEEL STOPS

A. Section not used

2.10 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
   1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
B. Proportion mixtures to provide normal-weight concrete with the following properties:
   1. Mix design shall correspond to MoDOT Class B-1 concrete, air-entrained.
C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
   1. Air Content: 5 percent plus or minus 1.5 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use plasticizing and retarding 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.
F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
   1. When air temperature is between 85 deg F 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/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For concrete mixes 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 concrete mixes 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, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
   1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
   2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
   3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1 require correction according to requirements in Division 31 Section "Earth Moving."
C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
   1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
   1. Doweled Joints: Install 1"x18" dowel bars and support assemblies at all construction joints. Dowels shall be spaced at 24" OC. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
C. Isolation Joints: Form isolation joints of preformed ¾" joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
   1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
   2. Extend joint fillers full width and depth of joint.
   3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
   4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
   5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
   6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated or spaced no more than 12 feet from one another. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement:
   1. Doweled Contraction Joints: Install 1"x18" dowel bars and support assemblies at all bars and support assemblies at all contraction joints. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site.

F. Do not add water to fresh concrete after testing.

G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

J. Screed pavement surfaces with a straightedge and strike off.

K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

L. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

M. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

N. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

O. 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 air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

P. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to 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 moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.
B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 SPECIAL FINISHES

A. Section not used

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
B. Comply with ACI 306.1 for cold-weather protection.
C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
   1. Moist 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. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   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.

3.10 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.

3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.11 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.
C. Sweep and clean surface to eliminate loose material and dust.
D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
   1. Spread glass beads uniformly into wet pavement markings at a rate of 6 lb/gal..

3.12 WHEEL STOPS

A. Section not used

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least 1 composite sample for each 5000 sq. ft. or fraction thereof of each concrete mix placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
   6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
      a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.14 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Expansion and contraction joints within cement concrete pavement.
   2. Joints between cement concrete and asphalt pavement.
B. Related Sections include the following:
   1. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
   2. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.
B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the commencement of the Work.
   1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
   2. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
   3. When joint substrates are wet or covered with frost.
   4. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   5. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
B. Colors of Exposed Joint Sealants: As selected by Landscape Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
   1. Products:
      a. Crafco Inc.; RoadSaver Silicone.
      b. Dow Corning Corporation; 888.

2.4 HOT-APPLIED JOINT SEALANTS

A. Section not used

2.5 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.6 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
   1. Proceed with installation only after unsuitable conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of backer materials.
   2. Do not stretch, twist, puncture, or tear backer materials.
   3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses provided for each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

REPUBLIC PARKS – AQUATIC CENTER EXPANSION
CITY OF REPUBLIC
REPUBLIC, MO

SECTION 323113 - CHAIN LINK FENCES AND GATES

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. Chain-link fences.
2. Swing gates.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete and post footings.

1.3 PREINSTALLATION MEETINGS

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
   a. Fence and gate posts, rails, and fittings.
   b. Chain-link fabric, reinforcements, and attachments.
   c. Gates and hardware.

B. Shop Drawings: For each type of fence and gate assembly.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include accessories, hardware, gate operation, and operational clearances.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: For each type of factory-applied finish.

D. Delegated-Design Submittal: For structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

A. Mockups: Build mockups to set quality standards for fabrication and installation.

1. Build mockup for typical chain-link fence and gate, including accessories.
   a. Size: 10-foot length of fence.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Failure to comply with performance requirements.
   b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.

B. 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: Per local code requirements .
   a. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified.

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: As indicated on Drawings.
2. Steel Wire for Fabric: Wire diameter of 0.120 inch .
    a. Mesh Size: 1-3/4 inches .
    b. Polymer-Coated Fabric: ASTM F 668, Class 2a over zinc -coated steel wire.
        1) Color: Black , according to ASTM F 934.
3. Selvage: Knuckled at both selvages .

2.3 FENCE FRAMEWORK

A. Posts and Rails : ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:

1. Fence Height: As indicated on Drawings .
2. Horizontal Framework Members: Intermediate top rails according to ASTM F 1043.
3. Brace Rails: ASTM F 1043.
4. Polymer coating over metallic coating.
    a. Color: Match chain-link fabric , according to ASTM F 934.

2.4 TENSION WIRE

A. Polymer-Coated Steel Wire: 0.177-inch- diameter, tension wire according to ASTM F 1664, Class 2a over zinc -coated steel wire.

1. Color: Match chain-link fabric , according to ASTM F 934.

2.5 SWING GATES

A. General: ASTM F 900 for gate posts and single double swing gate types.

1. Gate Leaf Width: As indicated on drawings.
2. Framework Member Sizes and Strength: Based on gate fabric height as indicated .

B. Pipe and Tubing:

1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framework .
2. Gate Posts: Round tubular steel .
3. Gate Frames and Bracing: Round tubular steel .

C. Frame Corner Construction: Welded.

2.6 FITTINGS

A. Provide fittings according to ASTM F 626.

B. Post Caps: Provide for each post.

1. Provide line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and rails to posts.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
   a. Hot-Dip Galvanized Steel: 0.148-inch- diameter wire ; galvanized coating thickness matching coating thickness of chain-link fence fabric.

I. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.
   a. Polymer coating over metallic coating.

2.7 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. 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.

2.8 GROUNDING MATERIALS

A. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.

1. Connectors for Below-Grade Use: Exothermic welded type.
2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.

1. Install fencing on established boundary lines inside property line.

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.

D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more 30 degrees or more . For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.

E. Line Posts: Space line posts uniformly at 10 feet o.c.

F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 18 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. As indicated on Drawings .

H. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

I. Intermediate and Bottom Rails: Secure to posts with fittings.

J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1-inch 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.

K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.

L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.4 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 GROUNDING AND BONDING

A. Fence and Gate Grounding:

1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
2. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet .
3. Ground fence on each side of gates and other fence openings.
    a. Bond metal gates to gate posts.
    b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

B. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

C. Connections:

1. Make connections with clean, bare metal at points of contact.
2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
4. Make above-grade ground connections with mechanical fasteners.
5. Make below-grade ground connections with exothermic welds.
6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

D. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.

3.6 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.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 323113

SECTION 323223 - SEGMENTAL RETAINING WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Segmental retaining walls.

B. Related Requirements:

1. Section 312000 "Earth Moving" for excavation for segmental retaining walls, base material, soil fill, fill placement and compaction, and field in-place density testing.

1.2 ACTION SUBMITTALS

A. Shop Drawings:

1. Show sizes, profiles, coursing, and locations of retaining wall units; including backfill and leveling base materials.
2. Show types, sizes, locations of soil reinforcing materials.
3. Signed and sealed by the qualified professional engineer responsible for their preparation.

B. Samples for Verification: Actual sample of finished products for each type of exposed finish of segmental retaining wall units.

1. Size: Manufacturers' standard size.

C. Delegated Design Submittals: For segmental retaining walls, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of segmental retaining wall unit and soil reinforcement from manufacturer.

1. Include test data for shear strength between segmental retaining wall units in accordance with ASTM D6916.
2. Include test data for connection strength between segmental retaining wall units and soil reinforcement in accordance with ASTM D6638.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Entity that employs installers certified under the National Concrete Masonry Association (NCMA) Certified Segmental Retaining Wall Installer program at the Basic certification level.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store and handle concrete units and accessories to prevent deterioration or damage due to contaminants, breaking, chipping, or other causes.

B. Store geosynthetics in manufacturer's original packaging with labels intact. Store and handle geosynthetics to prevent deterioration or damage due to sunlight, chemicals, flames, temperatures above 160 deg F or below 32 deg F, and other conditions that might damage them. Verify identification of geosynthetics before use, and examine them for defects as material is placed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design segmental retaining walls.

B. Structural Performance: Engineering design shall be based on the following loads and be in accordance with NCMA's "Design Manual for Segmental Retaining Walls."

1. Gravity loads due to soil pressures resulting from grades indicated.
2. Superimposed loads (surcharge) indicated on Drawings.

2.2 SEGMENTAL RETAINING WALL UNITS

A. Concrete Units: ASTM C1372, Normal Weight, except that units shall not differ in height more than plus or minus 1/16 inch from specified dimension.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Versa-Lok Retaining Wall Systems.
   b. Or approved equal.
2. Provide units that comply with requirements in ASTM C1372 for freeze-thaw durability.
3. Provide units that interlock with courses above and below by means of pins .

B. Color: As selected by Landscape Architect from manufacturer's full range.

C. Shape and Texture:

1. Provide units matching basic shape, dimensions, and face texture of basis-of-design product.

D. Cap Units: Provide cap units of with smooth, as-cast top surfaces without holes or lugs.

E. Special Units: Provide corner units, end units, and other shapes as needed to produce segmental retaining walls of dimensions and profiles indicated and to provide texture on exposed surfaces as indicated.

2.3 INSTALLATION MATERIALS

A. Pins: Product supplied by segmental retaining wall unit manufacturer for use with units provided, made from non degrading polymer reinforced with glass fibers.

B. Cap Adhesive: Product supplied or recommended by segmental retaining wall unit manufacturer for adhering cap units to units below.

C. Leveling Base: Comply with requirements in Section 312000 "Earth Moving" for base course.

D. Drainage Fill: Comply with requirements in Section 312000 "Earth Moving" for drainage course.

E. Reinforced Soil Fill:

1. Comply with requirements in Section 312000 "Earth Moving" for satisfactory soils.
2. ASTM D2487; GW, GP, SW, SP, and SM soil classification groups or a combination of these groups; free of debris, waste, frozen materials, vegetation, and other deleterious matter; complying with the following gradation in accordance with ASTM C136/C136M: 20 to 100 percent passing No. 4 sieve, zero to 60 percent passing No. 40 sieve, zero to 35 percent passing No. 200 sieve, and with fine fraction having a plasticity index of less than 20.

F. Nonreinforced-Soil Fill: Comply with requirements in Section 312000 "Earth Moving" for satisfactory soils.

G. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

H. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation of greater than 50 percent.

1. Apparent Opening Size: No. 70 to 100 sieve, maximum; ASTM D4751.
2. Minimum Grab Tensile Strength: 110 lb; ASTM D4632/D4632M.
3. Minimum Weight: 4 oz./sq. yd.

I. Soil Reinforcement: Product specifically manufactured for use as soil reinforcement and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Versa-Lok Retaining Wall Systems.
   b. Or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF RETAINING WALLS

A. General: Place units in accordance with NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions.

1. Form corners and ends by using special units or cutting units with motor-driven saw.

B. Do not use units with chips, cracks, or other defects where such defects are exposed in the completed Work.

C. Leveling Base: Place and compact base material to thickness indicated and with not less than 95 percent maximum dry unit weight in accordance with ASTM D698.

D. First Course: Place first course of segmental retaining wall units for full length of wall. Place units in firm contact with each other, properly aligned and level.

1. Tamp units into leveling base as necessary to bring tops of units into a level plane.

E. Subsequent Courses: Remove excess fill and debris from tops of units in course below. Place units in firm contact, properly aligned, and directly on course below.

1. For units with lugs designed to fit into holes in adjacent units, lay units so lugs are accurately aligned with holes, and bedding surfaces are firmly seated on beds of units below.
2. For units with lips at front of units, slide units as far forward as possible for firm contact with lips of units below.
3. For units with lips at bottom rear of units, slide units as far forward as possible for firm contact of lips with units below.
4. For units with pins, install pins and align units.
5. For units with clips, install clips and align units.

F. Cap Units: Place cap units and secure with cap adhesive.

3.3 FILL PLACEMENT

A. General: Comply with requirements in Section 312000 "Earth Moving," with NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions.

B. Fill voids between and within units with drainage fill. Place fill as each course of units is laid.

C. Place, spread, and compact drainage fill and soil fill in uniform lifts for full width and length of embankment as wall is laid. Place and compact fills without disturbing alignment of units. Where both sides of wall are indicated to be filled, place fills on both sides at same time. Begin at wall, and place and spread fills toward embankment.

1. Use only hand-operated compaction equipment within 48 inches of wall or one-half of height above bottom of wall, whichever is greater.
2. Compact reinforced-soil fill to not less than 95 percent maximum dry unit weight in accordance with ASTM D698.
    a. In areas where only hand-operated compaction equipment is allowed, compact fills to not less than 90 percent maximum dry unit weight in accordance with ASTM D698.

b. In areas where fill height exceeds 15 feet, compact reinforced-soil fill that will be more than 15 feet below finished grade to not less than 98 percent maximum dry unit weight in accordance with ASTM D698.
c. In areas where fill height exceeds 30 feet, compact reinforced-soil fill that will be more than 30 feet below finished grade to not less than 100 percent maximum dry unit weight in accordance with ASTM D698.

3. Compact nonreinforced-soil fill to comply with Section 312000 "Earth Moving."

D. Place drainage geotextile against back of wall, and place layer of drainage fill at least 12 inches wide behind drainage geotextile to within 12 inches of finished grade. Place another layer of drainage geotextile between drainage fill and soil fill.

E. Wrap subdrainage pipe with filter fabric and place in drainage fill as indicated , sloped not less than 0.5 percent to drain.

F. Place impervious fill over top edge of drainage fill layer.

G. Slope grade at top of wall away from wall unless otherwise indicated. Slope grade at wall base away from wall. Provide uniform slopes that prevent ponding.

H. Place soil reinforcement in horizontal joints of retaining wall where indicated and in accordance with soil-reinforcement manufacturer's written instructions. Embed reinforcement a minimum of 8 inches into retaining wall and stretch tight over compacted backfill. Anchor soil reinforcement before placing fill.

1. Place additional soil reinforcement at corners and curved walls to provide continuous reinforcement.
2. Place geosynthetics with seams, if any, oriented perpendicularly to segmental retaining walls.
3. Do not dump fill material directly from trucks onto geosynthetics.
4. Place at least 6 inches of fill over reinforcement before compacting with tracked vehicles or 4 inches before compacting with rubber-tired vehicles.
5. Do not turn vehicles on fill until first layer of fill is compacted and second layer is placed over each soil-reinforcement layer.

3.4 CONSTRUCTION TOLERANCES

A. Variation from Level: For bed-joint lines along walls, do not exceed 1-1/4 inches in 10 feet, 3 inches maximum.

B. Variation from Indicated Batter: For slope of wall face, do not vary from indicated slope by more than 1-1/4 inches in 10 feet.

C. Variation from Indicated Wall Line: For walls indicated as straight, do not vary from straight line by more than 1-1/4 inches in 10 feet.

D. Maximum Gap between Units: 1/8 inch.

3.5 ADJUSTING

A. Remove and replace segmental retaining wall construction of the following descriptions:

1. Broken, chipped, stained, or otherwise damaged units. Units may be repaired if Architect approves methods and results.
2. Segmental retaining walls that do not match approved Samples.
3. Segmental retaining walls that do not comply with other requirements indicated.

B. Replace units so segmental retaining wall matches approved Samples and mockups, complies with other requirements, and shows no evidence of replacement.

END OF SECTION 323223

SECTION 328400 - PLANTING IRRIGATION

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. Related Sections:
   1. Section 329200 "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.
   2. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DESCRIPTION OF WORK

A. The work required is indicated on the drawings and includes, but is not limited to, the design, installation, and maintenance of lawn and planting area irrigation systems, backflow prevention devices, protective housings, automatic controller(s), rain sensors, remote control valves, quick coupler valves, and water and electric services.

B. Irrigation system shall be designed as a new system. Connections and zones should be logical in design and appropriate for indicated water service.

   1. Contractor shall verify extent of any exiting system prior to start of design for this scope of work.
   2. Contractor shall familiarize himself with all existing and proposed conditions including grade differences, location of walls, site features, utilities, and all other site improvements.

C. Coordinate with Landscape Contractor the placement, type, and water requirements for all plant material.

D. Areas of underground irrigation system are to include all lawn areas, planting beds, and other disturbed areas as defined in the bid documents. The contractor shall provide the design of the specific system. The system shall be in accordance with the following design performance criteria:

   1. Design of irrigation system shall conform to current industry standards and comply with local and state governing codes.
   2. Location of all major components (i.e.: controller, backflow preventer, meter, etc.) shall be coordinated with the owner.
   3. Site contains irrigated planting areas with steep grades. Refer to grading plans to ensure design allows for even irrigation of slopes and prevents saturating plantings at toes of slopes from irrigation line drain down. Provide check valves and multiple zones on hillsides as necessary to achieve uniform irrigation.

4. All irrigation system(s) shall be designed to minimize vandalism, including lockable protective housings for all equipment installed in location accessible to the public.
5. For each point of connection, submit pressure calculations for the system(s) with the highest psi requirement to operate properly allowing for friction losses within the system. Water velocity within the system shall not exceed 5 fps. In the event pressure differences are not reported prior to start of construction, the irrigation contractor shall assume full responsibility for any revisions necessary.
6. Irrigation system(s) shall have the design capability of delivering 1" of water in a 5 day period.
7. The minimum coverage requirements are 100% head-to-head coverage in lawn area, 90% in all bed areas.
8. Irrigation water shall be applied at a rate which does not exceed the infiltration rate of the soil and system(s) shall be programmed to prevent ponding and runoff.
9. Provide separate control valves for sprinkler line operating at the top, toe, and intermediate areas of slopes.
10. Irrigation system shall be designed to meet the peak moisture demand of all plant materials used within the design area. Separate zones and irrigation methods shall be used for trees, ground cover, planting areas, and turf and sunny vs. shaded areas where applicable.
11. Irrigation system shall be designed and operated to minimize fogging, overspray, and discharge onto areas not under control of the user including streets and sidewalks.
12. Sprinkler heads used in turf areas shall be equipped with protective covers.
13. All sprinkler heads shall be "pop-up" type unless otherwise noted.
14. Irrigation system shall be designed for positive winterization. Provide blowouts where positive drainage is not met.
15. Design system(s) to lowest available pressure per local water company's records.
16. Gate Valves shall be provided to allow shutting down various sections of the system independent of the entire system. Each section shall not exceed four (4) remote control valves. Valves shall be installed per manufacturer's recommendations and local codes and ordinances.
17. All backflow prevention devices must comply with requirements set forth by the local health department and city water department. Prevent any back-siphoning after sectional valves are closed. Backflow prevention devices are not permitted on irrigation systems using reclaimed water.
18. Locate remote control valves in shrub areas when possible. All valves to be in green Ametek boxes, or approved equal. Remote control valves shall be located outside of storm water detention areas or designated athletic play areas (where applicable).
19. Anti-drain valves in line and/or under sprinkler heads are to be properly installed on sloped irrigation systems to minimize to of slope sprinkler drainage.
20. Rain sensor shall be connected to the irrigation controller, out of public view.
21. Provide construction details for components.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Indicate on product data sheets (circle, highlight) which products will be used during the construction of the project. Ensure sheets are scanned and submitted right side up.

B. Wiring Diagrams: For power, signal, and control wiring.

C. Shop Drawings: Submit shop drawings in AutoCAD format, or approved equivalent for underground irrigation system including:

1. Plan layout and details illustrating:

    a. Point of connection.
    b. Location and type of heads.
    c. Valves.
    d. Piping circuits.
    e. Controls.
    f. Electrical information.
    g. Accessories.

2. Drawings shall be sealed and signed by a Certified Irrigation Designer.
3. Drawings shall not exceed 1" = 20'.
4. Color-coded zone diagram to differentiate zones.

D. Substitutions: Submit all desired substitutions for review by the Owner prior to, or simultaneous to, the submittal of the Contractor's bid.

E. Record Drawings (commonly called 'As Built Drawings'):

1. Record accurately on one set of contract drawings all changes in the work constituting departures from the original shop drawings. Maintain Record Drawings on site at all times.
2. The changes and dimensions shall be recorded in a legible and workmanlike manner to the satisfaction of the Landscape Architect. Prior to final inspection of the work, submit Record Drawings.
3. Dimensions shall be from two permanent points of reference (buildings, monuments, sidewalks, curbs, pavements, etc.). Data to be shown on Record Drawings shall be recorded day-to-day as the project is being installed. All lettering on drawings shall be 1/10-inch in size, minimum.
4. Show locations and depths of the following items:

    a. Point of connection.
    b. Routing of sprinkler pressure lines.
    c. Gate valves.
    d. Sprinkler control valves.
    e. Quick coupling valves.
    f. Routing of control wires.
    g. All related equipment (backflow prevention device(s), controller, rain sensor, etc.).

5. The following charts, manuals, and equipment shall be turned over to the Owner or Landscape Architect no later than 10 days prior to the final inspection at the end of the maintenance period.

    a. Record Drawings must be approved by the Landscape Architect before controller schedules and charts are prepared.
    b. Submit a schedule indicating the controller, the station number, the valves controlled by the station, and the length of time each valve is to remain open to produce 1" minimum of precipitation per week.
    c. Provide one (1) controller chart of maximum size controller door will allow for each automatic controller. The chart shall show the area covered by the controller.

        1) The chart is to be a reduced copy of the actual Record Drawing. In the event the controller sequence is not legible when the drawings are reduced, it shall be enlarged to a readable size.

2) Chart shall be on a black line print with different colors used to show the area of coverage for each station.
3) When completed and approved, the chart shall be hermetically sealed between pieces of plastic, each piece being a minimum of 20 mil thickness.
4) Controller charts shall be completed and installed prior to Substantial Completion.

6. All field changes shall be updated in the shop drawings using the same software that created the shop drawings. Record Drawings shall be submitted as a PDF, or approved equal.

F. Qualification Data: For qualified installer.

G. Operation and Maintenance Manuals: One digital file as PDF, or approved equal, of operation and maintenance manual shall be delivered to the Landscape Architect ten (10) calendar days prior to final acceptance inspection. The manual shall describe the material installed. The manual shall include the following information:

1. Index sheet stating the Project Name, Contractor's Company Name, contact person, Company address, telephone number, expiration date of the guarantee period, list of equipment including names and addresses of local manufacturer representatives.
2. Complete operating and maintenance instructions for all equipment.
3. Spare parts lists and related product and manufacturer information for all equipment.

H. Closeout Submittals shall be completed and submitted prior to the issuance of the Final Payment.

I. Inspection Records: Any inspection that does not pass shall be corrected at the Contractor's expense.

J. Equipment: Supply as part of this contract the following items:

1. Two (2) keys for each automatic controller.
2. Two (2) valve box cover keys or wrenches.
3. Two (2) 5' tee wrench for operating gate valves 2-1/2 inches or larger.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sprinklers, controllers, and automatic control valves to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide underground irrigation system as a complete unit produced by the approved manufacturers including heads, valves, controls, and accessories.

B. Designer Qualifications: Designer shall be certified for designing systems that require the reduction of potable and natural water resources as indicated by USGBC/LEED.

C. Installer Qualifications: An employer of workers that include a certified irrigation designer qualified by The Irrigation Association and a company having not less than 5 years of experience in the installation of automated irrigation systems using experienced installers who have worked on projects similar in size and scope of the proposed project. Subcontract irrigation work to an experienced, single firm specializing in irrigation design, installation, and operations. Irrigation installer to have state

certification. Irrigation Contractor to provide 3 references of work that is of similar size, scope, and expected craftsmanship as those shown in the Contract Documents. References shall include project name and address, owner's or general contractor's name, and current contact information. Irrigation Contractor shall be approved by Owner.

D. Electrical Components, Devices, and Accessories: Installation shall be by a licensed electrical contractor as required by local and state regulatory requirements to provide a fully operative irrigation system. Electrical contractor shall provide Owner's Representative documentation of inspection and approval of work by all governing regulatory agencies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

C. All other components.

1.8 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without Owner's written permission.

1.9 WARRANTY

A. Description: For a period of one (1) year after date of Substantial Completion of work performed under this Contract, Contractor shall promptly furnish and install, without cost to Owner, parts which prove to be defective in material or workmanship.

B. Shut down and start-up service

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers for irrigation system equipment are:

1. Rain Bird Corporation.
2. The Toro Company (Toro and Irritrol brands).
3. Hunter Industries.
4. Netafim USA (Drip Irrigation products).
5. Approved Equal.

2.2 MATERIALS AND EQUIPMENT

A. General requirements:

1. New materials and equipment.
2. PVC pipe, drip tubing, fittings, isolation valves, control valves, drip zone valve kits, valve boxes, controller(s), decoder(s), flow sensors, rain gauge, and rain sensor shall all be compatible.

2.3 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.
1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.

C. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedule 40.
1. PVC Socket Fittings: ASTM D 2466, Schedule 40.
2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.

D. PVC Pipe, Pressure Rated: ASTM D 2241, PVC 1120 compound, SDR 21.
1. PVC Socket Fittings: ASTM D 2467, Schedule 80.
2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.4 PIPING JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

C. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656. Solvent shall contain pigment.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.5 MANUAL VALVES

A. Bronze Gate Valves:
1. Description:
a. Standard: MSS SP-80, Type 2.
b. Class: 125.
c. CWP Rating: 200 psig.

d. Body Material: ASTM B 62 bronze with integral seat and screw-in bonnet.
e. Ends: Threaded or solder joint.
f. Stem: Bronze, nonrising.
g. Disc: Solid wedge; bronze.
h. Packing: Asbestos free.
i. Handwheel: Malleable iron, bronze, or aluminum.

2.6 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:
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. Hunter Industries Incorporated.
b. Orbit Irrigation Products, Inc.
c. Rain Bird Corporation.
d. Toro Company (The).
e. Weathermatic.
2. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.7 AUTOMATIC DRAIN VALVES

A. Description: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig (17 to 20 kPa).

2.8 MISCELLANEOUS SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or PDI WH 201, with bellows or piston-type pressurized cushioning chamber and in sizes complying with PDI WH 201, Sizes A to F.

B. Quick Coupling Swing Joints: Schedule 40 PVC tee and 1-inch swing joint with three 90 degree elbows.

C. Rain Gauge: Provide and install tipping rain gauge, compatible with control system.

D. Flow Sensor: Provide and install flow sensor compatible with control package being installed.

1. Flow sensor shall be installed according to manufacturer's recommendations, positioned after/downstream from master valve. Install with manufacturer's recommended distances before and/or after other devices (master valve and mainline tees/fittings).

E. Rain Sensor: Provide and install rain sensor compatible with control system.

2.9 SPRINKLERS

A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

B. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hunter Industries Incorporated.
   b. Rain Bird Corporation.
   c. Toro Company .

2. Description:

   a. Body Material: ABS.
   b. Nozzle: ABS.
   c. Retraction Spring: Stainless steel.
   d. Internal Parts: Corrosion resistant.

C. Plastic, Pop-up Spray Sprinklers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hunter Industries Incorporated.
   b. Rain Bird Corporation.
   c. Toro Company .

2. Description:

   a. Body Material: ABS.
   b. Nozzle: ABS.
   c. Retraction Spring: Stainless steel.
   d. Internal Parts: Corrosion resistant.
   e. Pattern: Fixed, with flow adjustment.

2.10 QUICK COUPLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Hunter Industries Incorporated.
   2. Rain Bird Corporation.
   3. Toro Company .

B. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

   1. Locking-Top Option: Vandal-resistant locking feature. Include two matching key(s).

2.11 CONTROLLERS

A. Two-wire Decoder Controller.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Hunter Industries Incorporated.
   2. Rain Bird Corporation.

3. Toro Company .

C. Description:

1. Controller Stations for Automatic Control Valves: Each station is variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each station.
2. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.

    a. Body Material: Stainless-steel sheet metal.
    b. Mounting: Surface type for wall.

3. Contractor shall provide one remote transmitter/receiver kit per controller and all necessary accessories for users to communicate remotely with the control unit. Receiver mounting location(s) to be coordinated with the Owner.
4. Control Transformer: 24-V secondary, with primary fuse.
5. Rain and Freeze Sensor: Adjustable from one to seven days, to shut off water flow during rain or freezing conditions.
6. Flow monitor: Provide meter/sensor assembly compatible with specified controller for monitoring system flow and detecting zone leaks.
7. Master valve: Incorporate a master valve to disable water flow to the circuit main piping when not in use.
8. Wiring: UL 493, Type UF multiconductor, with solid-copper conductors; insulated cable; suitable for direct burial.
    a. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
    b. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
    c. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

2.12 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:

1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.

    a. Size: As required for valves and service.
    b. Shape: Rectangular.
    c. Sidewall Material: PE, ABS, or FRP.
    d. Cover Material: PE, ABS, or FRP.

        1) Lettering: " IRRIGATION."

B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch (19 mm) minimum to 3 inches (75 mm) maximum.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

B. Install warning tape directly above pressure piping, 12 inches (300 mm) below finished grades, except 6 inches (150 mm) below subgrade under pavement and slabs.

C. Drain Pockets: Excavate to sizes provided on shop drawings. Backfill with cleaned gravel or crushed stone, graded from 3/4 to 3 inches (19 to 75 mm), to 12 inches (300 mm) below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.

D. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 36 inches (900 mm) below finished grade.
2. Circuit Piping: 12 inches (300 mm).
3. Drain Piping: 12 inches (300 mm).
4. Sleeves: 24 inches (600 mm).

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

3.3 PIPING INSTALLATION

A. Location and Arrangement: Shop Drawings shall indicate location and arrangement of piping systems. Install piping as indicated.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Install unions adjacent to valves and to final connections to other components with NPS 2 (DN 50) or smaller pipe connection.

G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 (DN 65) or larger pipe connection.

H. Lay piping on solid subbase, uniformly sloped without humps or depressions.

I. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.

J. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.

K. Install piping in sleeves under parking lots, roadways, and sidewalks.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. 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.

D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 VALVE INSTALLATION

A. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.

B. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.

C. Throttling Valves: Install in underground piping in boxes for automatic control valves.

D. Drain Valves: Install in underground piping in boxes for automatic control valves.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and 2 inches (50 mm) from other boundaries unless otherwise indicated.

3.7 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

A. Equipment Mounting: Install exterior controllers on building wall. Coordinate final location with Owner.

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.

B. Install control cable in same trench as irrigation piping and at least 2 inches (51 mm) below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.8 CONNECTIONS

A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

B. Connect wiring between controllers and automatic control valves.

3.9 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Any irrigation product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that controllers are installed and connected according to the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.11 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2 inch (13 mm) above, finish grade.

D. Adjust all sprinkler heads for optimum performance and to prevent over-spray onto paving and structures.

3.12 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.13 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

END OF SECTION 328400

SECTION 329113 - SOIL PREPARATION

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 planting soils specified by composition of the mixes.

B. Related Requirements:

1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
2. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
3. Section 329300 "Plants" for placing planting soil for plantings.

1.3 ALLOWANCES

A. Preconstruction testing is part of testing and inspecting allowance.

1.4 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

F. Imported Soil: Soil that is transported to Project site for use.

G. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

H. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

I. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

J. SSSA: Soil Science Society of America.

K. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

L. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

M. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

N. USCC: U.S. Composting Council.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for application and use.
2. Include test data substantiating that products comply with requirements.
3. Include sieve analyses for aggregate materials.
4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:

    a. Manufacturer's qualified testing agency's certified analysis of standard products.
    b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
    c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-quart (1-L) volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

C. Delivery and Purchase Tickets: Delivery and purchase tickets for each supplied soil type and compost from supplier. Delivery tickets shall include date, time, driver's name, project name, and quantity of material.

1.6 INFORMATIONAL SUBMITTALS

A. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1. Laboratories: Subject to compliance with requirements, provide testing by one of the following:

a. SGS; 1511 E. Main St.; P.O. Box 175; Belleville, IL 62221.
b. Local University Extension Soils Testing Laboratory (University of Missouri, University of Illinois, etc.)

2. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on imported soil.

1. Notify Landscape Architect seven days in advance of the dates and times when laboratory samples will be taken.

B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by Contractor under the direction of the testing agency.

1. Number and Location of Samples: Minimum of eight representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
2. Procedures and Depth of Samples: Per testing laboratory directions.
3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

    a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
    b. Hydrometer Method: Report percentages of sand, silt, and clay.

C. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."

D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NCR-13, including the following:

1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Soluble-salts ppm.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. (100 sq. m) for 6-inch (150-mm) depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. (100 sq. m) for 6-inch (150-mm) depth of soil.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
5. Topsoil and/or planting soil stockpile(s) shall be formed under normal industry standards. Stockpile height shall not exceed highest point of lifting mechanism of equipment (maximum height: 72 inches; maximum width: 12') creating the stockpile. Stockpile will be considered defective if equipment drives or otherwise compacts stockpile. Do not stockpile within protection zones.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.

B. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Blend existing, on-site surface soil with the soil amendments and fertilizers in the quantities recomended by the testing agency to produce planting soil.

C. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of loam soil according to USDA textures; and modified to produce viable planting soil.

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or noxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, bermuda grass, cuttings and/or rhizomes, zoysia grass, and bromegrass.
2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
3. Unacceptable Properties: Clean soil of the following:

    a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
    b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
    c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches (50 mm) in any dimension.

4. Amended Soil Composition: Blend imported, unamended soil with the soil amendments and fertilizers in the quantities recommended by the testing agency to produce planting soil.

2.2 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 a No. 8 (2.36-mm) sieve and a minimum of 75 percent passing through a No. 60 (0.25-mm) sieve.
2. Class: O, with a minimum of 95 percent passing through a No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through a No. 60 (0.25-mm) sieve.
3. Form: Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through a No. 40 (0.425-mm) sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Feedstock: Limited to leaves and other green waste (grass clippings, twigs, green food waste etc.).
2. Reaction: pH of 5.5 to 8.
3. Soluble-Salt Concentration: Less than 4 dS/m.
4. Moisture Content: 35 to 55 percent by weight.
5. Organic-Matter Content: 50 to 60 percent of dry weight.
6. Particle Size: Minimum of 98 percent passing through a 2-inch (50-mm) sieve.

B. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. Partially Decomposed Wood Derivatives: In lieu of shredded and composted wood derivatives, mix shredded and partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. (2.4 kg/cu. m) of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. (4 kg/cu. m) of loose sawdust or ground bark.

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, persistent herbicides, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. 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: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

a. Poultry based litter.
b. Approved equal.

D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

B. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 2 inches (50 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.

C. Mixing: Spread unamended soil to total depth indicated on Drawings, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments and fertilizer, except compost, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

a. Mix lime or sulfur with dry soil before mixing fertilizer per soil testing recommendations.
b. Mix fertilizer with planting soil no more than seven days before planting.

2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 12 inches (300 mm) in loose depth for material compacted by compaction equipment, and not more than 6 inches (150 mm) in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth indicated on drawings. Remove stones larger than 2 inches (50 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Apply soil amendments and fertilizer, except compost, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

1. Mix lime or sulfur with dry soil before mixing fertilizer per soil testing recommendation.
2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 PROTECTION

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

3.6 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Coordinate with owner the legal disposal of excess subsoil and unsuitable materials.

END OF SECTION 329113

SECTION 329200 - TURF AND GRASSES

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. Seeding.
2. Sodding.
3. Erosion-control material(s).

B. Related Requirements:

1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required maintenance periods.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf and native grass and wildflower seeding establishment.

1. Experience: Five years' experience in turf installation in addition to requirements in Section 014000 "Quality Requirements."
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
3. Pesticide Applicator: State licensed, commercial.
4. Maintenance Proximity: Not more than one hours' normal travel time from Installer's place of business to Project site.

1.7 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 compliance 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" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.9 MAINTENANCE SERVICE

A. Initial Turfgrass Sod Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain and protect Sod Lawns as required in Part 3. Begin maintenance and protection immediately after each area is planted and continue until acceptable turf is established but for not less than **30 days** from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Number 1 Quality/Premium, 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 that is strongly rooted and capable of vigorous growth and development when planted.

1. Turf Type Tall Fescue, with a minimum of 3 improved cultivars, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed. Mix to be submitted to Landscape Architect for approval.

2.2 Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

A. Seed Species:

1. Quality: State-certified seed of grass species as listed below for solar exposure.

2. Full Sun: Turf-Type Tall Fescue, a minimum of three improved cultivars.

2.3 FERTILIZERS

A. 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: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Compost Mulch: 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 (25-mm) sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.5 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.6 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."

B. Placing Planting Soil: As indicated on drawings and specified in Section 329113 Soil Preparation.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" and “Native Seed Bed Preparation” Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph .
   1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
   2. Do not use wet seed or seed that is moldy or otherwise damaged.
   3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 5 to 8 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 with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 1:6 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.

F. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

3.6 SODDING

A. Lay sod within 24 hours of harvesting unless a suitable preservation method is accepted by Architect prior to delivery time. 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 soil or sod during installation. Tamp and roll lightly to ensure contact with soil, 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 slopes exceeding 1:3.
   2. Anchor sod on slopes exceeding 1:6 with biodegradeable anchor stakes or steel staples spaced as recommended by sod manufacturer but not less than two 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 (38 mm) below sod.

3.7 TURF MAINTENANCE

A. Turfgrass shall be maintained for 30 days from the time of substantial completion or until satisfactory turf is established, as approved by landscape architect. 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. Any sod that does not survive the first month shall be replaced with new sod from the same source.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

D. Turf Postfertilization: Apply commercial fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Landscape Architect:
1. 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.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.
3. Tree stabilization.

B. Related Sections:
1. Section 329200 "Turf and Grasses" for turf (lawn), hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

H. Finish Grade: Elevation of finished surface of planting soil.

I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

K. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

L. Planting Area: Areas to be planted.

M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
3. Plant Photographs: digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. For species where more than 20 plants are required, include a

minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Compile photographs for delivery into a single PDF document. Each plant shall utilize one "letter" sized sheet (8.5" x 11") and include the following information:

a. Color Photograph with multi-colored scale rod or adult
b. Full Latin and common name of plant.
c. Size of plant.
d. Name of growing nursery.
e. City, State of nursery.

B. Samples for Verification: For each of the following:

1. Trees and Shrubs: Three samples of each variety and size. Maintain approved samples on-site as a standard for comparison.
2. Organic Mulch: 1-quart (1-liter) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified landscape Installer. Provide 3 references of projects similar in size, scope and expected craftsmanship as those shown in the Contract Documents. Include photographs demonstrating Installer's capabilities and experience. Provide project name, address, year completed, and owner's or general contractor's name and current contact information.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Material Test Reports: For existing native surface topsoil, and imported or manufactured topsoil.

D. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

E. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Ten years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements." Landscape Contractor shall be approved by Owner.

3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation, maintenance, and irrigation specialty areas, designated CLT-Exterior.
    b. Certified Ornamental Landscape Professional, designated COLP.

5. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of plants purchased under allowances will be made by Landscape Architect, who will tag plants at their place of growth before they are prepared for transplanting.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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 if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Landscape Architect no fewer than two weeks in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Landscape Architect's or Owner's written permission.

C. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Perennials, grasses, and shrubs: March 1 to June 15
2. Trees and shrubs: October 1 to March 30th.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.9 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of tree stabilization & edgings.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Substantial Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
c. Annuals: Three months.

3. Include the following remedial actions as a minimum:

    a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
    b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
    c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
    d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.10 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

    1. Maintenance Period: 12 months from date of Substantial Completion.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

    1. Maintenance Period: 12 months from date of Substantial Completion.

C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

    1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.
    2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

E. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 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 (2.36-mm) sieve and a minimum of 75 percent passing through No. 60 (0.25-mm) sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.
3. Provide lime in form of ground dolomitic limestone or calcitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) 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 (0.30-mm) 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.

2.3 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 through1/2-inch (13-mm) sieve; soluble salt

content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. 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, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 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. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

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. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

E. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 21-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

F. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

2.5 PLANTING SOILS: Refer to “Section 329113 - Soil Preparation”

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood or Ground or shredded bark.
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
3. Color: Natural.

2.7 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end.
2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.
4. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
5. Guy Cables: Five-strand, 3/16-inch-(4.8-mm-)diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches (75 mm) long, with two 3/8-inch (10-mm) galvanized eyebolts.
6. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.

2.9 MISCELLANEOUS PRODUCTS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

B. Burlap: Non-synthetic, biodegradable.

C. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

D. Planter Filter Fabric: Woven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

E. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Landscape Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped or container-grown stock.
2. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
8. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Subsoil and topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch-(150-mm-)diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.4 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare2 inches (50 mm) above adjacent finish grades.

1. Use planting soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set container-grown stock plumb and in center of planting pit or trench with root flare2 inches (50 mm) above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.5 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not apply pruning paint to wounds.

3.6 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.

2. Use two stakes for trees up to 12 feet (3.6 m) high and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Staking and Guying: Stake and guy trees more than 14 feet (4.2 m) in height and more than 3 inches (75 mm) in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes 30 inches (760 mm) long, driven to grade.

1. Site-Fabricated Staking-and-Guying Method:

a. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
b. Support trees with strands of cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
c. Attach flags to each guy wire, 30 inches (760 mm) above finish grade.
d. Paint turnbuckles with luminescent white paint.

3.7 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.8 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 2-inch (50-mm) average thickness, with 36-inch (900-mm) radius around trunks or stems. Do not place mulch within 3 inches (75 mm) of trunks or stems.

2. Organic Mulch in Planting Areas: Apply 2-inch (50-mm) average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.9 EDGING INSTALLATION

A. Shovel/Spade-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch-(100- to 150-mm-) deep, shovel-cut edge as shown on Drawings.

3.10 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.11 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.13 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 329300

SECTION 331100 – WATER UTILITY DISTRIBUTION PIPING

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 outside the building for the following:
   1. Water services.
   2. Fire-service mains.
B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

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. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Piping specialties.
   2. Valves and accessories.
B. Field Quality-Control Test Reports: From Contractor.
C. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
   1. Valves.

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. Refer to Division 01 Section "Product Requirements."
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. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
E. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
F. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
G. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
H. NSF Compliance:
   1. Comply with NSF 14 for plastic potable-water-service piping
   2. 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 Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect'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. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
   2. Products: Subject to compliance with requirements, provide one of the products specified.
   3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
   4. 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, fitting, and joining materials.

2.3 DUCTILE-IRON CULVERT PIPE AND FITTINGS

A. Section not used

2.4 COPPER TUBE AND FITTINGS

A. Section not used

2.5 PE PIPE AND FITTINGS

A. Section not used

2.6 PEX TUBE AND FITTINGS

A. Section not used

2.7 PVC PIPE AND FITTINGS

A. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket and spigot end.
   1. Comply with UL 1285 for fire-service mains if indicated.
   2. 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.

2.8 JOINING MATERIALS

A. Refer to Division 33 Section "Utility Materials" for commonly used joining materials.
B. 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.

C. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.9 PIPING SPECIALTIES

A. Section not used

2.10 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.

2.11 GATE VALVES

A. Acceptable Manufacturers
   1. Per City of Republic Construction Specifications

2.12 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Section not used

2.13 CHECK VALVES

A. Section not used

2.14 CORPORATION VALVES AND CURB VALVES

A. Section not used

2.15 WATER-REGULATING VALVES

A. Section not used

2.16 RELIEF VALVES

A. Section not used

2.17 DETECTOR CHECK VALVES

A. Section not used

2.18 WATER METERS

A. Water meters will be furnished by City of Republic.

2.19 DETECTOR-TYPE WATER METERS

A. Section not used

2.20 WATER-METER BOXES
A. Contractor shall coordinate with City of Republic

2.21 HOSE-CONNECTION, BACKFLOW-PREVENTION DEVICES
A. Section not used

2.22 BACKFLOW PREVENTERS
A. Per MEP Plans

2.23 CONCRETE VAULTS
A. Section not used

2.24 PROTECTIVE ENCLOSURES
A. Valve Boxes
1. Contractor shall coordinate with City of Republic

2.25 FREESTANDING FIRE HYDRANTS
A. Section not used

2.26 FLUSHING HYDRANTS
A. Section not used

2.27 FIRE DEPARTMENT CONNECTIONS
A. Section not used

2.28 ALARM DEVICES
A. Section not used

2.29 POST HYDRANTS
A. Section not used

2.30 DRINKING FOUNTAINS
A. Section not used

PART 3 - EXECUTION

3.1 EARTHWORK
A. Refer to Division 31 Section "Earth Moving" 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 ¾ to NPS 3: PVC, Schedule 80 socket fittings; and solvent-cemented joints.
    2. NPS 4 to NPS 8: PVC C900 pipe; push on gasketed joints, ductile-iron fittings
F. Underground Fire-Service-Main Piping: Use the following:
    1. NPS 4 to NPS 8: PVC C900 pipe listed for fire-protection service; push on gasketed joints, ductile-iron fittings
G. Underground Combined Water-Service and Fire-Service-Main Piping: Use the following:
    1. Section not used

3.3 VALVE APPLICATIONS

A. As specified in Section 2.11

3.4 JOINT CONSTRUCTION

A. Joints:
    1. Push-On:
        a. All pipe shall be provided with push-on joints conforming to ANSI A21.51/AWWA C111, except gaskets shall be synthetic rubber. Natural rubber will not be acceptable. The pipe shall be cement mortar lined, conforming to ANSI A2104/AWWA C104 and shall be coated inside and out with a bituminous coating.
    2. Restrained:
        a. Provide restrained joint pipe where required.
        b. Provide restrained joints of following approved types:
    3. Restrained mechanical joint
    4. Restrained push-on joint.
    5. Boltless or bolted ball and socket joint.
    6. Anchored couplings.
        a. Provide retainer glands where required.

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Division 33 Section "Utility Materials" for piping-system common requirements.

3.6 PIPING INSTALLATION

A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
B. 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.
C. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.
D. Bury piping with depth of cover over top at least 42".

E. Install piping by tunneling, jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
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.
G. Anchor service-entry piping to building wall.
H. See Division 22 for potable-water piping inside the building.
I. See Division 22 for fire-suppression water piping inside the building.

3.7 ANCHORAGE INSTALLATION

A. Section not used

3.8 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.

3.9 WATER-METER INSTALLATION

A. Install water meters, piping, and specialties according to City of Republic's written requirements.

3.10 ROUGHING-IN FOR WATER METERS

A. Rough-in piping and specialties for water-meter installation according to City of Republic's written instructions and requirements.

3.11 PROTECTIVE ENCLOSURE INSTALLATION

A. Install protective enclosure over valves and equipment.
B. Anchor protective enclosure to concrete base.

3.12 FIRE HYDRANT INSTALLATION

A. Per City of Republic Construction Specifications and City of Republic Fire Department standards

3.13 FLUSHING HYDRANT INSTALLATION

A. Per City of Republic Construction Specifications and City of Republic Fire Department standards

3.14 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Section not used

3.15 ALARM DEVICE INSTALLATION

A. See MEP plans

3.16 POST HYDRANT INSTALLATION

A. Section not used

3.17 DRINKING FOUNTAIN INSTALLATION

A. Section not used

3.18 CONNECTIONS

A. Piping installation requirements are specified in other Division 33 Sections. Drawings indicate general arrangement of piping and specialties.
B. See Division 33 Section "Utility Materials" for piping connections to valves and equipment.
C. Connect water-distribution piping to existing utility water main. Connection to be coordinated with utility.
D. Connect water-distribution piping to interior domestic-water and fire-suppression piping.

3.19 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: Test at not less than 1-1/2 times working pressure 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.

3.20 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Division 31 Section "Earth Moving" for underground warning tapes.
B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel. See Division 33 Section "Utility Materials" for identifying devices.

3.21 ADJUSTING

A. Section not used

3.22 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:
        a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.

b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.
C. After completing drinking fountain installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
D. Clean drinking fountains, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 331100

SECTION 334100 - UTILITY DRAINAGE PIPING

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 gravity-flow, non-pressure storm drainage outside the building, with the following components:
   1. Cleanouts.
   2. No pressure drainage piping
   3. Concrete manholes junction boxes and inlets.

1.3 DEFINITIONS

A. HDPE: High Density Polyethylene plastic.
B. PVC: Polyvinyl chloride plastic.
C. RCP: Reinforced concrete pipe

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating: 10-foot head of water
Pipe joints shall be at least silt-tight, unless otherwise indicated.

1.5 SUBMITTALS

A. Product Data: For the following:
   1. Special pipe fittings.
   2. Drains.
B. Shop Drawings: For the following:
   1. Manholes and Junction Boxes: Include plans, elevations, sections, details, and frames and covers. Include design calculations, and concrete design-mix report for cast-in-place manholes.
   2. Catch Basins and Stormwater Inlets: Include plans, elevations, sections, details, and frames, covers, and grates.
   3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, design calculations, and concrete design-mix report.
C. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe, and fittings in direct sunlight.
B. Protect pipe, pipe fittings, and seals from dirt and damage.
C. Handle manholes according to manufacturer's written rigging instructions.
D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
   1. Notify Architect no fewer than two days in advance of proposed interruption of service.
   2. Do not proceed with interruption of service without Architect's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.3 DUCTILE-IRON CULVERT PIPE AND FITTINGS

A. Section not used

2.4 DUCTILE-IRON PRESSURE PIPE AND FITTINGS

A. Section not used

2.5 STEEL PIPE AND FITTINGS

A. Section not used

2.6 ALUMINUM PIPE AND FITTINGS

A. Section not used

2.7 ABS PIPE AND FITTINGS

A. Section not used

2.8 HDPE PIPE AND FITTINGS

A. Corrugated HDPE Drainage Pipe and Fittings 4" through 60" (100 mm to 1500mm) AASHTO M 252M, with smooth waterway.
   1. Corrugated HDPE Pipe and Fittings NPS 4 to NPS 60: AASHTO M 294, with smooth waterway for coupling joints.

2. Watertight Soiltight Couplings: AASHTO M 294, corrugated, matching pipe and fittings. Gaskets shall meet ASTM F477 and watertight according to ASTM D3212.

2.9 PVC PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: Class 200, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.10 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, with groove and tongue ends and sealant joints with ASTM C 990.
   1. Class III, Wall - unless otherwise stated on the drawings.

2.11 NONPRESSURE-TYPE PIPE COUPLINGS

A. Section not used

2.12 SPECIAL PIPE FITTINGS

A. Section not used

2.13 BACKWATER VALVES

A. Section not used

2.14 CLEANOUTS

A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.
   1. Available Manufacturers:
      a. Canplas Inc.
      b. IPS Corporation.
      c. NDS Inc.
      d. Plastic Oddities, Inc.
      e. Sioux Chief Manufacturing Company, Inc.
      f. Zurn Industries, Inc.; Zurn Light Commercial Specialty Plumbing Products.

B. HDPE Cleanout: As specified on the plans

2.15 DRAINS

A. Section not used

2.16 CORROSION-PROTECTION PIPING ENCASEMENT

A. Section not used

2.17 MANHOLES

A. As specified on the plans

2.18 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
   1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
   2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
   1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
   2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.19 CATCH BASINS

A. As specified on the plan

2.20 STORMWATER INLETS

A. As specified on the plans

2.21 STORMWATER DETENTION STRUCTURES

A. As specified on the plans

2.22 PIPE OUTLETS

A. As specified on the plans

2.23 BELOW GROUND STORMWATER PIPE DETENTION SYSTEMS

A. Section not used.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING APPLICATIONS

A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
   1. Use non-pressure-type flexible couplings where required to join gravity-flow, non-pressure sewer piping, unless otherwise indicated.
      a. Unshielded flexible or rigid couplings for same or minor difference OD pipes.
      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.

2. Use pressure-type pipe couplings for force-main joints.

B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

C. Gravity-Flow, Non-pressure Sewer Piping: Use any of the following pipe materials in the locations specified on the drawings for each size range:

1. NPS 4 and NPS 6: PVC sewer pipe and fittings, gaskets, and gasketed joints.
2. NPS 4 and NPS 6: Corrugated HDPE drainage pipe and fittings, watertight couplings, and coupled joints.
3. NPS 8 to NPS 12: NPS 12 reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.
4. NPS 8 to NPS 12: Corrugated HDPE drainage pipe and fittings in NPS 8 and NPS 10 and corrugated HDPE pipe and fittings in NPS 12, watertight couplings, and coupled joints.
5. NPS 8 to NPS 12: PVC sewer pipe and fittings, gaskets, and gasketed joints.
6. NPS 18 to NPS 36: Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.
7. NPS 18 to NPS 36: Corrugated HDPE pipe and fittings, watertight couplings, and coupled joints.

3.3 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 design considerations into account. 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 manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. 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.

E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

F. Install gravity-flow, non-pressure drainage piping according to the following:

1. Install piping pitched down in direction of flow.
2. Install HDPE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
3. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
4. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
5. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.4 PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, non-pressure drainage piping according to the following:

1. Join corrugated HDPE piping according to CPPA 100 and the following:
   a. Use watertight couplings.

2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
3. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
4. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
5. Join dissimilar pipe materials with non-pressure-type flexible couplings.

3.5 BACKWATER VALVE INSTALLATION

A. Section not used

3.6 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade at locations shown on the drawings. 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 heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas other than street, roads and parking lots.
   2. Use extra-heavy-duty, top-loading classification cleanouts in streets, roads, and parking lot areas.
B. Set cleanout frames and covers 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 with tops flush with pavement surface.

3.7 DRAIN INSTALLATION

A. Per manufactures specifications.

3.8 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.
B. Install precast concrete manhole sections according to ASTM C 891.
C. Construct cast-in-place manholes as indicated.
D. Install FRP manholes according to manufacturer's written instructions.
E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

3.9 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.
B. Set frames and grates to elevations indicated.

3.10 STORMWATER INLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
B. Construct riprap of broken stone, as indicated.
C. Install outlets that spill onto grade, anchored with concrete, where indicated.
D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
E. Construct energy dissipaters at outlets, as indicated.

3.11 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.12 BELOW GROUND STORMWATER PIPE DENTENTION SYSTEM INSTALLATION

A. As specified on the plans

3.13 CONNECTIONS

A. Connect non-pressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Facility Storm Drainage Piping."

3.14 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
   1. Close open ends of piping with at least 8-inch- thick, brick masonry bulkheads.
   2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
   1. Remove manhole or structure and close open ends of remaining piping.
   2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, or gravel. Fill to top with concrete in paved areas or earth in non-paved areas.

C. Backfill to grade according to Division 31 Section "Earth Moving."

3.15 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
   1. Use detectable warning tape over non-metallic ferrous piping.
   2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.16 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. 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 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. Option: Test HDPE according to ASTM F2487.
      b. Option: Test plastic piping according to ASTM F 1417.
      c. Option: Test concrete piping according to ASTM C 924.

C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.17 CLEANING

A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION 334100

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 321373