# SPECIFICATIONS

# CITY OF SAPULPA
# DEWEY STREETSCAPE
# REDEVELOPMENT

REED ARCHITECTURE AND INTERIORS
18 EAST HOBSON AVENUE
SAPULPA, OKLAHOMA 74066

# SECTION 00 01 07
# SEALS PAGE

PROJECT

Dewey Streetscape Redevelopment

OWNER

City of Sapulpa
425 E. Dewey Ave.
Sapulpa, OK 74066

ARCHITECT OF RECORD

David R. Reed, AIA, ALEP
Reed Architecture & Interiors, LLC
18 E. Hobson Ave
Sapulpa, OK 74066


9/29/2023

Architect of Record

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PROJECT

Dewey Streetscape

OWNER

City of Sapulpa
425 E. Dewey Ave.
Sapulpa, OK 74066

STRUCTURAL ENGINEER OF RECORD

Snowden Engineering
8128 E. 63rd Street
Tulsa, OK  74133


Structural Engineer of Record

PROJECT

Dewey Streetscape

OWNER

City of Sapulpa
425 E. Dewey Ave.
Sapulpa, OK 74066

MECHANICAL ELECTRICAL AND PLUMBING ENGINEER(S) OF RECORD

TFK Engineering
PO Box 2204
Broken Arrow, OK 74013

CofA # 5206 Expires 6/2025


Mechanical Plumbing and Electrical Engineer(s) of Record

PROJECT

Dewey Streetscape

OWNER

City of Sapulpa
425 E. Dewey Ave.
Sapulpa, OK 74066

LANDSCAPE ARCHITECT OF RECORD

PDG – Planning Design Group
5314 S. Yale Ave.
Suite 510
Tulsa, OK 74135


Landscape Architect of Record

END OF SECTION

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# SECTION 00 11 13
# ADVERTISEMENT FOR BIDS

Sealed Bids in duplicate for **DEWEY STREETSCAPE REDEVELOPMENT** can be submitted to the City Clerk at Sapulpa City Hall until 2:00 P.M. on November 7, 2023. Sealed bids will be publicly opened and read aloud AT 2:00 P.M., November 7, 2023 at the CITY OF SAPULPA offices, hereinafter referred to as "Owner"

The bidding process will be in compliance with the Public Competitive Bidding Act of 1974. Bids must be accompanied by a bid security in the amount of 5 percent (5%) of the bid. By this notice, all provisions of the act apply to this project and are incorporated into notice by reference.

Upon receipt of an acceptable bid, the contract will be awarded within thirty (30) days after the opening of bids and the written contract executed within ten (10) days thereafter.

The owner reserves the right to reject any or all bids and to waive informalities and minor irregularities in any bid.

The successful bidding contractor must perform a minimum of 50% of total contract scope with their own in-house personnel, and provide full-time on-site project manager, on site daily.

Contractor qualification statement must be submitted **seven (7)** calendar days prior to bid date to the Owner, if not currently on file.

A designated completion date of Substantial Completion for this project will be established based on the number of calendar days determined by the bidder and as stated in the accepted bid to complete Substantial Completion. There will be a one thousand dollar ($1,000.00) per day Liquidated Damages Clause for failure to complete the work within the stipulated time in the contract for the project. Time is of the essence for this project. The scheduled completion date will be a very significant and material factor to the Owner when selecting the Lowest Responsible Bidder.
Bidder must provide (in a space provided on its Bid Form) a date of Substantial Completion after receipt of official Notice to Proceed from the Owner.

A mandatory pre-bid conference for interpretations and clarifications will be conducted at 10:00 a.m., October 26, 2023 at Reed Architecture, 18 East Hobson Avenue, Sapulpa, Oklahoma 74066.

**Failure to comply with the above bid requirements will result in the return of the unopened Bid Proposal.**

The drawings and specifications may be reviewed at the following locations:

Southwest Construction News, Tulsa, OK
F.W. Dodge Plan Room, Tulsa, OK
ConstructConnect, Tulsa, OK

**Section 00 11 30**
**Form of Proposal**

**For**

**DEWEY STREETSCAPE REDEVELOPMENT**

**CITY OF SAPULPA**

**BID OPENING 2:00pm, November 07, 2023**

CONTRACTORS WILL NOTE THAT A *PROPOSAL MUST BE MADE ON THIS FORM.* OTHER PROPOSALS WILL NOT BE ACCEPTED. COMPLETE ALL BLANKS. ALL BID PRICES SHALL BE IN BOTH FIGURES AND IN WRITING. PROPOSALS SHALL BE ENCLOSED IN A SEALED ENVELOPE, MARKED ON THE OUTSIDE **"SEALED BID: DEWEY STREETSCAPE REDEVELOPMENT" WITH COMPANY NAME, ADDRESS & PHONE NUMBER.**

Selection of the successful bidder will be based on the lowest and best bid.
The owner reserves the right to reject any or all bids and to waive informalities and minor irregularities in any bid.

The undersigned Contractor, in compliance with Advertisement for Bids and other requirements contained in the Bid documents for **DEWEY STREETSCAPE REDEVELPOMENT**, **Creek County**, Oklahoma having examined the specifications, drawings, details, and Scope of Work, and areas where the work is proposed, and being familiar with all of the work required at the project site(s), hereby proposes to furnish all labor, materials, tools, equipment, supplies and services to complete the project(s) within the time set forth in this Proposal for the price as herein stated. The price(s) indicated is to cover all expenses incurred in performing all of the work required under the Contract Documents of which this proposal is a part.

If awarded a contract for the Project the undersigned agrees as follows:

1. To furnish a Contractor's Written Warranty which will warranty the project(s) for a period of one (1) year after substantial completion and acceptance by Owner against all defects in materials and workmanship.

2. To furnish all other Bonds required as indicated in the "Advertisement for Bids" and General Conditions in the amount equal to the Total Contract Price.

3. To furnish a completed and certified monthly Application and Certificate for Payment (AIA Documents G702, G703) and Certificate of Substantial Completion (AIA Document G704) for the project(s) based on the contract bid price indicated on this proposal.

The bidder acknowledges there is a liquidated damages provision of $1,000.00 (One Thousand dollars) per calendar day if the project date of Substantial Completion exceeds bidder defined completion date. Project time date starts upon receipt of official Notice to Proceed from City of Sapulpa.

The bidder acknowledges five percent (5%) retainage for pay applications.

The bidder acknowledges "Alternate Number One" as described in contract specifications and includes said sum in submitted Bid Form.

The bidder acknowledges two "Allowances" as described in contract specifications and includes said sum in submitted Bid Form.

The bidder acknowledges the following Addenda: _____, _____, _____, _____.

OUR BID FOR COMPLETING THE REQUIRED WORK DEFINED ABOVE AND DESCRIBED IN THESE BID DOCUMENTS IS AS FOLLOWS:

## INSERT OR ATTACH

## EXECUTED BIDDER'S

## BID FORM

COMPANY NAME _____
CONTACT NAME _____
PHONE _____
COMPANY ADDRESS _____

We have included the following sworn and notarized bid affidavits and bid security. They are attached to this proposal:

1. Bid Bond, Certified Cashier's Check or other approved security as listed in the "Advertisement for Bids" and in the amount of five (5%) of the bid.
2. No Kick Back Statement.
3. Non-Collusion Affidavit.
4. Business Relationships Affidavit.
5. Non-Discrimination Affidavit.
6. Contractor's Qualification Statement **(Completed and submitted seven calendar days prior to bid).**

Respectfully submitted, Seal if Bid is by Corporation

_____
Company

By

Title

Address

City, State, Zip

Area Code & Telephone Number

Company ID

**NOTE:** **When submitting your bid, all blanks on this form must be filled in**

## SECTION 00 11 40
## NO KICK-BACK STATEMENT

A duplicate of the following statement is required to be signed, notarized, and submitted with each and every copy of the AIA Document G702, "Application and Certificate for Payment", that is presented to the Owner for payment.

STATE OF OKLAHOMA )
) ss.
CREEK COUNTY )

The undersigned Contractor, of lawful age, being first duly sworn, an oath says that this invoice is true and correct. Affiant further states that the services as shown by the invoice have been completed in accordance with the contract. Affiant further states that he has made no payment directly or indirectly to any elected official, officer or employee of the State of Oklahoma, any county or local subdivision of the state, of money or any other things of value to obtain payment.

Contractor

_____
(Title)

By_____

Subscribed and sworn to before me this _____ day of _____, 2023.

_____
Notary Public

My Commission Expires:

_____

[SEAL]

END OF SECTION

## SECTION 00 11 50
## NON-COLLUSION AFFIDAVIT

STATE OF OKLAHOMA )
) ss.
CREEK COUNTY )

_____ , of lawful age, being first duly sworn, on oath says that (she)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any state official or employee as to quantity, quality, or price in any discussions between bidders and any state official concerning exchange of money or other thing of value for special consideration in the letting of a contract.

Subscribed and sworn to before me this _____ day of _____, 2023.

_____
Company Representative

_____
Notary Public

My Commission Expires:

_____

## SECTION 00 11 60
## BUSINESS RELATIONSHIP AFFIDAVIT

STATE OF OKLAHOMA )
) ss.
CREEK COUNTY )

_____ , of lawful age, being first duly sworn, on oath says that (she)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the nature of any partnership, joint venture, or other business relationship presently in effect or which existed within one (1) year prior to the date of this statement with the Architect, Engineer, or other party to the project is as follows:

Affiant further states that any such business relationship presently in effect or which existed within one (1) year prior to the date of this statement between any officer or director of the bidding company, any officer or director of the architectural or engineering firm or other party to the project is as follows:

Affiant further states that the names of all persons having any such business relationships and the positions they hold with their respective companies or firms are as follows:

(If none of the business relationships herein above mentioned exist, affiant should so state.)

_____
Company Representative

Subscribed and sworn to before me this _____ day of _____, 2010.

_____
Notary Public

My Commission Expires:

_____

## SECTION 00 11 70
## NON-DISCRIMINATION AFFIDAVIT

The Contractor affirms and states that he/she complies with the following:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, sex, religion, national origin or age. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, sex, religion, national origin or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment, or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the requirements of these nondiscrimination provisions.

2. The Contractor will state, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will receive consideration for employment without regard to race, color, sex, religion, national origin or age."

_____
Company Representative

Subscribed and sworn to before me this _____ day of _____, 2023.

_____
Notary Public

My Commission Expires:

_____

# SECTION 00 11 90
# CONTRACTORS QUALIFICATIONS STATEMENT

This form must be submitted not less than seven (7) days prior to the bid date. All questions must be answered, the data must be clear and comprehensive, and must be signed and notarized.

1. Name of Bidder: _____

2. Permanent Main Office Address: _____

3. When organized: _____

4. If incorporated, when and where: _____

5. How many years have you been engaged in the contracting business under your present firm or trading name? _____

6. List 5 projects of similar size work, references with telephone numbers, cost of project and year completed: _____

**(1) Project**: _____, Year: _____,

Cost: $_____

Reference: _____, Phone: _____

**(2) Project**: _____, Year: _____,

Cost: $_____

Reference: _____, Phone: _____

**(3) Project**: _____, Year: _____,

Cost: $_____

Reference: _____, Phone: _____

**(4) Project**: _____, Year: _____,

Cost: $_____

Reference: _____, Phone: _____

**(5) Project**: _____, Year: _____,

Cost: $_____

Reference: _____, Phone: _____

7. Have you ever failed to complete any work awarded to you? Please explain.

8. Please state the size of your business:

   # of employee's (total):_____

9. Are any of your job captains bilingual?

10. Financial Information:

    a. State the name of the bank with whom you do your principal business:

    Name of Bank Address City, State Phone Number

    _____

    b. State 5 trade references with whom you do business:

    1. _____

    2. _____

    3. _____

    4. _____

_____
President of Company

_____, _____
(Notary Public) (Date)

Affix Notary Seal

**SECTION 00 72 00**
**GENERAL CONDITIONS**

**FORM OF GENERAL CONDITIONS**

**1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT IS AIA DOCUMENT A201-2017 EDITION INCLUDED HEREIN BY REFERENCE.**

**RELATED REQUIREMENTS**

**SUPPLEMENTARY CONDITIONS**

**3.01 REFER TO DOCUMENT 00 73 00 - SUPPLEMENTARY CONDITIONS FOR AMENDMENTS TO THESE GENERAL CONDITIONS.**

**END OF SECTION**

**SECTION 00 73 01**
**SUPPLEMENTARY GENERAL CONDITIONS**

**THIS SUPPLEMENT TO THE GENERAL CONDITIONS IS EXECUTED SIMULTANEOUSLY WITH AND CONSTITUTES A PART OF THE STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR, AIA A101-2017 AND GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A201-2017 EDITION.**

**THIS SUPPLEMENT MODIFIES THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A201-2017 AND TO THE EXTENT THAT THERE IS ANY CONFLICT BETWEEN THE PRINTED GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AND THIS SUPPLEMENT, THE TERMS OF THIS SUPPLEMENT SHALL CONTROL. THE GENERAL CONDITIONS AS MODIFIED BY THIS SUPPLEMENT CONTAIN TERMS REGARDINGTHE DUTIES OF THE ARCHITECT TO THE OWNER AND THE RELATIONSHIP AMONG THE ARCHITECT, CONTRACTOR AND THE OWNER.**

**THE FOLLOWING SECTION NUMBERS CORRESPOND TO THE NUMBERING OF THE ARTICLES IN THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION. SECTIONS THAT ARE SUBSTITUTED OR MODIFIED ARE SET FORTH UNDER THE CORRESPONDING SECTION USED IN THE GENERAL CONDITIONS. IF NEW MATERIALS ARE ADDED, THE SECTION NUMBERS FOR THOSE PROVISIONS ARE NUMBERED TO BE CONSISTENT WITH THE GENERAL CONDITIONS FORMAT.**

**CONDITIONS OF THE CONTRACT FOR CONSTRUCTION. SECTIONS THAT ARE SUBSTITUTED OR MODIFIED ARE SET FORTH UNDER THE CORRESPONDING SECTION USED IN THE GENERAL CONDITIONS AND IF NEW MATERIALS ARE ADDED. THE SECTION NUMBERS FOR THOSE PROVISIONS ARE NUMBERED TO BE CONSISTENT WITH THE GENERAL CONDITIONS FORMAT.**

**ARTICLE 1- GENERAL PROVISIONS:**

**BASIC DEFINITIONS:**

**REPLACE THE LAST SENTENCE IN SECTION 1.1.1 WITH THE FOLLOWING:**

**"THE CONTRACT DOCUMENTS 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 CONTRACTORS BID OR PROPOSAL, AND PORTIONS OF ADDENDA RELATING TO BIDDING REQUIREMENTS."**

**EXECUTION, CORRELATION AND INTENT:**

**ADD THE FOLLOWING CLAUSE 1.2.3.1 TO SECTION 1.2.3**

**"1.2.3.1 IN THE EVENT OF CONFLICTS OR DISCREPANCIES AMONG THE CONTRACT DOCUMENTS, INTERPRETATIONS WILL BE BASED ON THE FOLLOWING PRIORITIES:**

**1. ADDENDA, WITH THOSE OF LATER DATE HAVING PRECEDENCE OVER THOSE OF EARLIER DATE.**

**2. THE SUPPLEMENTARY CONDITIONS.**

**3. THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.**

**4. DIVISION 1 OF THE SPECIFICATIONS.**

**5. DRAWINGS AND DIVISION 2-49 OF THE SPECIFICATIONS. IN THE CASE OF CONFLICTS OR DISCREPANCIES BETWEEN DRAWINGS AND DIVISION 2-49 OF THE SPECIFICATIONS, OR WITHIN EITHER DOCUMENT NOT CLARIFIED BY ADDENDUM, THE ARCHITECT WILL DETERMINE WHICH TAKES PRECEDENCE IN ACCORDANCE WITH SECTION 4.2.12.**

**6. ALTERNATES IN THE CONTRACT DOCUMENTS."**

**PERIODIC MEETINGS:**

**ADD THE FOLLOWING SECTION 1.9, AND SUBSEQUENT SECTION 1.9.1:**

**"REPRESENTATIVES OF THE OWNER, CONTRACTOR AND ARCHITECT SHALL MEET PERIODICALLY AT MUTUALLY AGREED UPON INTERVALS FOR THE PURPOSE OF ESTABLISHING PROCEDURES TO FACILITATE COOPERATION, COMMUNICATION AND TIMELY RESPONSES AMONG THE PARTICIPANTS. BY PARTICIPATING IN THIS ARRANGEMENT, THE PARTIES DO NOT INTEND TO CREATE ADDITIONAL CONTRACTUAL OBLIGATIONS OR MODIFY THE LEGAL RELATIONSHIPS WHICH MAY OTHERWISE EXIST."**

**ARTICLE 2- OWNER:**

**INFORMATION AND SERVICES REQUIRED OF THE OWNER:**

**SUBSECTION 2.2.3 SHALL BE REVISED TO READ AS FOLLOWS:**

**" EXCEPT WHERE SPECIFICALLY REQUIRED OF A CONTRACTOR, THE OWNER SHALL FURNISH SURVEYS DESCRIBING THE SITE OF THE PROJECT. THE OWNER MAKES NO REPRESENTATIONS CONCERNING THE ACCURACY OR COMPLETENESS OF THIS SURVEY. SUCH SURVEYS MAY CONTAIN DESCRIPTIONS OF PHYSICAL CHARACTERISTICS, LEGAL LIMITATIONS, UTILITY LOCATIONS, PERMANENT BENCHMARKS,EXISTING STRUCTURES, SLOPES AND CONTOURS, LEGAL DESCRIPTIONS AND OTHER SUCH PERTINENT INFORMATION. SUCH OWNER-FURNISHED SURVEYS MAY BE BOUND WITH THE DRAWINGS OR MAY BE FULLY OR PARTIALLY TRANSCRIBED ON THE PLOT PLAN OR SITE PLAN DRAWING. ANY SUCH SURVEY SHALL NOT BE A PART OF THE CONTRACT DOCUMENTS, BUT WILL BE PROVIDED FOR INFORMATION PURPOSES."**

**ADD THE FOLLOWING CLAUSE 2.2.4.1 TO SECTION 2.2.4:**

**"THE OWNER WILL SELECT THE APPROPRIATE TESTING LABORATORY FOR STRUCTURAL TESTS AND SPECIAL INSPECTIONS AS REQUIRED BY THE APPLICABLE BUILDING CODE."**

**ARTICLE 3- CONTRACTOR:**

**REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR:**

**CHANGE SECTION 3.2.2 AS FOLLOWS:**

**"IN THE SECOND SENTENCE CHANGE THE PHRASE 'REQUEST FOR INFORMATION' TO "REQUEST FOR INTERPRETATION".**

**CHANGE SECTION 3.2.3 AS FOLLOWS:**

**IN THE FIRST SENTENCE CHANGE THE PHRASE 'REQUEST FOR INFORMATION' TO "REQUEST FOR INTERPRETATION".**

**ADD THE FOLLOWING SUBSECTION 3.2.5 TO SECTION 3.2:**

**"THE OWNER SHALL BE ENTITLED TO DEDUCT FROM THE CONTRACT SUM AMOUNTS PAID TO THE ARCHITECT FOR THE ARCHITECT TO EVALUATE AND RESPOND TO THE CONTRACTOR'S REQUESTS FOR INTERPRETATION WHEN SUCH INFORMATION WAS AVAILABLE TO THE CONTRACTOR FROM A CAREFUL STUDY AND COMPARISON TO THE CONTRACT DOCUMENTS, FIELD CONDITIONS, OTHER OWNER-PROVIDED INFORMATION, CONTRACTOR-PREPARED COORDINATION DRAWINGS, OR PRIOR PROJECT CORRESPONDENCE OR DOCUMENTATION."**

**ADD THE FOLLOWING SECTION 3.2.6 TO SECTION 3.2:**

**" 3.2.6: THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND SUBMITTALS APPROVED PURSUANT TO SECTION 3.1.2."**

**<u>LABOR AND MATERIALS:</u>**

**DELETE SECTION 3.4.2 AND SUBSTITUTE THE FOLLOWING SECTION 3.4.2 TO SECTION 3.4:**

**"AFTER THE CONTRACT HAS BEEN EXECUTED, THE OWNER AND ARCHITECT WILL CONSIDER A FORMAL REQUEST FOR THE SUBSTITUTION OF PRODUCTS IN PLACE OF THOSE SPECIFIED ONLY UNDER THE CONDITIONS SET FORTH IN THE DIVISION 1 OF THE SPECIFICATIONS".**

**FOR SUBSTITUTIONS, THE CONTRACTOR:**

**REPRESENTS THAT THE SUB-CONTRACTOR HAS PERSONALLY INVESTIGATED THE SUBSTITUTE PRODUCT AND DETERMINED THAT IT IS EQUAL OR SUPERIOR IN ALL RESPECTS TO THAT SPECIFIED.**

**REPRESENTS THAT THE SUB-CONTRACTOR WILL PROVIDE THE SAME WARRANTY FOR THE SUBSTITUTION THAT THE CONTRACTOR WOULD FOR THAT SPECIFIED;**

**CERTIFIES THAT THE COST DATA PRESENTED IS COMPLETE AND INCLUDES ALL RELATED COSTS UNDER THIS CONTRACT EXCEPT THE ARCHITECT'S REDESIGN COSTS, AND WAIVES ALL CLAIMS FOR ADDITIONAL COSTS RELATED TO THE SUBSTITUTION WHICH SUBSEQUENTLY BECOME APPARENT; AND WILL COORDINATE THE INSTALLATION OF THE ACCEPTED SUBSTITUTE, MAKING SUCH CHANGES AS MAY BE REQUIRED FOR THE WORK TO BE COMPLETE IN ALL RESPECTS."**

**ADD THE FOLLOWING SUBSECTION 3.4.4 TO SECTION 3.4:**

**"THE OWNER SHALL BE ENTITLED TO DEDUCT FROM THE CONTRACT SUM ANY AMOUNTS PAID TO THE ARCHITECT TO EVALUATE THE CONTRACTOR'S PROPOSED SUBSTITUTIONS AND TO MAKE AGREED UPON CHANGES IN THE DRAWINGS AND SPECIFICATIONS MADE NECESSARY BY THE OWNER'S ACCEPTANCE OF SUCH SUBSTITUTIONS."**

**<u>TAXES:</u>**

**ADD THE FOLLOWING SECTION 3.6.1 TO SECTION 3.6:**

**"THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR THE PAYMENT OF ALL CONTRIBUTIONS AND PAYROLL TAXES (STATE AND FEDERAL) AS TO ALL SUBCONTRACTORS AND EMPLOYEES ENGAGED IN THE PERFORMANCE OF WORK PURSUANT HERETO, AND FURTHER AGREES TO CHECK AND MEET ALL REQUIREMENTS THAT MIGHT BE SPECIFIED UNDER REGULATIONS OF THE ADMINISTRATIVE OFFICIAL OR BOARD CHARGED WITH THE ENFORCEMENT OF ANY STATE OR FEDERAL ACT ON THE SUBJECT REFERRED TO. CONTRACTOR AGREES TO FURNISH THE OWNER, UPON REQUEST, A CERTIFICATE OR OTHER EVIDENCE OF COMPLIANCE THEREWITH."**

**PERMITS, FEES AND NOTICES:**

**ADD THE FOLLOWING TO SECTION 3.7.2:**

**"IN GENERAL, IT IS NOT THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE CONTRACT DOCUMENTS ARE IN ACCORDANCE WITH APPLICABLE LAWS, ORDINANCES, STATUTES, BUILDING CODES AND RULES AND REGULATIONS. HOWEVER, CONTRACTORS PRACTICING BUILDING TRADES LICENSED BY REGULATORY AUTHORITIES SHALL BE HELD RESPONSIBLE FOR FULL AND COMPLETE KNOWLEDGE OF ALL APPLICABLE LAW, ORDINANCES, STATUTES, STANDARDS, BUILDING CODES,RULES AND REGULATIONS AS THEY APPLY TO THEIR OWN LICENSED TRADE. WHERE THE CONTRACT DOCUMENTS SPECIFICALLY DIRECT THAT PORTIONS OF THE WORK BE COMPLETED IN COMPLIANCE WITH CERTAIN OR APPLICABLE LAWS, ORDINANCES, STATUTES, STANDARD, BUILDING CODES, RULES AND REGULATIONS, IT IS THE CONTRACTOR'S DUTY, OBLIGATION, AND RESPONSIBILITY TO DILIGENTLY AND CAREFULLY RESEARCH AND STUDY AND TO ACQUIRE FULL KNOWLEDGE OF SUCH LAWS,ORDINANCES, STATUTES, STANDARDS, BUILDING CODES, RULES AND REGULATIONS. IF THECONTRACTOR OBSERVES THAT PORTIONS OF THE CONTRACT DOCUMENTS ARE AT VARIANCE FROM APPLICABLE LAWS, ORDINANCES, STATUTES, STANDARDS, BUILDING CODES, RULES AND REGULATIONS, OR IS INFORMED OF SUCH VARIANCE BY ANY PUBLIC AUTHORITY OR OTHER ENTITY,THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT AND OWNER IN WRITING, AND NECESSARY CHANGES SHALL BE ACCOMPLISHED BY APPROPRIATE MODIFICATION. NOTHING IN THESE REQUIREMENTS SHALL RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR COMPLIANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS WHERE THOSE REQUIREMENTS EXCEED THOSE OF THE APPLICABLE LAWS, ORDINANCES, AND STATUTES, STANDARDS, BUILDING CODES, RULES AND REGULATIONS."**

**ADD THE FOLLOWING TO SECTION 3.7.3:**

**"CLAIMS FOR ADDITIONAL COSTS WILL NOT BE APPROVED BY THE OWNER FOR CHANGES REQUIRED TO COMPLY WITH APPLICABLE LAWS, ORDINANCES, STATUTES, STANDARDS, BUILDING CODES,RULES AND REGULATIONS FOR THOSE PORTIONS OF THE WORK FOR WHICH THE CONTRACTOR IS REQUIRED BY THE CONTRACT DOCUMENTS TO HAVE KNOWLEDGE. SHOULD APPLICABLE LAWS,ORDINANCES, STATUTES, STANDARDS, BUILDING CODES, RULES AND REGULATIONS CHANGE BETWEEN THE BID DATE AND THE COMMENCEMENT OF THE WORK OR DURING THE PROGRESS OFTHE WORK, OR COMMENTS RECEIVED BY CITY INSPECTORS NOT INCORPORATED INTO CONTRACT DOCUMENTS AND SHOULD SUCH CHANGE REQUIRE THE CONTRACTOR TO PERFORM EITHER MORE OR LESS WORK, THE CONTRACT SUM AND CONTRACT TIME SHALL BE APPROPRIATELY ADJUSTED IN COMPLIANCE WITH THE REQUIREMENTS OF ARTICLE 7, CHANGES IN THE WORK."**

**ALLOWANCES:**

**DELETE THE PERIOD AT THE END OF CLAUSE 3.8.2.3 AND ADD THE FOLLOWING:**

**"EXCEPT THAT IF THE INSTALLATION IS INCLUDED AS PART OF AN ALLOWANCE IN DIVISIONS 1-49 OF THE SPECIFICATIONS, THE INSTALLATION AND LABOR COST FOR GREATER OR LESSER QUANTITIES OF WORK SHALL BE DETERMINED IN ACCORDANCE WITH SECTION 7.3.7."**

**ADD THE FOLLOWING SUBSECTION 3.9.4 TO SECTION 3.9:**

**"THE CONTRACTOR SHALL EMPLOY A FULL TIME SUPERINTENDENT OR AN ASSISTANT TO THE SUPERINTENDENT WHO WILL PERFORM AS A COORDINATOR FOR MECHANICAL AND ELECTRICALTHE COORDINATOR SHALL BE KNOWLEDGEABLE IN MECHANICAL AND ELECTRICALSYSTEMS AND CAPABLE OF READING, INTERPRETING AND COORDINATING DRAWINGS, SPECIFICATIONS, AND SHOP DRAWINGS PERTAINING TO SUCH SYSTEMS. THE COORDINATOR SHALL ASSIST THE SUBCONTRACTORS IN ARRANGING SPACE CONDITIONS TO ELIMINATE INTERFERENCE BETWEEN THE MECHANICAL AND ELECTRICAL SYSTEMS AND OTHER WORK AND SHALL SUPERVISE THE PREPARATION OF COORDINATION DRAWINGS DOCUMENTING THE SPATIAL ARRANGEMENTS FOR SUCH SYSTEMS WITHIN RESTRICTED SPACES. THE COORDINATOR SHALL ASSIST IN PLANNING AND EXPEDITING THE PROPER SEQUENCE OF DELIVERY OF MECHANICALAND ELECTRICAL EQUIPMENT TO THE SITE."**

**CONTRACTOR"S CONSTRUCTION SCHEDULES:**

**ADD THE FOLLOWING SECTION 3.10.4 TO SECTION 3.10:**

**"NOTHING IN THE REQUIREMENT TO SUBMIT CONSTRUCTION SCHEDULES, OR TO REVISE SUCH SCHEDULES OR ANY REVIEW OF SUCH SCHEDULES BY THE OWNER OR ARCHITECT, SHALL GIVE RISE TO A DUTY, OBLIGATION, OR RESPONSIBILITY OF THE OWNER OR ARCHITECT TO THECONTRACTOR, SUBCONTRACTOR, MATERIAL SUPPLIER OR ANY OTHER ENTITY INVOLVED IN THE WORK,TO ENSURE COMPLETION OF THE WORK WITHIN THE CONTRACT TIME. IT IS THE SOLE DUTY, RESPONSIBILITY, AND OBLIGATION OF THE CONTRACTOR TO COMPLETE THE WORK WITHIN THE CONTRACT TIME."**

**SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:**

**ADD THE FOLLOWING SENTENCE TO SECTION 3.12.5:**

**"SUBMITTALS WHICH ARE NOT MARKED AS REVIEWED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS AND ACKNOWLEDGED BY THE CONTRACTOR MAY BE RETURNED BY THE ARCHITECT WITHOUT ACTION."**

**ADD THE FOLLOWING SENTENCE TO SUBSECTION 3.12.9:**

**"SPECIFIC ATTENTION IN WRITING SHALL BE DEFINED AS A LETTER SUBMITTED WITH THE SHOP DRAWINGS, PRODUCT DATA, SAMPLE OR SIMILAR SUBMITTAL WHICH SHALL CONTAIN THE FOLLOWING PHRASE: "YOUR ATTENTION IS DIRECTED TO THE FOLLOWING REVISIONS WHICH ARE IN ADDITION TO THOSE REVISIONS THAT YOU REQUESTED", FOLLOWED BY A DETAILED WRITTEN LISTING OF ALL SUCH REVISIONS."**

**ADD SECTION 3.12.11 TO SECTION 3.12:**

**"THE ARCHITECT'S REVIEW OF CONTRACTOR'S SUBMITTALS WILL BE LIMITED TO EXAMINATION OF AN INITIAL SUBMITTAL AND ONE (1) RE-SUBMITTAL. THE ARCHITECT'S REVIEW OF ADDITIONAL SUBMITTALS WILL BE MADE ONLY WITH THE CONSENT OF THE OWNER AFTER NOTIFICATION BY THE ARCHITECT. THE OWNER SHALL BE ENTITLED TO DEDUCT FROM THE CONTRACT SUM AMOUNTS PAID TO THE ARCHITECT FOR EVALUATION OF SUCH ADDITIONAL RE-SUBMITTALS."**

**INDEMNIFICATION:**

**MODIFY SECTION 3.18.1 AS FOLLOWS:**

**"TO THE FULLEST EXTENT PERMITTED BY LAW, THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER, ARCHITECT, AND THEIR CONSULTANTS, AGENTS AND EMPLOYEES OF ANY OF THEM, FROM AND AGAINST ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING, BUT NOT LIMITED TO ATTORNEYS' FEES ARISING OUT OF OR RESULTING FROM THE PERFORMANCE OR NON-PERFORMANCE OF THE WORK, TO THE EXTENT CAUSED IN WHOLE OR IN PART BY THE NEGLIGENT ACTS OR OMISSIONS, OR FAILURE TO FOLLOW THE CONTRACT DOCUMENTS, OF THECONTRACTOR, A SUBCONTRACTOR, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THEM, OR ANYONE FOR WHOSE ACTS MAY BE LIABLE, REGARDLESS OF WHETHER OR NOT SUCH CLAIM, DAMAGE, LOSS OR EXPENSE IS CAUSED IN PART BY ANY PARTY INDEMNIFIED HEREUNDER. SUCH OBLIGATION SHALL NOT BE CONSTRUED TO NEGATE, ABRIDGE, OR REDUCE OTHER RIGHTS OR OBLIGATIONS OF INDEMNITY WHICH WOULD OTHERWISE EXIST TO A PARTY OR PERSON DESCRIBED IN THIS PARAGRAPH. IN ADDITION TO OTHER REMEDIES, THE OWNER IS ENTITLED TO WITHHOLD PAYMENTS DUE UNDER THIS CONTRACT TO REIMBURSE THE PARTIES INDEMNIFIED UNDER THIS SECTION."**

**ARTICLE 4- ARCHITECT:**

**ADMINISTRATION OF THE CONTRACT:**

**DELETE SECTION 4.2.1 AND SUBSTITUTE THE FOLLOWING MODIFIED SECTION 4.2.1 TO SECTION 4.2:**

**"THE ARCHITECT WILL PROVIDE ADMINISTRATION OF THE CONTRACT AS DESCRIBED IN THE**

**CONTRACT DOCUMENTS, AND WILL BE THE OWNER'S REPRESENTATIVES (1) DURING CONSTRUCTION, (2) UNTIL FINAL PAYMENT IS DUE AND (3) WITH THE OWNER'S CONCURRENCE, FROM TIME TO TIME DURING THE CORRECTION PERIOD DESCRIBED IN SECTION 12.2. THE ARCHITECT WILL ADVISE AND CONSULT WITH THE OWNER AND WILL HAVE AUTHORITY TO ACT ON BEHALF OF THE OWNER ONLY TO THE EXTENT PROVIDED IN THE CONTRACT DOCUMENTS, UNLESS OTHERWISE MODIFIED BY WRITTEN INSTRUMENT IN ACCORDANCE WITH OTHER PROVISIONS OF THECONTRACT."**

**ADD THE FOLLOWING CLAUSE 4.2.2.1 TO SUBSECTION 4.2.2:**

**"THE CONTRACTOR SHALL REIMBURSE THE OWNER FOR COMPENSATION PAID TO THE ARCHITECT FOR ADDITIONAL SITE VISITS MADE NECESSARY BY THE FAULT, NEGLECT OR REQUEST OF THE CONTRACTOR."**

**ARTICLE 5- SUBCONTRACTORS:**

**AWARD OF SUBCONTRACTS & OTHER CONTRACTS FOR PORTIONS OF THE WORK:**

**DELETE SECTION 5.2.3 AND SUBSTITUTE THE FOLLOWING MODIFIED SECTION 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. THE CONTRACT SUM SHALL BE INCREASED OR DECREASED BY THE DIFFERENCE IN COST OCCASIONED BY SUCH CHANGE AND AN APPROPRIATE CHANGE ORDER SHALL BE ISSUED. HOWEVER, NO INCREASE IN THE CONTRACT SUM SHALL BE ALLOWED FOR SUCH CHANGE UNLESS THE CONTRACTOR HAS ACTED PROMPTLY AND RESPONSIVELY IN SUBMITTING NAMES AS REQUIRED."**

**DELETE SECTION 5.2.4 AND SUBSTITUTE THE FOLLOWING MODIFIED SECTION 5.2.4: "**

**THE CONTRACTOR SHALL NOT CHANGE A SUBCONTRACTOR, PERSON OR ENTITY PREVIOUSLYSELECTED IF THE OWNER OR ARCHITECT MAKES REASONABLE OBJECTION TO SUCH CHANGE."**

**CONTINGENT ASSIGNMENT OF SUB-CONTRACTS:**

**DELETE SECTION 5.4.2 AND SUBSTITUTE THE FOLLOWING MODIFIED SECTION 5.4.2:**

**"IF THE WORK HAS BEEN SUSPENDED FOR MORE THAN THIRTY (30) DAYS, THE SUBCONTRACTOR'S COMPENSATION SHALL BE EQUITABLY ADJUSTED TO REFLECT THE WORK COMPLETED BY EACH SUBCONTRACTOR."**

**ARTICLE 6 – CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

**ADD NEW SUBSECTION 6.2.6 IMMEDIATELY FOLLOWING SUBSECTION 6.2.5 TO READ AS FOLLOWS:**

**"SHOULD A CLAIM AGAINST THE OWNER BE FILED BY A SEPARATE CONTRACTOR ALLEGING**

**DAMAGE CAUSED BY THE CONTRACTOR, THE OWNER SHALL NOTIFY THE CONTRACTOR OF SUCH CLAIM. THE CONTRACTOR SHALL DEFEND THE OWNER IN ALL CLAIM PROCEEDINGS AT THE CONTRACTOR'S EXPENSE. SHOULD AN AWARD OR JUDGMENT AGAINST THE OWNER BE SECURED BY THE SEPARATE CONTRACTOR, THE CONTRACTOR SHALL PAY OR SATISFY SAID AWARD OR JUDGMENT AND SHALL REIMBURSE THE OWNER FOR ALL ATTORNEY'S FEES, COURT COSTS, AND ALL OTHER COSTS OR EXPENSES WHICH THE OWNER HAS INCURRED."**

**ARTICLE 7 – CHANGES IN THE WORK:**

**MODIFY SUBSECTION 7.3.8 TO READ AS FOLLOWS:**

**"THE AMOUNT OF CREDIT OR ADDITION FOR A CHANGE WHICH RESULTS IN A NET INCREASE OR DECREASE IN THE CONTRACT SUM SHALL BE ACTUAL NET COST AS CONFIRMED BY THE ARCHITECT TO INCLUDE A REASONABLE CORRESPONDING ADJUSTMENT FOR OVERHEAD AND PROFIT. WHEN BOTH ADDITIONS AND CREDITS ARE INVOLVED IN A CHANGE, THE OVERHEAD AND NET PROFIT ALLOWANCE SHALL BE CALCULATED ON THE BASIS OF THE NET CHANGE."**

**ADD NEW SUBSECTION 7.3.11 IMMEDIATELY FOLLOWING SUBSECTION 7.3.10; TO READ AS FOLLOWS:**

**"7.3.11 PRIOR TO FINAL PAYMENT, ALL CONSTRUCTION CHANGE DIRECTIVES ISSUED DURING THE PROGRESS OF THE WORK SHALL BE CONVERTED TO CHANGE ORDERS AND SIGNED BY THE CONTRACTOR, ARCHITECT AND OWNER. SHOULD THE PARTIES FAIL TO AGREE WITH THE DETERMINATION MADE BY THE ARCHITECT CONCERNING ADJUSTMENTS IN THE CONTRACT SUM AND THE CONTRACT TIME, OR OTHERWISE FAIL TO REACH AGREEMENTS UPON THE ADJUSTMENTS, THAT PORTION OF THE FINAL PAYMENT WHICH IS AFFECTED BY THE DISPUTE, IF ANY, SHALL BE WITHHELD PENDING FINAL JUDGMENT ISSUED BY A COURT OF COMPETENTJURISDICTION."**

**ADD NEW SECTION, 7.5 EXPEDITING CHANGES IN THE WORK, IMMEDIATELY FOLLOWING SECTION 7.4 TO READ AS FOLLOWS:**

**"7.5 EXPEDITING CHANGES IN THE WORK:**

**THE CONTRACTOR SHALL NOT PROCEED WITH CHANGES IN THE WORK AUTHORIZED UNDER**

**PARAGRAPHS 7.2 OR 7.3 UNTIL RECEIPT OF THE APPROPRIATE SIGNED DOCUMENTS."**

**ARTICLE 8 – TIME:**

**DELETE SUBSECTION 8.2.1 AND SUBSTITUTE THE FOLLOWING NEW SUBSECTION 8.2.1:**

**"TIME LIMITS AND TIME FOR PERFORMANCE AS STATED IN THE CONTRACT**

**DOCUMENTS ARE THE ESSENCE OF THE CONTRACT. HOWEVER, IF THE LAST DAY TO PERFORM, FALLS ON A HOLIDAY, SATURDAY OR SUNDAY, THE TIME TO ACT WILL BE EXTENDED TO THE NEXT BUSINESS DAY. BY EXECUTING THE AGREEMENT, THE CONTRACTOR CONFIRMS THAT THECONTRACT TIME IS REASONABLE PERIOD FOR PERFORMING SUCH WORK, INCLUDING DELAYS CAUSED BY ANTICIPATED ADVERSE WEATHER DAYS."**

**DELAYS AND EXTENSIONS OF TIME:**

**DELETE SECTION 8.3.1 AND SUBSTITUTE THE FOLLOWING NEW SECTION 8.3.1:**

**"8.3.1: IF THE CONTRACTOR IS DELAYED AT ANY TIME IN PROGRESS OF THE WORK BY AN ACT OR NEGLECT OF THE OWNER, ARCHITECT, ANY OF THE OTHER CONTRACTORS OR ANY EMPLOYEE OF ANY OFTHEM, OR BY CHANGES ORDERED IN THE WORK, OR BY LABOR DISPUTES, FIRE, UNUSUAL DELAY IN DELIVERIES, UNAVOIDABLE CASUALTIES, OR OTHER CAUSES BEYOND THE CONTRACTOR'S CONTROL, OR BY DELAY AUTHORIZED BY THE OWNER PENDING RESOLUTION OF CLAIMS, OR BYOTHER CAUSES WHICH THE ARCHITECT, DETERMINES MAY JUSTIFY DELAY, THEN THE CONTRACT TIME MAY BE EXTENDED BY CHANGE ORDER FOR SUCH REASONABLE TIME AS THE ARCHITECT MAY DETERMINE. ARCHITECT SHALL NOTIFY OWNER OF ALL DELAYS IN PROGRESS. IF ANY DELAY WILL CAUSE THE POSTPONEMENT OF OCCUPANCY OF THE FACILITY, ARCHITECT SHALL NOTIFY OWNER IN ADVANCE OF AUTHORIZING SUCH DELAY, AND CONTRACTOR, ARCHITECT AND OWNER SHALL MEET TO DETERMINE ALTERNATIVES TO AVOID DELAY IN OPENING THE FACILITY."**

**ARTICLE 9 – PAYMENTS AND COMPLETION:**

**SCHEDULE OF VALUES:**

**ADD THE SECTION NUMBER 9.2.1.**

**"9.2.1. THE SCHEDULE OF VALUES SHALL BE SUFFICIENT OF DETAIL TO PERMIT THE OWNER REASONABLE ACCURATE VERIFICATION OF COMPLETION; DIVIDING LARGE DIVISIONS OF THE WORK AND GROUPING SMALL DIVISIONS OF THE WORK BY SEQUENCED EVENTS IN DELIVERY OF PRODUCTS TO HE SITE AND EXECUTION OF THE WORK."**

**APPLICATIONS FOR PAYMENT:**

**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 TM APPLICATION AND CERTIFICATE FOR PAYMENT,SUPPORTED BY A CURRENT AUTHORIZED EDITION OF AIA DOCUMENT G703TM, CONTINUATIONSHEET."**

**ADD NEW CLAUSE 9.3.1.3 IMMEDIATELY FOLLOWING CLAUSE 9.3.1.2, TO READ AS FOLLOWS:**

**"9.3.1.3 THE OWNER SHALL PAY NINETY FIVE PERCENT (95%) OF THE AMOUNT DUE THE CONTRACTOR ON ACCOUNT OF PROGRESS PAYMENTS, UNLESS OTHERWISE PROVIDED BY STATUTE OR AGREEMENT. THE REMAINING FIVE PERCENT (5%) SHALL CONSTITUTE "RETAINAGE." UPON FINAL COMPLETION, IN ACCORDANCE WITH STATE STATUTES THE OWNER SHALL PAY THE BALANCE OF THE RETAINAGE TO THE CONTRACTOR.**

**ADD NEW CLAUSE 9.3.2.1 IMMEDIATELY FOLLOWING SUBSECTION 9.3.2 TO READ AS FOLLOWS:**

**"9.3.2.1. ACCOMPANYING EACH APPLICATION AND CERTIFICATE FOR PAYMENT UPON WHICH THE CONTRACTOR APPLIES FOR PAYMENT FOR MATERIALS NOT YET INCORPORATED INTO THE WORK, THE CONTRACTOR SHALL INCLUDE A STATEMENT AS FOLLOWS: "AT TIME OF PAYMENT, FOR VALUE RECEIVED, THE CONTRACTOR AND APPLICABLE SUBCONTRACTORS AND MATERIAL SUPPLIERS, JOINTLY AND SEVERALLY, HEREBY SELL, ASSIGN OR TRANSFER UNTO THE OWNER THE PROPERTY DESCRIBED AS STORED MATERIALS IN THIS APPLICATION AND CERTIFICATE FOR PAYMENT AND DO HEREBY WARRANT THE TITTLE TO SAID PROPERTY, AND DO HEREBY CERTIFY THAT SAID PROPERTY IS FREE OF ALL LIENS AND ENCUMBRANCES." SHOULD THIS STATEMENT NOT BE INCLUDED WITH THEAPPLICATION AND CERTIFICATE FOR PAYMENT, IT SHOULD BE INCLUDED BY REFERENCE WITH THE SAME FORCE AND EFFECT AS IF IT HAD BEEN WRITTEN THEREON."**

**CERTIFICATES FOR PAYMENT:**

**DELETE SECTION 9.4.1 AND SUBSTITUTE THE FOLLOWING SECTION 9.4.1:**

**"9.4.1. THE GENERAL CONTRACTOR WILL ASSEMBLE A PROJECT APPLICATION FOR PAYMENT BY COMBINING THE GENERAL CONTRACTOR'S APPLICATIONS WITH SIMILAR APPLICATIONS FOR PROGRESS PAYMENTS FROM SUB CONTRACTORS AND, AFTER CERTIFYING THE AMOUNTS DUE ON SUCH APPLICATIONS, FORWARD THEM TO THE ARCHITECT WITHIN SEVEN DAYS. THE OWNER RESERVES THE RIGHT TO DISAPPROVE ANY CERTIFICATE FOR PAYMENT IF OWNER HAS REJECTEDTHE WORK FOR WHICH THE CERTIFICATE FOR PAYMENT REPRESENTS, IN WHOLE OR IN PART. OWNER IS REQUIRED TO APPROVE ALL CERTIFICATES FOR PAYMENT PRIOR TO PAYMENT OF SAME."**

**DECISIONS TO WITHHOLD CERTIFICATION:**

**ADD THE FOLLOWING SENTENCE TO SECTION 9.5.1:**

**"THE FOREGOING IS SUBJECT TO THE RIGHTS OF THE OWNER TO APPROVE PAYMENTS TO GENERAL CONTRACTOR AS PROVIDED ELSEWHERE IN THIS AGREEMENT AND THE ARCHITECTURAL SERVICES AGREEMENT."**

**PROGRESS PAYMENTS:**

**ADD THE FOLLOWING PHRASE TO 9.6.4:**

**"BUT THE OWNER MAY MAKE DIRECT PAYMENTS TO SUBCONTRACTORS IF DEEMED APPROPRIATE BY OWNER TO PROTECT THE WORK AND OWNER'S INTERESTS.**

**DELETE SECTION 9.9.2 AND SUBSTITUTE THE FOLLOWING MODIFIED SECTION 9.9.2:**

**"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."**

**ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY:**

**SAFETY OF PERSONS AND PROPERTY:**

**ADD THE FOLLOWING CLAUSE 10.2.4.1 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."**

**ADD THE FOLLOWING CLAUSE 10.2.4.2 TO SECTION 10.2.4:**

**"10.4.4.2 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 AND IN ACCORDANCE WITH APPLICABLE STATE AND FEDERAL REGULATIONS."**

**ADD THE FOLLOWING PROVISIONS TO SECTION 10.2.5:**

**"THE EXCEPTION FOUND WITHIN THE PARENTHESES IN LINES ONE AND TWO OF THE SUBPARAGRAPH SHALL NOT APPLY TO DAMAGE AND LOSS CAUSED BY CONTRACTOR, ITS OWNERS, OFFICERS, DIRECTORS, AGENTS OR EMPLOYEES. OWNER MAY DEDUCT OR WITHHOLD FROM ANY PAYMENT TO THE CONTRACTOR UNDER THE CONTRACT DOCUMENTS FOR CONTRACTOR'S FAILURE, OR ANTICIPATED INABILITY, TO REMEDY ANY SUCH DAMAGE OR LOSS. THE FACT THAT SUCH DAMAGE OR LOSS MAY HAVE OCCURRED PRIOR TO A PAYMENT, WHICH WAS NOT DIMINISHED BY OWNER, SHALL NOT BE CONSIDERED A WAIVER OF OWNER'S RIGHT TO DEDUCT OR WITHHOLD PAYMENT FOR DAMAGE OR LOSS FROM ANY SUBSEQUENT PAYMENT."**

**EMERGENCIES:**

**DELETE SECTION 10.4 AND SUBSTITUTE THE FOLLOWING MODIFIED SECTION 10.4.1:**

**"10.4.1 IN AN EMERGENCY AFFECTING THE SAFETY OF PERSONS OR PROPERTY AT THE WORK SITE OR OFFSITE STORAGE, IF ANY, THE CONTRACTOR SHALL TAKE WHATEVER STEPS THE CONTRACTOR REASONABLY BELIEVES UNDER THE CIRCUMSTANCES WILL PREVENT OR LESSEN SUCH ANTICIPATED DAMAGE, INJURY OR LOSS. CONTRACTOR SHALL ACT WITH REASONABLE CARE IN LIGHT OF ALL THE CIRCUMSTANCES EXISTING AT THE TIME OF THE EMERGENCY. ADDITIONAL COMPENSATION OR EXTENSION OF TIME CLAIMED BY THE CONTRACTOR ON ACCOUNT OF AN EMERGENCY SHALL BE DETERMINED AS PROVIDED IN ARTICLE 7."**

**ARTICLE 11 – INSURANCE AND BONDS:**

**CONTRACTOR'S LIABILITY INSURANCE:**

**DELETE SECTION 11.1.2 AND SUBSTITUTE THE FOLLOWING MODIFIED SECTION 11.1.2 ALONG WITH THE FOLLOWING CLAUSES 1 THROUGH 9:**

**THE CONTRACTOR SHALL MAINTAIN SUCH INSURANCE, WHICH SHALL PROTECT HIM, THE OWNER AND THE ARCHITECT FROM CLAIMS UNDER:**

| | |
|---|---|
| **1. WORKER'S COMPENSATION** | **STATUTORY LIMITS** |
| **2. COMPREHENSIVE GENERAL LIABILITY** | **$1,000,000 GENERAL AGGREGATE** |
| | **$1,000,000 PRODUCTS- COMP/OP AGG** |
| | **$ 500,000 PERSONAL & ADV INJURY** |
| | **$ 500,000 EACH OCCURRENCE** |
| | **$ 50,000 FIRE DAMAGE** |
| | **$ 5,000 MED EXP** |
| | **$1,000,000 COMBINED SINGLE LIMIT** |
| **3. COMPREHENSIVE AUTOMOBILE LIABILITY** | **$1,000,000 COMBINED SINGLE LIMIT (ANY AUTO)** |

**4. THE POLICY MUST INCLUDE ALL OWNED, NON-OWNED, AND HIRED VEHICLE AND EQUIPMENT EXPOSURE.**

**5. COMPLETED OPERATIONS LIABILITY: COVERAGE FOR HEREINBEFORE SPECIFIED INSURANCE SHALL REMAIN IN FORCE FOR A PERIOD OF ONE YEAR AFTER COMPLETION AND ACCEPTANCE OFTHE WORK.**

**6. CONTRACTOR AND SUBCONTRACTOR'S INSURANCE MUST PROVIDE BLANKET CONTRACTUAL INSURANCE, PERSONAL INJURY INSURANCE; PROVIDE COVERAGE FOR EXPLOSION, COLLAPSE AND UNDERGROUND DAMAGE. IN ADDITION, THIRTY (30) DAYS NOTICE OF CANCELLATION MUST BEGIVEN TO THE OWNER AND ARCHITECT FOR ALL INSURANCE COVERAGE.**

**7. ALL CERTIFICATES OF INSURANCE MUST INDICATE THE NATURE AND EXTENT OF COVERAGE. CONTRACTOR SHALL PROVIDE COPIES OF ALL CERTIFICATES OF INSURANCE FOR ITSELF AND ITS SUBCONTRACTORS TO THE ARCHITECT BEFORE WORK IS COMMENCED BY THAT ENTITY.**

**8. THE CONTRACTOR SHALL EITHER: (1) REQUIRE EACH OF HIS SUBCONTRACTORS TO PROCURE AND MAINTAIN DURING THE TERM OF THIS SUBCONTRACT, SUBCONTRACTOR'S PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE OF THE TYPE AND AMOUNTS AS REQUIRED BY THIS CONTRACT, OR (2) INSURE THE ACTIVITIES OF HIS SUBCONTRACTORS IN HIS OWN POLICY.**

**9. IF ANY SUBCONTRACTOR DOES NOT CARRY ALL FORMS OF INSURANCE LISTED OR COVERAGE IN THE AMOUNTS DESIGNATED, CONTRACTOR SHALL INFORM THE ARCHITECT. OWNER MAY MODIFY THESE REQUIREMENTS FOR SUBCONTRACTORS ON A CASE-BY-CASE BASIS."**

**PROPERTY INSURANCE:**

**ADD THE FOLLOWING SENTENCE TO SECTION 11.3.1.1:**

**"THE FORM OF POLICY SHALL BE 'COMPLETED VALUE'."**

**ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK:**

**CORRECTION OF WORK:**

**MODIFY SECTION 12.2.1 AS FOLLOWS:**

**"AT THE END OF THE SECTION ADD THE FOLLOWING STATEMENT: "THE OWNER RESERVES THE RIGHT, IN ADDITION TO OTHER REMEDIES, TO WITHHOLD PAYMENT TO THE CONTRACTOR FOR ANY WORK REJECTED BY THE ARCHITECT OR OWNER FROM ANY PROGRESS OR FINAL PAYMENTS, AND RETAIN SUCH UNTIL THE WORK IS ACCEPTABLE."**

**MODIFY SECTION 12.2.3 AS FOLLOWS:**

**AFTER THE WORD "REMOVE" ON THE FIRST LINE OF THE SECTION ADD THE FOLLOWING WORDS "WITHOUT ADDITIONAL COMPENSATION."**

**ADD THE FOLLOWING MODIFIED SECTION 12.2.4:**

**"IF THE CONTRACTOR FAILS TO CORRECT NON-CONFORMING WORK WITHIN A REASONABLE TIME, THE OWNER MAY CORRECT IT IN ACCORDANCE WITH PARAGRAPH 2.4. IF THE CONTRACTOR DOES NOT PROCEED WITH CORRECTION OF SUCH NON-CONFORMING WORK WITHIN A REASONABLE TIME FIXEDBY WRITTEN NOTICE FROM THE ARCHITECT, THE OWNER MAY REMOVE THE NON-CONFORMINGWORK AND STORE THE SALVAGEABLE MATERIALS OR EQUIPMENT AT THE CONTRACTOR'S EXPENSE, WITHOUT LIABILITY TO CONTRACTOR. IF THE CONTRACTOR DOES NOT PAY COSTS OF SUCH REMOVAL AND STORAGE WITHIN TEN (10) DAYS AFTER WRITTEN NOTICE, THE OWNER MAY, WITHOUT LIABILITY TO THE CONTRACTOR EXCEPT FOR ACCOUNTING FOR THE PROCEEDS THEREOF, DISPOSE OF SUCH EQUIPMENT BY SUCH MEANS AS OWNER DEEMS APPROPRIATE. OWNER SHALL ACCOUNT FOR THE PROCEEDS THEREOF, AND IF AFTER DEDUCTING COSTS AND DAMAGES THAT SHOULD HAVE BEEN BORNE BY THE CONTRACTOR, INCLUDING COMPENSATION FOR THE ARCHITECT'S AND OWNER'S SERVICES AND EXPENSES, INCLUDING ATTORNEY FEES MADE NECESSARY BY CONTRACTOR'S ACTIONS, THE PROCEEDS DO NOT COVER THE COSTS WHICH THE CONTRACTOR SHOULD HAVE BORNE, THE CONTRACT SUM SHALL BE REDUCED BY THE DEFICIENCY. IF THE PAYMENTS THEN AND THEREAFTER DUE THE CONTRACT ARE NOT SUFFICIENT TO COVER SUCH AMOUNT, THE CONTRACTOR SHALL PAY THE DIFFERENCE TO THE OWNER. IN THE EVENTTHAT THE PROCEEDS EXCEED THE COSTS, SUCH EXCESS SHALL BE PAID TO THE CONTRACTOR."**

**ARTICLE 13 – MISCELLANEOUS PROVISIONS:**

**ADD THE FOLLOWING SUBSECTION 13.1.1:**

**ALL CONTRACTORS AND SUBCONTRACTORS EMPLOYED UPON THE WORK SHALL CONFORM TO THE LABOR LAWS OF THE STATE IN WHICH THE PROJECT IS LOCATED AND THE VARIOUS ACTS AMENDATORY AND SUPPLEMENTARY THERETO; AND TO ALL OTHER LAWS, ORDINANCES AND LEGAL REQUIREMENTS APPLICABLE THERETO."**

**TESTS AND INSPECTIONS:**

**ADD THE FOLLOWING SECTION 13.5.1 TO SECTION 13.5:**

**"13.5.1 IN THE EVENT THAT THE OWNER IS REQUIRED TO BRING AN ACTION TO ENFORCE ITS RIGHTS UNDER THE CONTRACT DOCUMENTS, OWNER SHALL ALSO BE ENTITLED TO RECOVER ITS COSTS INCLUDING ITS REASONABLE ATTORNEY'S AND ARCHITECT'S FEES."**

**ARTICLE 14 – TERMINATION OR SUSPENSION OF CONTRACT:**

**TERMINATION BY THE OWNER FOR CAUSE:**

**ADD NEW CLAUSE 14.2.1.5 TO SUBSECTION 14.2.1 IMMEDIATELY FOLLOWING CLAUSE 14.2.1.4 TO READ AS FOLLOWS:**

**"14.2.1.5 IS ADJUDGED BANKRUPT, OR IF HE MAKES A GENERAL ASSIGNMENT FOR THE BENEFIT OF HIS CREDITORS OR IF A RECEIVER IS APPOINTED ON ACCOUNT OF HIS INSOLVENCY."**

**ADD THE FOLLOWING SENTENCE TO SECTION 14.2.3: "THE CONTRACTOR IS NOT ENTITLED TO DAMAGES."**

**ADD THE FOLLOWING PROVISIONS TO SECTION 14.2.4:**

**"IN REGARD TO REASONS SET FORTH IN SECTION 14.2.1, IF THE COSTS OF**

**FINISHING THE WORK EXCEED THE UNPAID BALANCE, THE CONTRACTOR SHALL PAY THE**

**DIFFERENCE TO THE OWNER. IN THE EVENT THAT THE COSTS OF COMPLETION DO NOT EXCEED THE UNPAID BALANCE, CONTRACTOR SHALL BE PAID ONLY FOR THE WORK COMPLETED AND ACCEPTED BY OWNER AND ARCHITECT."**

**SUSPENSION BY THE OWNER FOR CONVENIENCE:**

**ADD THE FOLLOWING SECTION 14.3.3 TO SECTION 14.3:**

**"14.3.3 CONTRACTOR SHALL BE PAID FOR ALL WORK PERFORMED AT THE TIME NOTICE OF SUSPENSION WAS RECEIVED BY CONTRACTOR."**

**ARTICLE 15 – CLAIMS AND DISPUTES:**

**CLAIMS:**

**ADD THE FOLLOWING CLAUSE 15.1.5.1 TO SECTION 15.1.5:**

**"15.1.5.1. 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 SHALLPROVIDE SUCH SUPPORTING DOCUMENTATION AS THE OWNER MAY REQUIRE INCLUDING, WHERE APPROPRIATE, A REVISED CONSTRUCTION SCHEDULE INDICATING ALL THE ACTIVITIES AFFECTED BYTHE CIRCUMSTANCES FORMING THE BASIS OF THE CLAIM."**

**ADD THE FOLLOWING CLAUSE 15.1.5.2 TO SECTION 15.1.5:**

**"15.1.5.2 THE CONTRACTOR SHALL NOT BE ENTITLED TO A SEPARATE INCREASE IN THE CONTRACT TIME FOR EACH ONE OF THE NUMBER CAUSES OF DELAY WHICH MAY HAVE CONCURRENT OF INTERRELATED EFFECTS ON THE PROGRESS OF THE WORK, OR FOR CONCURRENT DELAYS DUE TO THE FAULT OF THECONTRACTOR."**

**END OF SECTION**

**SECTION 01 10 00**
**SUMMARY**

## PART 1 GENERAL

### 1.01 PROJECT

A. Project Name: Dewey Streetscape Redevelopment

B. Owner's Name: City of Sapulpa.

C. Architect's Name: Reed Architecture and Interiors.

D. The Project consists of the construction of various street improvements and site embellishments to the existing streetscape of a downtown section of Dewey Street.

### 1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price

### 1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.

B. Scope of alterations work is indicated on drawings.

### 1.04 OWNER OCCUPANCY

A. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

B. Schedule the Work to accommodate Owner occupancy.

### 1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Provide access to and from site as required by law and by Owner:

C. Utility Outages and Shutdown:
   1. Limit disruption of utility services in agreement with Owner and Architect.
   2. Prevent accidental disruption of utility services to other facilities.

### 1.06 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner and Architect.

**END OF SECTION**

**SECTION 01 20 00**
**PRICE AND PAYMENT PROCEDURES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Change procedures.

### 1.02 RELATED REQUIREMENTS

A. Section 00 72 00 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

B. Section 00 73 00 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit.

C. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

D. Section 01 78 00 - Closeout Submittals: Project record documents.

### 1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Forms filled out by hand will not be accepted.

C. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

D. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.

### 1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

G. Submit one electronic and three hard-copies of each Application for Payment.

H. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 30 00.
   3. Current construction photographs specified in Section 01 30 00.
   4. Partial release of liens from major subcontractors and vendors.
   5. Affidavits attesting to off-site stored products.

I. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

### 1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.

1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.

C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 10 days.

D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.

E. Substantiation of Costs: Provide full information required for evaluation.

F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

**1.06 APPLICATION FOR FINAL PAYMENT**

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

**END OF SECTION**

**SECTION 01 21 00**
**ALLOWANCES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Cash allowances.

### 1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

### 1.03 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of product including power and installation to Contractor or subcontractor, less applicable trade discounts.

B. Architect Responsibilities:
   1. Consult with Contractor for consideration and selection of products, suppliers , and installers.
   2. Select products in consultation with Owner and transmit decision to Contractor.

C. Contractor Responsibilities:
   1. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   2. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

D. Differences in costs will be adjusted by Change Order.

### 1.04 ALLOWANCES SCHEDULE

A. **Allowance One:**
   1. Section 10 1416 Plaques and Section 10 1419: Dimensional Letter Signage: Include the stipulated sum of $25,000.00 (Twenty Five Thousand dollars) for purchase, delivery, and installaton of all dimensional letter signage at Gateway structure as noted on contract drawings. Include cost for providing power and lighting for a complete installation. Includes bronze plaques mounted to access panels where shown on contract drawings. Design graphics to be determined.

B. **Allowance Two:**
   1. Fence Screen Banners. Include the stiplated sum of $25,000.00 (Twenty FiveThousand dollars) for purchase, delivery, and installation of custom banners to be attached to project fence screening. Details, sizes, verbiage and graphics to be determned and proofed by Owner and Architect prior to fabrication.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION - NOT USED

**END OF SECTION**

**SECTION 01 23 00**
**ALTERNATES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Description of Alternates.

### 1.02 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

### 1.03 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

### 1.04 SCHEDULE OF ALTERNATES

A. Alternate Number One: Provide and install tensile fabric sail structure where shown on contract drawings.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION - NOT USED

**END OF SECTION**

**SECTION 01 25 00**
**SUBSTITUTION PROCEDURES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

### 1.02 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. Unavailability.
      b. Regulatory changes.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

### 1.03 REFERENCE STANDARDS

A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage) Current Edition.

B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase) Current Edition.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   5. Waives claims for additional costs or time extension that may subsequently become apparent.
   6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

B. A Substitution Request for specified installer constitutes a representation that the submitter:
   1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

E. Limit each request to a single proposed substitution item.

### 3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Form (before award of contract):

1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
2. Substitution Requests during bidding will be considered no later than five (5) days prior to date for receipt of bids. Substitution requests presented after said date will be returned to proposer without action.

**3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

A. Submittal Form (after award of contract):
   1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
   1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
   2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
   3. Bear the costs engendered by proposed substitution of:
      a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.

D. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.

**3.04 RESOLUTION**

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.

**3.05 ACCEPTANCE**

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

**3.06 CLOSEOUT ACTIVITIES**

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

**END OF SECTION**

**SECTION 01 30 00**
**ADMINISTRATIVE REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Construction progress schedule.

G. Progress photographs.

H. Coordination drawings.

I. Submittals for review, information, and project closeout.

J. Requests for Interpretation (RFI) procedures.

K. Submittal procedures.

### 1.02 RELATED REQUIREMENTS

A. Section 01 60 00 - Product Requirements: General product requirements.

B. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.

C. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

### 1.03 REFERENCE STANDARDS

A. AIA G716 - Request for Information 2004.

B. AIA G810 - Transmittal Letter 2001.

C. CSI/CSC Form 12.1A - Submittal Transmittal Current Edition.

D. CSI/CSC Form 13.2A - Request for Information Current Edition.

### 1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Correction Punch List and Final Correction Punch List for Substantial Completion.
   10. Closeout submittals.

### 1.05 PROJECT COORDINATOR

A. Project Coordinator: Construction Manager/Contractor.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for designatedaccess, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Contractor and Architect are required to use this service.
   3. It is Contractor's responsibility to submit documents in allowable format.
   4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
   5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

### 3.02 PRECONSTRUCTION MEETING

A. Schedule meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

C. Agenda:
   1. Distribution of Contract Documents.
   2. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   3. Designation of personnel representing the parties to Contract and <1|A/E|>.
   4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   5. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### 3.03 SITE MOBILIZATION MEETING

A. Project Coordinator will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Special consultants.
   5. Contractor's superintendent.
   6. Major subcontractors.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements.
   3. Survey and site layout.
   4. Security and housekeeping procedures.
   5. Schedules.
   6. Application for payment procedures.
   7. Procedures for testing.
   8. Procedures for maintaining record documents.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### 3.04 PROGRESS MEETINGS

A. Schedule and administer bi-weekly meetings throughout progress of the work. Additional Progress Meetings may be required.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's superintendent.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of RFIs log and status of responses.
   7. Maintenance of progress schedule.
   8. Planned progress during succeeding three week work period.
   9. Effect of proposed changes on progress schedule and coordination.
   10. Other business relating to work.

E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

### 3.05 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. At each Progress Meeting, provide an updated 3-week progress forecasting schedule.

### 3.06 PROGRESS PHOTOGRAPHS

A. Submit photographs weekly unless noted otherwise.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work

D. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Via email.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

### 3.07 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit an RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare using software provided by the Electronic Document Submittal Service.
   3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.

D. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

E. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.

F. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   3. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

**3.08 SUBMITTALS FOR REVIEW**

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

**3.09 SUBMITTALS FOR INFORMATION**

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

**3.10 SUBMITTALS FOR PROJECT CLOSEOUT**

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

### 3.11 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.

### 3.12 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a separate transmittal for each item.
   2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   5. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
   6. Provide space for Contractor and Architect review stamps.
   7. When revised for resubmission, identify all changes made since previous submission.
   8. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
   9. Submittals not requested will not be recognized or processed.

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
   2. Do not reproduce the Contract Documents to create shop drawings.
   3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

### 3.13 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal and denote appropriate action.

B. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
   1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

C. Architect's actions on items submitted for review:
   1. "Reviewed-No exceptions taken".
   2. "Reviewed-Note exceptions taken".
   3. "Reviewed-Resubmit".
   4. "Reviewed-Rejected".
   5. "Not reviewed".

D. Architect's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. ""Reviewed Only"" - no further action is required from Contractor.

**END OF SECTION**

**SECTION 01 33 20**
**ELECTRONIC DATA WAIVER, RELEASE AND INDEMNITY AGREEMENT**

**THE USE OF THE REQUESTED ELECTRONIC DATA IS RESTRICTED TO THIS SPECIFIC PROJECT AND CONTAINS INTELLECTUAL PROPERTY THAT IS SOLELY OWNED BY REED ARCHITECTURE AND INTERIORS LLC. ANY ELECTRONIC FILES THAT ARE PROVIDED BY PROPERTY THAT IS SOLELY OWNED BY REED ARCHITECTURE AND INTERIORS LLC. ANY ELECTRONIC FILES THAT ARE PROVIDED BY REED ARCHITECTS AND INTERIORS, LLC ARE ONLY FOR THE SPECIFIC USE THAT IS IDENTIFIED WITHIN THIS REQUEST FORM BY THE USER.**

**WHEREAS, REED ARCHITECTS AND INTERIORS, LLC, HEREAFTER "ARCHITECT" HAS UTILIZED CERTAIN ELECTRONIC COMPUTER AIDED DRAFTING(CAD) FILES AND BUILDING INFORMATION MODELING (BIM) FILES IN PREPARATION OF DRAWINGS FOR SPECIFIC PROJECTS, AND WHEREAS, THE USER DESIRES TO OBTAIN COPIES OF THE ARCHITECT'S CAD AND/OR BIM FILES CONSISTING OF ATTACHED COMPRESSED FILES HEREINAFTER, "ELECTRONIC DATA", AND WHEREAS, ARCHITECT IS THE SOLE OWNER OF SAID ELECTRONIC DATA AND IS WILLING TO PROVIDE COPIES FOR THE CONVENIENCE OF THE REQUESTING "USER" ONLY UNDER CERTAIN EXPRESS CONDITIONS OF UNDERSTANDING, ACKNOWLEDGMENT AND COVENANTS OF PROTECTION, WHICH THE USER ACCEPTS WITHOUT RESERVATION AND COVENANTS AS HEREINAFTER PROVIDED WITHOUT QUALIFICATION.**

**NOW THEREFORE, ARCHITECT AND THE USER AGREE AS FOLLOWS:**

**ACKNOWLEDGMENT AND LIMITATIONS:**

**IT IS ACKNOWLEDGED THAT (1) ARCHITECT'S INSTRUMENTS OF PROFESSIONAL SERVICES ARE THE HARD COPY DRAWINGS AND SPECIFICATIONS ISSUED AND SEALED BY ARCHITECT, HEREINAFTER "INSTRUMENTS," (2) THE ELECTRONIC DATA ARE NOT SUBSTITUTIONS FOR SAID INSTRUMENTS, (3) DIFFERENCES MAY EXIST BETWEEN SAID INSTRUMENTS AND THE ELECTRONIC DATA WHICH ARCHITECT IS UNDER NO OBLIGATION TO DISCOVER OR DISCLOSE IF KNOWN, (4) THE ELECTRONIC DATA MAY BE INCOMPATIBLE WITH THE USER'S SOFTWARE AND HARDWARE CONFIGURATIONS. IN ALL WAYS, INCLUDING THOSE ENUMERATED, USER ACCEPTS THE ELECTRONIC DATA "AS IS" AND ARCHITECT IS UNDER NO OBLIGATION TO CORRECT, UPDATE FOR CHANGES, ENHANCE OR MAINTAIN THE ELECTRONIC DATA FOR THE USER.**

**ARCHITECT DOES NOT REPRESENT OR WARRANT THAT THE ELECTRONIC DATA ARE COMPLETE, FREE FROM DEFECTS, OR ACCURATE NOW OR IN THE FUTURE. IT IS ACKNOWLEDGED, FINALLY, THAT NO CLIENT RELATIONSHIP OR DUTY IS CREATED BY OR THROUGH THIS INSTRUMENT BETWEEN ARCHITECT AND THE USER AND SPECIFICATIONS ISSUED AND SEALED BY ARCHITECT, HEREINAFTER "INSTRUMENTS:" (2) THE ELECTRONIC DATA ARE NOT SUBSTITUTIONS FOR SAID INSTRUMENTS: (3) DIFFERENCES MAY EXIST BETWEEN SAID INSTRUMENTS AND THE ELECTRONIC DATA WHICH ARCHITECT IS UNDER NO OBLIGATION TO DISCOVER OR DISCLOSE IF KNOWN: (4) THE ELECTRONIC DATA MAY BE INCOMPATIBLE WITH THE USER'S SOFTWARE AND HARDWARE CONFIGURATIONS. IN ALL WAYS, INCLUDING THOSE ENUMERATED, USER ACCEPTS THE ELECTRONIC DATA "AS IS" AND ARCHITECT IS UNDER NO OBLIGATION TO CORRECT, UPDATE FOR CHANGES, ENHANCE OR MAINTAIN THE ELECTRONIC DATA FOR THE USER.**

**BUILDING INFORMATION MODELING (BIM):**

**IT IS EXPRESSLY UNDERSTOOD THAT THE BIM FILES ARE BEING ISSUED ONLY AS SUPPLEMENTAL INFORMATION FOR CONVENIENCE TO THE CONTRACTOR. BIM FILES, LIKE ANY ELECTRONIC DATA, TRANSFERRED IN ANY MANNER OR TRANSLATED FROM THE SYSTEM AND FORMAT USED BY ALL OF THE DESIGN PROFESSIONALS ON THIS PROJECT ("DESIGN TEAM") TO ANOTHER SYSTEM OR FORMAT ARE SUBJECT TO ERRORS AND MODIFICATIONS THAT MAY AFFECT THE ACCURACY AND RELIABILITY OF THE DATA, AND, IN ADDITION, THAT ELECTRONIC DATA MAY BE ALTERED OR CORRUPTED WHETHER INADVERTENTLY OR OTHERWISE. AS A RESULT, NO REPRESENTATIONS OR WARRANTIES, WHETHER EXPRESSED OR IMPLIED, AS TO THE ACCURACY OF THE BIM FILES TRANSFERRED ARE MADE HEREIN. AS THE ACCURACY OF THE BIM FILES CANNOT BE WARRANTED OR GUARANTEED, IT IS ISSUED AS SUPPLEMENTAL INFORMATION ONLY AND MUST BE READ IN CONJUNCTION THE CONTRACT DOCUMENTS, AND THE TO THE EXTENT THERE ARE ANY DISCREPANCIES BETWEEN THE BIM FILES AND THE CONTRACT DOCUMENTS, THE PHYSICAL CONTRACT DOCUMENTS MUST BE RELIED UPON.**

**BY SIGNING THE RELEASE BELOW YOU ARE ACKNOWLEDGING THAT:**

**1) ("OWNER") AND THE DESIGN TEAM SHALL BE HELD HARMLESS FROM ANY AND ALL CLAIMS, LIABILITIES, DAMAGES, LOSSES, OR EXPENSES ARISING OUT THE CONTRACTOR'S USE OF THE BIM FILES AND CANNOT BE HELD RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WITHIN THE BIM FILES, 2) THE BIM FILES ARE TO BE READ IN CONJUNCTION WITH ALL CONSTRUCTION DOCUMENTS, ADDENDA AND SUPPLEMENTAL CONTRACT DOCUMENTS, AND 3) THE BIM FILES ARE NOT TO BE USED FOR FABRICATION OR CONSTRUCTION OF ANY KIND.**

**WAIVER AND RELEASE:**

**THE USER ACCEPTS ALL RISK OF INCOMPLETE, INACCURATE, DEFECTIVE AND VARIANT INFORMATION CONTAINED IN THE ELECTRONIC DATA, AND WAIVES, QUITS, AND FOREVER DISCHARGES AND RELEASES ARCHITECT AND THEIR OFFICERS, DIRECTORS, EMPLOYEES AND SUCCESSORS FROM EVERY CLAIM ARISING OUT OF OR RELATED TO ANY ERROR, DISCREPANCY, INACCURACY, VARIATION OR OTHER DEFECT IN THE ELECTRONIC DATA, WHETHER OR NOT RESULTING IN WHOLE OR IN PART FROM AN ACT, ERROR OR OMISSION OF ARCHITECT AND WHETHER OR NOT SUCH CLAIM IS KNOWN OR UNKNOWN AS OF THE DATE OF THIS WAIVER AND RELEASE**

**REUSE:**

**THE ELECTRONIC DATA IS NOT SUITABLE FOR REUSE IN ANY WAY, WITHOUT COMPLETE VERIFICATION BY AN APPROPRIATE ARCHITECT ON ANY PROJECT, INCLUDING WITHOUT LIMITATION, ADDITIONS OR EXTENSIONS OF THE PROJECTS IDENTIFIED TO THE ELECTRONIC DATA. ARCHITECT DOES NOT AUTHORIZE RELEASE OF THE ELECTRONIC DATA TO ANY PERSON OR PARTY, AND THE USER AGREES AND COVENANTS NOT TO RELEASE THE ELECTRONIC DATA TO ANY OTHER PARTY. ANY SUCH RELEASE SHALL CONSTITUTE A BREACH OF THIS AGREEMENT AND ARCHITECT WILL AT SUCH TIME DEMAND RETURN OF ITS PROPERTY AND MAY SEEK LEGAL RECOURSE AND THE COST OF REASONABLE FEES.**

**INDEMNIFICATION**

**USE OF THE ELECTRONIC DATA SHALL BE AT THE SOLE RISK OF THE USER, AND THE ARCHITECT SHALL NOT BE LIABLE TO THE USER FOR ANY DAMAGES ON ACCOUNT OF ANY ERROR, OMISSION OR DEFECT THEREIN WHETHER SUCH ERROR, OMISSION OR DEFECT SHALL BE CLAIMED TO BE BREACH OF CONTRACT, NEGLIGENT BREACH OF CONTRACT, BREACH OF A DUTY OR WARRANTY IMPLIED IN OR ACCOMPANYING CONTRACT, NEGLIGENCE OR OTHER DUTY IMPOSED BY LAW OF WHATEVER KIND OR CHARACTER, WHETHER SIMILAR OR DISSIMILAR TO THE THINGS HEREIN DESCRIBED; AND THE CONTRACTOR SHALL TO THE FULLEST EXTENT PERMITTED BY LAW, DEFEND, INDEMNIFY AND HOLD HARMLESS THE ARCHITECT, ITS OFFICERS, DIRECTORS, EMPLOYEES AND SUCCESSORS FROM ALL CLAIMS AND DAMAGES, INCLUDING ATTORNEY'S FEES, ARISING OUT OF OR RESULTING IN WHOLE OR IN PART FROM THE USE OF THE ELECTRONIC MEDIA.**

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**FEES**

**FOR EACH REQUEST OF CAD FILE TRANSFERS THERE IS AN ASSOCIATED FIXED FEE OF $125.00 (ONE HUNDRED TWENTY-FIVE DOLLARS).**

**FOR EACH REQUEST FOR A BIM MODEL TRANSFER THERE IS AN ASSOCIATED FIXED FEE OF $250.00 (TWO HUNDRED FIFTY DOLLARS).**

**USER SHALL ATTACH A WRITTEN DESCRIPTION OF THIS AGREEMENT OUTLINING THE DATA REQUESTED INCLUDING SUCH INFORMATION AS SHEET NUMBER AND SHEET TITLE, AND A DESCRIPTION OF THE INTENDED USE OF THE DATA.**

**USER'S ACCEPTANCE OF THESE TERMS, WHICH IS COMMUNICATED BY SIGNATURE OF THIS AGREEMENT, CONSTITUTES A WAIVER OF LIABILITY AND THE ACCEPTANCE OF RESPONSIBILITIES FOR THE COORDINATION OF ANY REVISIONS MADE TO THE INFORMATION TRANSMITTED. ACCEPTANCE OF THESE TERMS MAY HAVE LEGAL COMPLICATIONS AND SHOULD BE INFORMATION TRANSMITTED. ACCEPTANCE OF THESE TERMS MAY HAVE LEGAL COMPLICATIONS AND SHOULD BE REVIEWED WITH USER'S LEGAL COUNSEL. ELECTRONIC DATA WILL NOT BE PROVIDED UNTIL ARCHITECT HAS RECEIVED A SIGNED ORIGINAL OF THIS AGREEMENT AND THE ASSOCIATED FIXED FEE.**

**_____**

**SIGNATURE**

**_____**

**_____**

**DATE**

**END OF SECTION**

**SECTION 01 40 00**
**QUALITY REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. Testing and inspection agencies and services.

E. Contractor's construction-related professional design services.

F. Control of installation.

G. Mock-ups.

H. Defect Assessment.

### 1.02 RELATED REQUIREMENTS

A. Document 00 31 00 - Available Project Information: Soil investigation data.

B. Document 00 72 00 - General Conditions: Inspections and approvals required by public authorities.

C. Section 01 30 00 - Administrative Requirements: Submittal procedures.

### 1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants 2008 (Reapproved 2023).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.

C. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.

### 1.04 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

### 1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents, or for Owner's information.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.

1. Include:
    a. Date issued.
    b. Project title and number.
    c. Name of inspector.
    d. Date and time of sampling or inspection.
    e. Identification of product and specifications section.
    f. Location in the Project.
    g. Type of test/inspection.
    h. Date of test/inspection.
    i. Results of test/inspection.
    j. Compliance with Contract Documents.
    k. When requested by Architect, provide interpretation of results.

2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

**1.06 QUALITY ASSURANCE**

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

**1.07 REFERENCES AND STANDARDS**

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

E. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

**1.08 TESTING AND INSPECTION AGENCIES AND SERVICES**

A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 CONTROL OF INSTALLATION**

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**3.02 MOCK-UPS**

A. Construct stand alone mock ups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Product Systems Mock-ups: Construct stand alone mock-up as indicated on drawings. Coordinate installation of materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Notify Architect fifteen (15) working days in advance of dates and times when mock-ups will be constructed.

E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

F. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

G. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

H. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.

I. Accepted mock-ups shall be a comparison standard for the remaining Work.

J. Accepted mock-up may be relocated and re-installed as part of the project work.

K. Where possible salvage and recycle the demolished mock-up materials.

**3.03 TESTING AND INSPECTION**

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.

3. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
4. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

**3.04 DEFECT ASSESSMENT**

A. Replace Work or portions of the Work not complying with specified requirements.

**END OF SECTION**

**SECTION 01 45 33**
**CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

### 1.02 RELATED REQUIREMENTS

A. Document 00 72 00 - General Conditions: Inspections and approvals required by public authorities.

B. Section 01 30 00 - Administrative Requirements: Submittal procedures.

C. Section 01 40 00 - Quality Requirements.

D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

### 1.03 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authority having jurisdiction.

B. IAS: International Accreditation Service, Inc.

C. NIST: National Institute of Standards and Technology.

### 1.04 DEFINITIONS

A. Code or Building Code: ICC (IBC)-2018, Edition of the International Building Code and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

### 1.05 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).

B. AISC 360 - Specification for Structural Steel Buildings 2022.

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

E. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field 2023.

F. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete 2017.

G. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.

H. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.

I. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2021.

J. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems 2020a.

K. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers 2020a.

L. ASTM E2570/E2570M - Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage 2007 (Reapproved 2019).

M. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).

N. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018, with Errata (2022).

O. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars 2018, with Amendment (2020).

P. IAS AC291 - Accreditation Criteria for Special Inspection Agencies AC291 2019.

Q. ICC (IBC)-2018 - International Building Code 2018.

R. SDI (QA/QC) - Standard for Quality Control and Quality Assurance for Installation of Steel Deck 2017.

S. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022, with Errata.

**1.06 SUBMITTALS**

A. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Submit certification that Special Inspection Agency is acceptable to AHJ.
   4. Submit documentation that Special Inspection Agency is accredited by IAS according to IAS AC291.

B. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures.

C. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures.

D. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of special inspection.
      h. Date of special inspection.
      i. Results of special inspection.
      j. Compliance with Contract Documents.
   2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

E. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of fabricated item and specification section.
      f. Location in the Project.
      g. Results of special inspection.
      h. Verification of fabrication and quality control procedures.
      i. Compliance with Contract Documents.
      j. Compliance with referenced standard(s).

F. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect and AHJ.

**1.07 SPECIAL INSPECTION AGENCY**

A. Owner or Contractor will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

**1.08 TESTING AND INSPECTION AGENCIES**

A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

**1.09 QUALITY ASSURANCE**

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC291.

B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC89.

C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

### 3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC).

B. Cold-Formed Steel Deck: Comply with quality assurance inspection requirements of SDI (QA/QC).

C. High-Strength Bolt, Nut and Washer Material:
   1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
   2. Submit manufacturer's certificates of compliance; periodic.

D. Welding:
   1. Structural Steel and Cold Formed Steel Deck:
      a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
      b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
      c. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
      d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
      e. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
   2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.
      a. Verification of weldability; periodic.
      b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as boundary elements of special structural walls of concrete and shear reinforcement; continuous.
      c. Shear reinforcement; continuous.
      d. Other reinforcing steel; periodic.

### 3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved Contract Documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.

B. Reinforcing Bar Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, 26.6.4; periodic.
   1. Inspect all other welds; continuous.

C. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved Contract Documents and ACI 318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.

D. Anchors Post-Installed in Hardened Concrete: Verify compliance with ACI 318.
   1. Adhesive Anchors: Verify horizontally or upwardly-inclined orientation installations resisting sustained tension loads - Section 17.8.2.4; continuous.

E. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 19, 16.4.3, 26.4.4; periodic.

F. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 4 and 5.2; periodic.

G. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Chapter 26.5, 26.12, and record the following, continuous:
   1. Slump.
   2. Air content.
   3. Temperature of concrete.

H. Specified Curing Temperature and Techniques: Verify compliance with approved Contract Documents and ACI 318, Sections 5.11 through 5.13; periodic.

I. Precast Concrete Members: Verify erection techniques and placement comply with approved Contract Documents and ACI 318, Chapter 26.9; periodic.

J. Precast Concrete Members: Verify erection techniques and placement comply with approved Contract Documents and ACI 318, Chapter 16; periodic.

K. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI 318, Chapter 26.11.1.2(b); periodic.

L. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI 318, Section 6.1.1; periodic.

**3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION**

A. Masonry Structures Subject to Special Inspection:
   1. Empirically designed masonry and masonry veneer in structures designated as "essential facilities".
   2. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".

B. Verify each item below complies with approved Contract Documents and the applicable articles of TMS 402/602.
   1. Inspections and Approvals:
      a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
      b. Verify approval of submittals required by Contract Documents; periodic.
   2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
   3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
   4. Joints and Accessories: When masonry construction begins, verify:
      a. Proportions of site prepared mortar; periodic.
      b. Construction of mortar joints; periodic.
      c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
   5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
      a. Size and location of structural elements; periodic.
      b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
      c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
      d. Welding of reinforcing bars; continuous.
   6. Grouting Preparation: Prior to grouting, verify:
      a. Grout space is clean; periodic.

b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
d. Correctly constructed mortar joints; periodic.

7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

**3.05 SPECIAL INSPECTIONS FOR SOILS**

A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
1. Design bearing capacity of material below shallow foundations; periodic.
2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.

B. Testing: Classify and test excavated material; periodic.

**3.06 OTHER SPECIAL INSPECTIONS**

A. Provide for special inspection of work that is required by AHJ.

B. Alternative Test Procedures: Where approved rules and standards do not exist, test materials and assemblies as required by AHJ or provide AHJ with documentation of quality and manner in which those materials and assemblies are used.

**3.07 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES**

A. Special Inspection Agency shall:
1. Verify samples submitted by Contractor comply with the referenced standards and the approved Contract Documents.
2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified reference standards.
4. Ascertain compliance of materials and products with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
6. Perform additional tests and inspections required by Architect.
7. Submit reports of all tests or inspections specified.

B. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

C. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

**3.08 TESTING AGENCY DUTIES AND RESPONSIBILITIES**

A. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

**3.09 CONTRACTOR DUTIES AND RESPONSIBILITIES**

A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site and to the work.
3. Provide incidental labor and facilities:
   a. To provide access to work to be tested or inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
   c. To facilitate tests or inspections.
   d. To provide storage and curing of test samples.
4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

B. Contractor Responsibilities, Wind Force-Resisting System and Wind Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

**3.10 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES**

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

**END OF SECTION**

**SECTION 01 50 00**
**TEMPORARY FACILITIES AND CONTROLS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Dewatering

B. Temporary utilities.

C. Temporary telecommunications services.

D. Temporary sanitary facilities.

E. Temporary Controls: Barriers, enclosures, and fencing.

F. Security requirements.

G. Vehicular access and parking.

H. Waste removal facilities and services.

I. Project identification sign.

J. Field offices.

### 1.02 DEWATERING

A. Provide temporary means and methods for dewatering all temporary facilities and controls.

### 1.03 TEMPORARY UTILITIES

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

B. Existing facilities may not be used.

### 1.04 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Telecommunications services shall include:
   1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
   2. Internet Connections: Minimum of one; DSL modem or faster.
   3. Email: Account/address reserved for project use.
   4. Facsimile Service: Minimum of one dedicated fax machine/printer, with dedicated phone line.

### 1.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

### 1.06 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Refer to contract drawings for Phasing Plans. Coordinate location of barriers with City of Sapulpa and Property Owners affected by each Phasing Plan.

C. Provide barricades and walkways required by governing authorities for public rights-of-way and for public access to existing buildings and businesses during business hours.

D. Provide protection for plants designated to remain. Replace damaged plants.

E. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

### 1.07 FENCING

A. Refer to contract drawings for location of fencing during each phase and to Fencing Section 32 31 13 of specififcations.

### 1.08 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

### 1.09 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

### 1.10 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

### 1.11 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated on drawings.

B. Erect on site at location indicated.

C. No other signs are allowed without Owner permission except those required by law.

### 1.12 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 8 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION - NOT USED

**END OF SECTION**

**SECTION 01 60 00**
**PRODUCT REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

E. Maintenance materials, including extra materials, spare parts, tools, and software.

### 1.02 RELATED REQUIREMENTS

A. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 01 40 00 - Quality Requirements: Product quality monitoring.

C. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

### 1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

## PART 2 PRODUCTS

### 2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

### 2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions.
   2. Are extracted, harvested, and/or manufactured closer to the location of the project.
   3. Have longer documented life span under normal use.
   4. Result in less construction waste. See Section 01 74 19
   5. Are made of recycled materials.

### 2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

### 2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

## PART 3 EXECUTION

### 3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

### 3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

### 3.03 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

D. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

F. Prevent contact with material that may cause corrosion, discoloration, or staining.

**END OF SECTION**

**SECTION 01 70 00**
**EXECUTION AND CLOSEOUT REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Pre-installation meetings.

B. Starting of systems and equipment.

C. Demonstration and instruction of Owner personnel.

D. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

E. General requirements for maintenance service.

### 1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

C. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

D. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

### 1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2022, with Errata (2021).

### 1.04 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

### 1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Perform dewatering activities, as required, for the duration of the project.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

### 1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent

responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

**PART 2 PRODUCTS NOT USED.**

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Examine and verify specific conditions described in individual specification sections.

C. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

**3.02 PREPARATION**

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

**3.03 PREINSTALLATION MEETINGS**

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Notify Architect four days in advance of meeting date.

**3.04 LAYING OUT THE WORK**

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

E. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

**3.05 GENERAL INSTALLATION REQUIREMENTS**

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

**3.06 PROGRESS CLEANING**

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

**3.07 PROTECTION OF INSTALLED WORK**

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

**3.08 SYSTEM STARTUP**

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel in accordance with manufacturers' instructions.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

**3.09 DEMONSTRATION AND INSTRUCTION**

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

**3.10 ADJUSTING**

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

**3.11 FINAL CLEANING**

A. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

B. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

D. Clean filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and elsewhere as required..

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

**3.12 CLOSEOUT PROCEDURES**

A. Make submittals that are required by governing or other authorities.
   1. Refer to Contract between Contractor and the City of Sapulpa for definition of Substantial Completion and accompanying requirements for Project Completion thereto.
   2. Provide copies to Architect and Owner.

B. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

C. Architect will not commence Substabtial Completion Inspection until all requirements listed in paragraph B above are complete.

D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

F. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

G. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

**3.13 MAINTENANCE**

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

**END OF SECTION**

**SECTION 01 78 00**
**CLOSEOUT SUBMITTALS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

### 1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

### 1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

**3.02 OPERATION AND MAINTENANCE DATA**

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

**3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Complete nomenclature and model number of replaceable parts.

B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

D. Provide servicing and lubrication schedule, and list of lubricants required.

E. Include manufacturer's printed operation and maintenance instructions.

F. Include sequence of operation by controls manufacturer.

G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

H. Additional Requirements: As specified in individual product specification sections.

**3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

E. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

F. Text: Manufacturer's printed data, or typewritten data.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

### 3.05 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

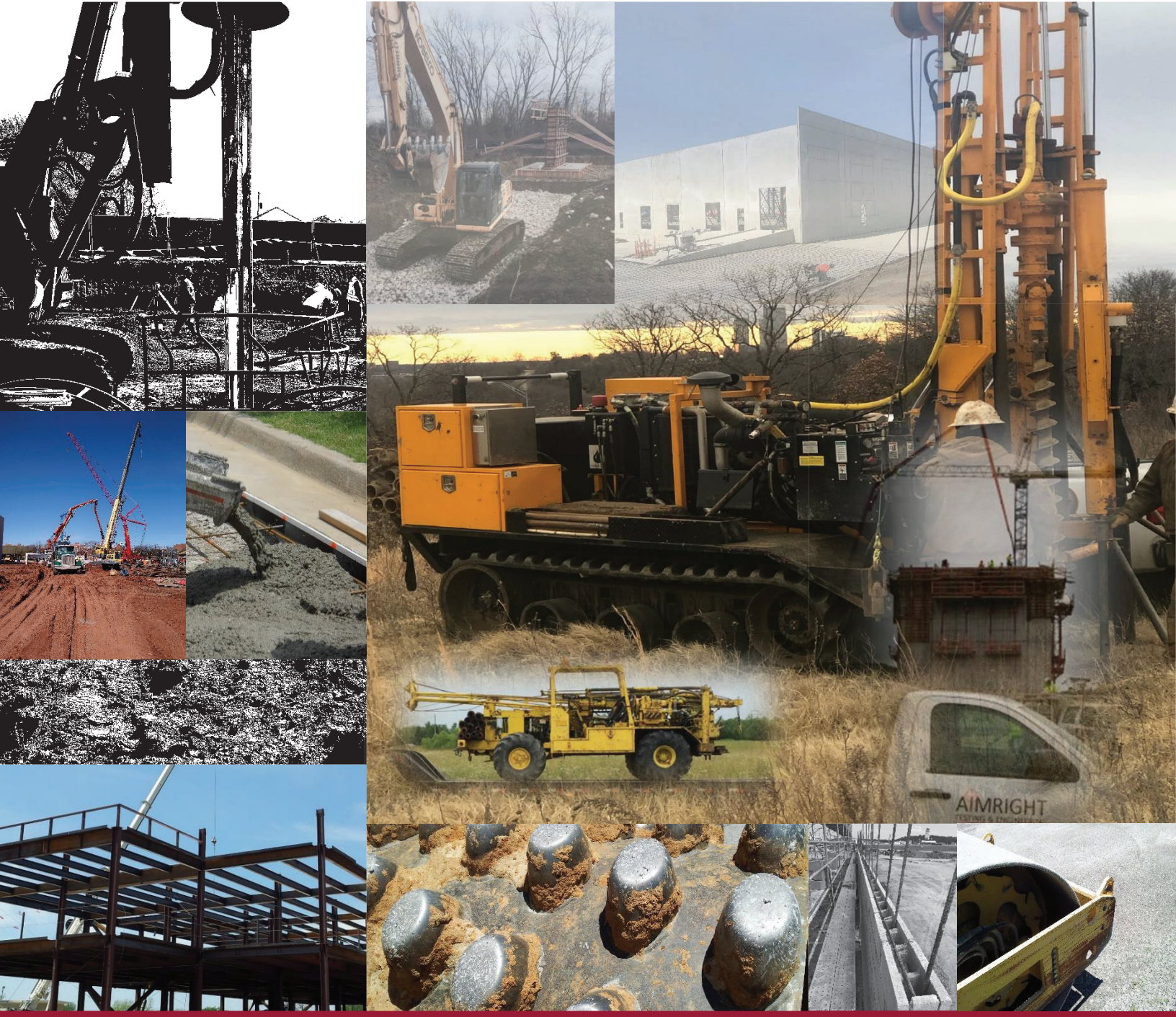
B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

**END OF SECTION**




# GEOTECHNICAL ENGINEERING REPORT

**AIMRIGHT Project No. 14560823**
**September 20, 2023, *revised September 22, 2023***

## Sapulpa Streetscape – Dewey Ave

**Prepared for:**
**City of Sapulpa**

AIMRIGHT
TESTING & ENGINEERING

**Construction Materials Testing • Special Inspections • Geotechnical Engineering**

September 20, 2023, *revised September 22, 2023*

City of Sapulpa
425 E Dewey Ave
Sapulpa, OK 74066
(918) 248-5917

Attn: Nikki Howard, Urban Development Director, nhoward@sapulpaok.gov

Re: Geotechnical Engineering Report | Project No. 14560823
Sapulpa Streetscape – Dewey Ave
E Dewey Ave (N Main St to E Elm St), Sapulpa, OK 74066

It has been a pleasure serving you on this project. AIMRIGHT is pleased to submit this Geotechnical Engineering Report for the proposed construction planned at the referenced site. This report presents the findings of the geotechnical exploration and presents recommendations for design for the project.

We appreciate the opportunity to provide geotechnical consultation services for the subject project. We look forward to serving as your geotechnical engineer and construction materials testing laboratory for the remainder of this and future projects. Please do not hesitate to contact us with any concerns or questions regarding this report.

Respectfully submitted,

AIMRIGHT Testing & Engineering, LLC
*CA No. 5794 (exp. 6/30/24)*
Justin J. Boyd Jr., P.E.
Engineering Manager
jboyd@aimrighttesting.com
(918) 392-8041

**see original report for engineer's stamp/signature**

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# 1.0 PROJECT INFORMATION

## 1.1 Description

We understand that new improvements to the streetscape could include miscellaneous re-paving of parking/drive areas, sidewalk expansions, various upgrades to existing above-below grade utilities, and new custom light post structures. The site footprint is located along East Dewey Avenue from North Main Street to just past East Elm Street. The final design has not been completed.

The new light post structures are anticipated to be supported by a concrete deep foundation system. Information regarding estimated structural loading conditions was not provided; however, we will utilize maximum column loads of 5 to 9 kip in our engineering analyses.

The new parking/drive areas will more than likely be constructed with an asphalt and/or concrete surface and aggregate base course overlying a properly prepared subgrade. Estimated traffic loading conditions were not provided; however, we utilized an estimated traffic volume to be equal to 5,000 for an average annual daily two-way traffic count (AADT) and 3,800,000 equivalent 18-kip single-axle loads (ESALs) over a 20-year period.

## 1.2 Scope of Services

The primary purpose of this report is to provide geotechnical engineering recommendations for the proposed site development. Our Scope of Services consisted of the following:

- Drilling three (3) soil test borings (borings) to planned depths of approximately 20 feet or 5 feet into rock or auger refusal, whichever occurred first.
- Performing laboratory testing of selected soil samples obtained from the borings.
- Providing engineering analysis and preparation of this report discussing, in general, project description, our scope, exploration, testing, analysis, and recommendations.

The Boring Location Plans, Boring Logs, and other supporting data are presented in the Appendices to this report. Our Scope of Services did not include a survey of boring locations and elevations, rock coring, quantity estimates, preparation of plans or specifications, slope stability analysis, or the identification and evaluation of environmental aspects of the project site.

## 1.3 Field Exploration

AIMRIGHT located the borings in the field by making measurements from known existing site features. No claim is made as to the accuracy of the locations shown on the Boring Location Plans, and they should be considered approximate.

The borings were advanced using an ATV-mounted drill rig equipped with an automatic hammer and 6-inch diameter augers. Representative soil samples were obtained using a standard 2-inch outside diameter split-barrel sampler in general compliance with the Standard Penetration Testing (SPT) method of the American Society of Testing and Materials (ASTM) D1586 standard to evaluate the consistency and general engineering properties of the subsurface soils.

The number of blows required to drive the split-barrel sampler three (3) consecutive 6-inch increments is recorded, and the blows of the last two 6-inch increments are added to obtain the SPT N-value in blows per foot (bpf) representing the penetration resistance of the soil. At regular intervals within the borings, split-spoon samples were visually classified based on texture and plasticity.

During the drilling process, all encounters with groundwater, if any, were recorded. Upon completion of drilling, all borings were backfilled per OWRB requirements.

## 1.4 Laboratory Testing

The samples obtained from the geotechnical exploration were transported to the AIMRIGHT laboratory where representative samples were selected for testing. Testing consisted of Atterberg limits, sieve analysis, and moisture content in general accordance with the ASTM testing procedures.

# 2.0 FIELD EXPLORATION FINDINGS

## 2.1 Subsurface

The subsurface conditions illustrated in the table below represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. The transitions between soil strata are usually less distinct than shown on the Boring Logs.

| Stratum | General Depth Interval | General Description of Conditions |
|---|---|---|
| Surface | 9 to 10.5 inches | existing pavement section |
| Native Soils | 0 to 13.5 feet | soft to hard, lean clay and loose to medium dense gravel; with varying amounts of clay, silt, sand, and gravel, sandstone, shale fragments (fat clay was encountered at 1.5 to 3.5 feet in boring B-3) |
| Weathered Rock | 3.5 to 20 feet | highly to moderately weathered, poorly cemented to cemented sandstone and soft shale |

## 2.2 Groundwater

Groundwater was not encountered during or at the completion of drilling in any of the borings. Water traveling through soil and rock is often unpredictable and may be present at shallow depths. Due to the seasonal changes in groundwater and the unpredictable nature of groundwater paths, groundwater levels will fluctuate. As such, groundwater levels at other times of the year may be different than those described in this report.

Generally, the highest groundwater levels occur in late winter and early spring and the lowest levels in late summer and fall. Therefore, it is necessary during construction to be observant for groundwater seepage in excavations to assess the situation and make necessary changes. Where applicable, the contractor should determine the actual groundwater levels at the time of construction.

## 3.0 LABORATORY TESTING RESULTS

Laboratory tests were conducted on selected samples in general accordance with ASTM standards. The laboratory testing performed for this project consisted of Atterberg Limits (ASTM D4318), Moisture Content (ASTM D2216), and Sieve Analysis – No. 200 Sieve Wash Method (ASTM D1140) testing. The test results are presented on the Boring Logs and are summarized in the table below.

| Boring No. | Sample Depth Interval (ft) | In-place Moisture Content (%) | Finer than No. 200 Sieve (%) | Atterberg Limits | | |
|---|---|---|---|---|---|---|
| | | | | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index |
| B-1 | 1.5 to 3 | 19.3 | 66.0 | 40 | 20 | 20 |
| | 6 to 7.5 | 24.5 | 75.7 | 23 | 17 | 6 |
| B-2 | 0 to 1.5 | 6.8 | 9.4 | 27 | 18 | 9 |
| | 1.5 to 3 | 16.3 | 50.7 | 28 | 15 | 13 |
| B-3 | 0 to 1.5 | 19.4 | 68.9 | 41 | 15 | 26 |
| | 1.5 to 3 | 20.7 | 71.9 | 64 | 20 | 44 |

# 4.0 RECOMMENDATIONS

## 4.1 Site Preparation and Earthwork

Before proceeding with construction, AIMRIGHT recommends conducting a pre-grading meeting to discuss recommendations as outlined in this report.

Where appropriate, existing utilities beneath the construction footprints should be properly abandoned; or, should be removed and backfilled with properly compacted engineered fill as outlined in this report.

Any existing structures, pavements, topsoil/vegetation, wet, soft, or loose soils and any other deleterious non-soil materials should be removed to a minimum distance of 2 feet beyond the parking/drive/sidewalk area footprints, where applicable.

Upon completion of required excavations, proof-rolling of the subgrade with a 20 to 30-ton loaded truck or other pneumatic-tired vehicle of similar size and weight should then be performed. Proof-rolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated.

If proof-rolling with loaded trucks or other vehicles may not be performed due to access restrictions, then the subgrade shall be evaluated utilizing, at minimum, Dynamic Cone Penetrometer (DCP) testing at the planned bearing elevations.

All unsuitable materials observed during the evaluation and proof-rolling operations should be over-excavated and replaced with compacted fill or stabilized in place. The possible need for, and extent of over-excavation and/or in-place stabilization required can best be determined by the geotechnical engineer at that time.

The upper 8 inches of the existing subgrade in construction areas shall then be scarified, moisture-conditioned and re-compacted to at least ninety-five percent (95%) of the maximum dry density and within ±2 percentage points of the optimum moisture content as determined by a Standard Proctor (ASTM D698). The moisture content and compaction shall be maintained prior to beginning any fill or aggregate placement and/or construction.

At the time of the investigation, the site soils were generally moist. Depending on weather conditions prior to and during construction, the near surface soils may need moisture-conditioning to sufficiently enable adequate scarifying and compaction.

We note that some of the near surface materials (i.e., silty clayey sand, sandy silt, silty clay, silt, etc.) will often exhibit shearing as open subgrades under wheel loads and will not hold up well to construction activities, especially during wet periods. A layer of aggregate base or crushed stone quickly placed after subgrade preparation and verification will help confine the subgrade soils and reduce imminent disturbance from construction activities.

## 4.2 Potential Excavation Difficulties

Highly to moderately weathered, poorly cemented to cemented sandstone and soft shale was encountered in the borings beginning at depths of approximately 3.5 to 13.5 feet and extending down to the termination depths.

We anticipate the near-surface soils above these depths at the site can be excavated with pans, scrapers, backhoes, and front-end loaders using conventional means and methods.

Our experience indicates rock in a weathered, boulder, and/or massive form may vary erratically in location and depth within the referenced site. Therefore, there is always a potential that these materials could be encountered at shallower depths between the boring locations and should be anticipated during construction.

Installation or excavation of proposed subgrade, foundations, or underground utilities (depending on layout and planned bottom elevations) within some portions of the site may require jackhammering, coring, ripping, or other suitable methods to remove these materials.

## 4.3 Site Drainage

An important aspect to consider during development of this site is surface water control. During the initiation of grading operations, we recommend that the grading contractor take those steps necessary to enhance surface flow and promote rapid clearing of rainfall and runoff water following rain events.

It should be incumbent on the contractor to maintain favorable site drainage during construction to minimize deterioration of otherwise stable subgrades.

Permanent positive drainage should be provided around the perimeter of the structures to minimize moisture infiltration into the foundation and/or subgrade soils. We recommend landscaped areas adjacent to the structures be provided with a fall of at least 6 inches for the first 10 feet outward from the structure areas.

All grades must provide effective drainage away from the structures during and after construction. Water permitted to pond next to the structures can result in unacceptable differential floor slab movements and cracked slabs and/or walls.

After construction and landscaping, AIMRIGHT recommends verifying final grades to document that effective drainage has been achieved. Grades around the structures should also be periodically inspected and adjusted as necessary, as part of the structure's maintenance program.

Sprinkler mains and spray heads should be located a minimum of 5 feet away from the structure lines. Low-volume, drip style landscape irrigation should not be used near the structures.

Roof runoff should be collected in drains or gutters. Roof drains and downspouts should be discharged onto pavements which slope away from the structures or downspouts should be extended a minimum of 10 feet away from the structures.

## 4.4 Fill Material

A sample of each material type should be submitted to the geotechnical engineer for evaluation. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

All fill material in structural areas (including utility backfill) should be placed in continuous, horizontal lifts having a maximum pre-compacted thickness of 9 inches. Aggregate base should have a maximum pre-compacted thickness of 6 inches; and fill compacted with hand-held or smaller-sized equipment having a maximum pre-compacted thickness of 4 to 6 inches.

Each lift should be compacted to at least ninety-five percent (95%) of the maximum dry density and within ±2 percentage points of the optimum moisture content as determined by a Standard Proctor (ASTM D698), unless noted otherwise and maintained throughout construction activities.

A minimum of two (2) field tests to determine in-place density and moisture content should be performed per lift for each 5,000 sf within parking/drive/sidewalk area footprints.

**Engineered fill** should consist of approved materials that are free of organic matter and debris, exhibit a maximum plasticity index (PI) of 18, maximum liquid limit (LL) of 40, and a maximum rock size of 3 inches.

**Native soils** could be used as fill; whereby, upon re-use, the soils meet the requirements for engineered fill as stated in this report. Native soils that do not meet engineered fill requirements will be exposed during earthwork activities. AIMRIGHT recommends conducting additional soil sampling and laboratory testing of any excavated or cut native soils to determine characteristics and stabilization requirements prior to beginning any fill placement.

AIMRIGHT estimates that approximately 4 to 6 percent (based on the soil's compacted dry weight) hydrated lime would be required to reduce the PI of the native soils to 18 or less. The actual amounts of lime or other appropriate additive should be determined in the field and shall be performed and monitored in general accordance with current ODOT Standard Specifications for Highway Construction Section 307 Subgrade Treatment.

**Aggregate base** shall meet the requirements for ODOT Type A and beneath pavements, shall be compacted to at least ninety-five percent (95%) of the maximum dry density and within ±2 percentage points of the optimum moisture content as determined by a Modified Proctor (ASTM D1557).

## 4.5 Pavement Design

These recommendations are based on our discussions with you, interpretation of the field and laboratory data, assumed traffic loading conditions, review of the provided documents, our experience with similar projects and utilization of the 1993 AASHTO Pavement Design Guidelines. AIMRIGHT recommends that governing authorities (i.e., city, county, or other recognized officials) be contacted to discuss appropriate pavement section requirements with respect to this project. The project architect or engineer of record should design the final pavement section. We utilized the design parameters as illustrated below.

| | | | | | |
|---|---|---|---|---|---|
| **Maximum Estimated 20-yr Traffic** | **Average Annual Daily Traffic** | 5,000 | **Overall Standard Deviation** | **Asphalt** | 0.40 |
| | **ESALs** | 3,800,000 | | **Concrete** | 0.35 |
| **Subgrade Resilient Modulus ($M_r$), psi** | | 3,000 | **Serviceability** | **Initial (Asphalt)** | 4.2 |
| **Modulus of Subgrade Reaction (K), psi/in** | | 100 | | **Initial (Concrete)** | 4.5 |
| **Concrete Modulus of Rupture (R), psi** | | 650 | | **Terminal** | 2.0 |
| **Load Transfer Coefficient** | | 3.2 | **Layer Coefficients** | **Asphalt Wearing** | 0.44 |
| **Drainage Coefficient** | | 1.0 | | **Asphalt Base** | 0.40 |
| **Reliability, %** | | 95 | | **Aggregate Base** | 0.14 |

It is our opinion the following minimum sections overlying a properly prepared subgrade as outlined in this report may be utilized for construction:

| Pavement Type | Section | ESALs[2] = 3,800,000<br>AADT = 5,000<br>(inches) |
|---|---|---|
| Concrete[1] | Concrete (≥ 4,000 psi, air-entrained) | 9.0 |
| | ODOT Type A Aggregate Base | 4.0 |
| | Properly Prepared Subgrade | *Per Section 4.1, 4.4, and 4.6* |
| Asphalt[1] | ODOT Type B (S4) or C (S5) | 2.0 |
| | ODOT Type A (S3) | 9.0 |
| | ODOT Type A Aggregate Base | 8.0 |
| | Properly Prepared Subgrade | *Per Section 4.1, 4.4, and 4.6* |

1. Constructed in accordance with Oklahoma Department of Transportation (ODOT) and city or county governing specifications and applicable American Concrete Institute (ACI) guidelines.
2. ESALs calculation based on Directional Distribution Factor = 50%, Design Lane Distribution Factor = 100%, Growth Rate = 2%, Percent Trucks = 10%, Truck Factor (ESALs/Truck) = 1.70, and the 2022 AADT obtained from ODOT at AADT Traffic Counts (arcgis.com) for Site ID 00190026/Site No. 26 in Creek County (35.998828, -96.106829).

## 4.6 Pavement Construction

The parking/drive/sidewalk areas will likely consist of near surface conditions that are generally suitable for support of the anticipated loads. Soft, wet surfaces, or other unsuitable conditions will be encountered within some areas. Remediation of these soils shall be required during site preparation and earthwork while following the recommendations outlined in this report.

AIMRIGHT recommends conducting additional soil sampling and laboratory testing of the final soil subgrades during completion of grading activities to determine characteristics and stabilization requirements prior to beginning pavement construction.

- Where soils with PI greater than 18 are encountered, to provide the parking/drive (and sidewalk, if deemed applicable) areas with a more stable subgrade, at minimum, the upper 8 inches of the final soil subgrade plus an additional 2 feet beyond the footprint be constructed with properly compacted engineered fill or native soils stabilized with a lime or other appropriate additive.

- The actual amounts of additive should be determined in the field and the modification/stabilization procedure shall be performed and monitored in general accordance with current ODOT Standard Specifications for Highway Construction Section 307 Subgrade Treatment.

In general, long-term pavement performance requires good drainage, performance of periodic maintenance activities, and attention to subgrade preparation. We emphasize that good base course drainage is essential for successful pavement performance and should always be maintained in a drained condition. Consideration for proper drainage design should be carefully evaluated where unequal minimum pavement sections meet (i.e., light, or standard to heavy duty). Depending on drainage flow design, it may be necessary to deepen the aggregate base course for the thinner section requirement.

Water build-up in the base course could result in premature pavement failures. Sub-drains are typically utilized beneath a pavement where water may enter the pavement from below or above. Based on the results of the borings, we do not anticipate that sub-drains are required for this site. However, site drainage problems may be revealed during construction that requires sub-drains.

Proper drainage may be aided by grading the site such that surface water is directed away from pavements and by construction of swales adjacent to the pavements. All pavements should be graded such that surface water is directed towards the outer limits of the paved areas or to catch basins located such that surface water does not remain on the pavement.

## 4.7 Light Pole Foundation Design

Straight-sided drilled piers (minimum diameter of 12 inches) bearing into the applicable stratum may be used to support the proposed structure(s). Maximum column loads (plus additional weight of concrete foundations) of 5 to 9 kip were used in our engineering analyses. The analysis also included varying foundation depths between 10 and 20 feet at each location. For the conditions described above, we estimate that the settlements for the structures will be less than 1 inch (total) and ½ inch (differential).

The project structural engineer should determine the final foundation sizes based on the actual design loads, building code requirements, and other structural considerations. The following table may be utilized to assist in axial load design and lateral load analysis.

| Depth Interval (ft) | | L-Pile Layer Type[1] | Unit Weight γ[1] (pcf) | Friction Angle Φ (°) or Undrained Cohesion $c_u$ (psf) | L-Pile Horizontal Subgrade Modulus | | Strain Factor $\varepsilon_{50}/k_{rm}$ | Net Allowable End Bearing Capacity[2] (FS ≥ 2.5) (ksf) | Net Allowable Unit Side Resistance[3] (FS = 2.5) (ksf) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | $k_{dry(sand)}$ or $k_{static(clay)}$ (pci) | $k_{sat(sand)}$ or $k_{cyclic(clay)}$ (pci) | | | |
| B-1 | 0 to 6 | Soft Clay2 | 90 | 50 | 30 | N/A | 0.02 | N/A | N/A |
| | 6 to 13.5 | Stiff Clay17 | 115 | 1,500 | 500 | 200 | 0.007 | 3.0 | 0.33 |
| | 13.5 to 20 | Weak Rock[5] | 130 | 30° | N/A | N/A | 0.0005 | 15.0 | 1.0 |
| B-2 | 0 to 3.5 | Stiff Clay | 100 | 50 | 30 | N/A | 0.02 | N/A | N/A |
| | 3.5 to 6 | Stiff Clay | 115 | 1,500 | 500 | 200 | 0.007 | N/A | N/A |
| | 6 to 15 | Weak Rock[5] | 130 | 30° | N/A | N/A | 0.0005 | 15.0 | 1.0 |
| B-3 | 0 to 3.5 | Stiff Clay[4] | 100 | 250 | 100 | N/A | 0.02 | N/A | N/A |
| | 3.5 to 10+ | Weak Rock[5] | 130 | 30° | N/A | N/A | 0.0005 | 15.0 | 1.0 |

1. Interpretation of groundwater table was approximated to be at or near the initial encounter with water during drilling (indicated with an asterisk (*) in the depth interval), and effective unit weights should be determined, where applicable. Where applicable, L-Pile layer types of Clay "with" and "without" free water shall be used accordingly.
2. The recommended net allowable bearing pressure is the pressure more than the minimum surrounding overburden pressure at the pier base elevation. Maximum loads must include the additional weight of concrete foundation. Minimum pier spacing of 3 pier ⌀ (center-to-center) is required. 2018 IBC Earthquake Loads Site Class D shall be utilized for B-1, and Site Class C for B-2 and B-3.
3. Where provided, the unit side resistance between the pier and surrounding bearing material can be used to develop pier capacity in compression and uplift resistance. The pier weight and maximum allowable unit side resistance may be utilized to resist structural upward loadings. At minimum, the upper 5 feet of pier and one (1) pier diameter above the pier base should be ignored for unit side resistance in piers bearing in the clay soils stratum, where applicable.
4. Soil expansion uplift pressure of at least 50 psf should be included for portion of pier extending through the existing moderately to highly expansive soils within the upper 5 feet.
5. For weak rock, the following shall be utilized: Initial Modulus of Rock Mass = 7.5 to 35 ksi; RQD = 10 to 50%; Uniaxial Compressive Strength = 100 to 500 psi.

## 4.8 Light Pole Foundation Construction

Installation of the drilled piers and placement of concrete within the piers should be performed in accordance with the most recent ACI Specifications and installation monitoring shall be observed under supervision by AIMRIGHT.

We anticipate the near-surface soils at the site can be excavated using conventional drill rigs with sufficient torque and ability. The drilling rig should be equipped with earth augers and other necessary tools to excavate, clean and level rock bottoms properly, and without construction delay.

Following drilling, loose, or disturbed materials and any accumulated water should be removed from the bottom of the drilled piers prior to concrete placement. To facilitate construction, reinforcing steel should be ready and on site, and concrete should be available within a very short period for placement after excavation is completed. Drilled pier excavations must not remain open overnight.

Groundwater was not encountered in any of the borings, and the need for casings will likely not be required. Water traveling through soil and rock is often unpredictable and may be present in other areas at shallower depths. Due to the seasonal changes in groundwater and the unpredictable nature of groundwater paths, groundwater levels can fluctuate.

If casings are used, it is recommended that the concrete have a slump in the range of 5 to 7 inches to reduce the potential of arching when removing the casing. When removing the casing, the concrete inside the casing should be maintained at a sufficient level to reduce any earth and hydrostatic pressure outside the casing during removal.

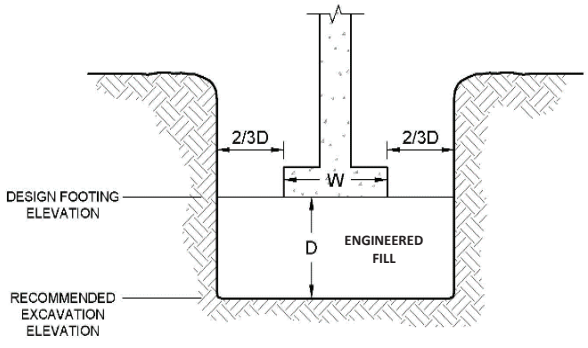
Concrete slump should be at least 5 inches, and generally in the range of 5 to 7 inches; however, a higher slump may be used to increase fluidity if appropriate for the concrete mix used. An uninterrupted supply and placement of concrete is recommended to produce a monolithic shaft. The maximum size of the concrete aggregate should not exceed one-third of the minimum clear spacing between individual reinforcing bars or bundles.

## 4.9 Shallow Foundation Design

The project structural engineer should determine the final foundation sizes based on the actual design loads, building code requirements, and other structural considerations. Structure foundations may be designed utilizing the following parameters.

| | | |
|---|---|---|
| **Maximum Structural Loads** | **Column** | 5 to 9 kip |
| **Bearing Material** | | approved engineered fill or native soils |
| **Net Allowable Bearing Pressure[1,5] (FS ≥ 2.5)** | | 3,000 psf |
| **Coefficient of Sliding Friction[2], μ** | | 0.25 to 0.35 |
| **Total Unit Weight[2], γ** | | 110 to 120 pcf |
| **Angle of Friction[2], ø** | | 5° |
| **Rankine Passive Earth Pressure Coefficient[2], $K_p$** | | 1.19 |
| **Minimum Footing Embedment[3]** | | 24 inches |
| **Minimum Footing Width** | **Column** | 30 inches |
| **Estimated Maximum Settlement[4]** | | ≤ 1 inch (total); ≤ ½ inch (differential) |

1. The recommended net allowable bearing pressure is based on foundations within approved bearing materials and is the pressure more than the minimum surrounding overburden pressure at the footing base elevation. 2018 IBC Earthquake Loads Site Class D shall be utilized for B-1, and Site Class C for B-2 and B-3.
2. Range of values provided for soil types encountered at the site and/or anticipated import material that are prepared in accordance with this report are illustrated, however, actual parameters are dependent on bearing material placed and/or exposed during construction. Values are provided for guidance and should only be utilized by experienced engineers and designers. Exclude total passive pressure resistance within 2 feet of the adjacent lowest final site elevation.
3. Minimum depth will provide frost protection and reduce the potential for moisture variation below the bearing level.
4. The magnitude of the settlements will be highly influenced by the variation in excavation requirements across the structure footprint, the distribution of loads, and the variability of underlying soils.
5. Weaker strength near subsurface conditions exists at boring B-1 and moderate to high shrink/swell potential exists at boring B-3. For foundations at borings B-1 and B-3, we recommend that a minimum of 24 inches of properly compacted engineered fill be provided below all foundation bearing elevations. All foundation subgrades should be over-excavated to a minimum depth, D, of 24 inches and the width of the excavation shall extend a minimum of ⅔ D (16 inches) beyond the entire footing footprint as illustrated below. The over-excavations may be terminated upon encountering rock. Excavations shall be conducted with appropriate safety requirements.



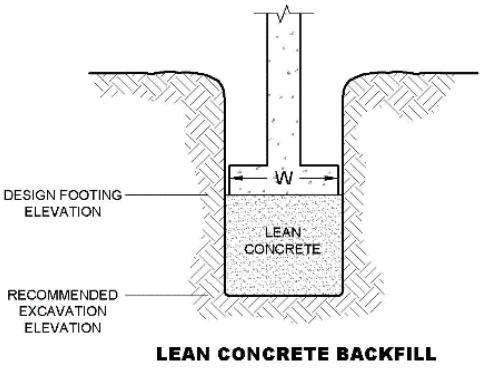

**OVEREXCAVATION / BACKFILL**

Note: Excavations shall be conducted with appropriate safety requirements.

## 4.10 Shallow Foundation Construction

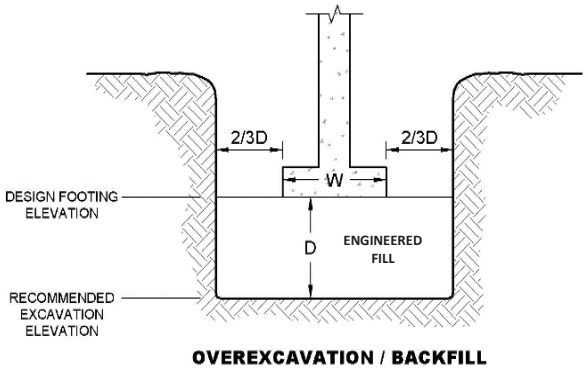
All exposed foundation subgrades should be re-compacted, observed, evaluated, and verified for the design soil bearing pressure by the geotechnical engineer after excavation and prior to concrete placement. This evaluation should include, as a minimum, Dynamic Cone Penetrometer (DCP) testing at the planned bearing elevations at intervals of no less than 35 feet and extending to depths of at least 3 feet below the bearing elevations.

If unsuitable material is encountered during foundation bearing grade testing and inspections (DCP Testing), foundations should; 1) extend deeper to a more suitable bearing material and bear directly on this material; 2) extend deeper to a more suitable bearing material and backfilled with lean concrete to the designed bottom of footing elevation (see Figure 1); 3) extend deeper to a more suitable bearing material and backfilled with engineered fill (see Figure 2). If option 3 is selected, the over-excavation should extend laterally to a minimum of 2/3 of the total depth of excavation.




**LEAN CONCRETE BACKFILL**

**Figure 1**




**OVEREXCAVATION / BACKFILL**

**Figure 2**

Note: Figures are shown for convenience and excavations shall be conducted with appropriate safety requirements.

To reduce differential settlement, it is imperative to ensure that all shallow foundations bear on a minimum of 12 inches of similar material. Where applicable, to prevent a “point-load” bearing condition where the newly placed engineered fill or native soils adjoins weathered rock within wall/column footings, we recommend over-excavating the weathered rock to a minimum depth of 12 inches within the entire length of the wall/column footing and backfilling with properly compacted engineered fill. Alternatively, the engineered fill and/or native soils may be over-excavated down to the weathered rock and backfilled with lean concrete to the designed bearing elevation as illustrated in Figure 1 above.

Foundation excavations must be maintained in a drained/de-watered condition throughout the foundation construction process and water should not be allowed to pond in any excavation. Excavations for footings should be made in such a way as to provide bearing surfaces that are firm and free of loose, soft, wet, or otherwise disturbed soils. Foundations should be concreted as soon as practical after they are excavated, and concrete should also not be placed on frozen or saturated subgrades. When applicable, it is recommended that a 2 to 4-inch-thick “mud mat” of lean concrete be placed on the bearing soils to help protect the bearing surface from rainfall or adverse construction activities.

## 5.0 CONSTRUCTION MONITORING

We recommend that all earthwork construction be monitored by an experienced engineering technician of AIMRIGHT. Monitoring should include site preparation, subgrade earthwork, engineered fill earthwork, structure foundation systems, conventional and/or structural slabs.

Monitoring will allow AIMRIGHT to confirm the soil conditions on site and evaluate the recommendations presented within this report. If at the time of construction, our recommendations are inappropriate for the project, monitoring will allow us to remediate the recommendations at that time to better serve the project.

Monitoring during construction will also allow for the testing of all construction materials for the project. This includes but is not limited to:

- ✓ subgrade inspection and density testing,
- ✓ structural area fill placement density testing,
- ✓ foundation bearing grade observations and testing,
- ✓ structural and reinforcing steel inspection,
- ✓ concrete testing, and
- ✓ asphaltic concrete testing, as applicable.

We recommend that AIMRIGHT be retained to provide these services based upon our current familiarity with the project subsurface conditions, and the provided intent of the geotechnical recommendations pertaining to the proposed development.

## 6.0 LIMITATIONS

The recommendations provided are based in part on project information provided to us and they only apply to the specific project and site discussed in this report. If our statements or assumptions concerning the location and design of this project contain incorrect information, or if additional information is available, you should convey the correct or additional information to us and retain us to review our recommendations. We can then modify our recommendations if they are inappropriate for the proposed project.

Regardless of the thoroughness of the geotechnical exploration, there is always a possibility that subsurface conditions will be different from those at a specific boring location and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. The conclusions and recommendations presented in this report were derived in accordance with standard geotechnical engineering practices and no other warranty is expressed or implied.


**APPROXIMATE BORING LOCATIONS**

# BORING LOCATION PLAN

**PROJECT NO.:** 14560823
**SOURCE:** Aerial Imagery

**PROJECT:** Sapulpa Streetscape – Dewey Ave
**CLIENT:** City of Sapulpa

AIMRIGHT TESTING & ENGINEERING

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# LOG OF BORING B-1

**PROJECT:** Sapulpa Streetscape - Dewey Ave

**CLIENT:** City of Sapulpa **PROJECT NO.:** 14560823

**PROJECT LOCATION:** Dewey Ave, Sapulpa, OK

**LOCATION:** see Boring Location Plan **ELEVATION:** N/A

**DRILLER:** Preston S. **LOGGED BY:** R. Dear **DRILLING RIG:** D-50 ATV-Mounted

**DRILLING METHOD:** Rotary Continuous Flight Augers **DATE:** 9/6/23

**DEPTH TO WATER> INITIAL:** ▽ Dry **AT COMPLETION:** ▼ Dry **CAVING>** ℄ None

| Depth (feet) | Sampler Type | Description | Graphic | USCS Symbol | SPT N-value (bpf) | Groundwater | Moisture Content | % < #200 | Liquid Limit | Plastic Limit | Plasticity Index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -0.75 | | | | | | | | | |
| | | ASPHALT - 2 inches; CONCRETE - 7 inches | | | | | | | | | |
| 0 | | 0 | | | | | | | | | |
| | | POORLY GRADED GRAVEL w/ CLAY and SAND<br>loose, light gray, moist | | | 8 | | | | | | |
| 1 | | | | | | | | | | | |
| | | 1.5 | | | | | | | | | |
| 2 | | SANDY LEAN CLAY w/ trace gravel<br>soft, medium grayish brown, moist | | CL | 2 | | 19.3 | 66.0 | 40 | 20 | 20 |
| 3 | | | | | | | | | | | |
| | | LEAN CLAY w/ trace sand, sandstone fragments<br>soft, dark brown, moist | | | 2 | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| | | 6 | | | | | | | | | |
| 6 | | SILTY CLAY w/ SAND, trace sandstone fragments<br>very stiff, dark and medium brown, moist | | CL-ML | 17 | | 24.5 | 75.7 | 23 | 17 | 6 |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| | | 8.5 | | | | | | | | | |
| 9 | | LEAN CLAY w/ SAND, sandstone, shale fragments<br>very stiff, medium and light brown mottled light gray, moist | | | 22 | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| | | 13.5 | | | | | | | | | |
| 14 | | SHALE sandy, highly weathered<br>soft, light grayish brown, moist | | | 46<br>50/4.25 | | | | | | |
| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 17 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 19 | | | | | 50/2.5 | | | | | | |
| | | Boring terminated at 19.21 ft. | | | | | | | | | |

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

AIMRIGHT TESTING & ENGINEERING

# LOG OF BORING B-2

**PROJECT:** Sapulpa Streetscape - Dewey Ave

**CLIENT:** City of Sapulpa **PROJECT NO.:** 14560823

**PROJECT LOCATION:** Dewey Ave, Sapulpa, OK

**LOCATION:** see Boring Location Plan **ELEVATION:** N/A

**DRILLER:** Preston S. **LOGGED BY:** R. Dear **DRILLING RIG:** D-50 ATV-Mounted

**DRILLING METHOD:** Rotary Continuous Flight Augers **DATE:** 9/6/23

**DEPTH TO WATER> INITIAL:** ▽ Dry **AT COMPLETION:** ▼ Dry **CAVING>** ℄ None

| Depth (feet) | Sampler Type | Description | Graphic | USCS Symbol | SPT N-value (bpf) | Groundwater | Moisture Content | % < #200 | Liquid Limit | Plastic Limit | Plasticity Index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -0.88<br>ASPHALT - 5 inches; CONCRETE - 5.5 inches | | | | | | | | | |
| 0 | | 0<br>POORLY GRADED GRAVEL w/ CLAY and SAND<br>medium dense, light gray, moist | | GP-GC | 21 | | 6.8 | 9.4 | 27 | 18 | 9 |
| 1 | | | | | | | | | | | |
| 2 | | 1.5<br>SANDY LEAN CLAY w/ trace gravel<br>stiff, dark grayish brown, moist | | CL | 8 | | 16.3 | 50.7 | 28 | 15 | 13 |
| 3 | | | | | | | | | | | |
| 4 | | LEAN CLAY w/ SAND, sandstone fragments<br>hard, dark brown, moist | | | 31 | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | 6<br>SHALE sandy, highly weathered<br>soft, medium brown, moist | | | 50/2.5 | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | 8.5<br>SANDSTONE clayey, highly weathered<br>poorly cemented, light brownish gray, moist | | | 50/4.0 | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | 50/3.5 | | | | | | |
| | | Boring terminated at 13.79 ft. | | | | | | | | | |

AIMRIGHT TESTING & ENGINEERING

# LOG OF BORING B-3

**PROJECT:** Sapulpa Streetscape - Dewey Ave

**CLIENT:** City of Sapulpa **PROJECT NO.:** 14560823

**PROJECT LOCATION:** Dewey Ave, Sapulpa, OK

**LOCATION:** see Boring Location Plan **ELEVATION:** N/A

**DRILLER:** Preston S. **LOGGED BY:** R. Dear **DRILLING RIG:** D-50 ATV-Mounted

**DRILLING METHOD:** Rotary Continuous Flight Augers **DATE:** 9/6/23

**DEPTH TO WATER> INITIAL:** Dry **AT COMPLETION:** Dry **CAVING>** None

| Depth (feet) | Sampler Type | Description | Graphic | USCS Symbol | SPT N-value (bpf) | Groundwater | Moisture Content | % < #200 | Liquid Limit | Plastic Limit | Plasticity Index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -0.88<br>ASPHALT - 6.5 inches; CONCRETE - 4 inches | | | | | | | | | |
| 0 | | 0<br>SANDY LEAN CLAY w/ trace gravel<br>stiff, dark grayish brown, moist | | CL | 9 | | 19.4 | 68.9 | 41 | 15 | 26 |
| 1 | | | | | | | | | | | |
| 2 | | 1.5<br>FAT CLAY w/ SAND, trace gravel<br>stiff, dark grayish brown, moist | | CH | 10 | | 20.7 | 71.9 | 64 | 20 | 44 |
| 3 | | | | | | | | | | | |
| 4 | | 3.5<br>SANDSTONE clayey, highly weathered<br>poorly cemented, light gray, moist | | | 34<br>50/1.75 | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | SANDSTONE highly to moderately weathered<br>poorly cemeted to cemented, medium grayish brown, moist | | | 50/2.25 | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | Boring terminated at 8.563 ft. | | | 50/0.75 | | | | | | |

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

# KEY TO SYMBOLS

| Symbol | Description |
|---|---|

## Strata Symbols

| | |
|---|---|
|  | Existing Pavement Section |
|  | Poorly Graded Gravel with Clay and Sand |
|  | Low Plasticity Clay |
|  | Silty Low Plasticity Clay |
|  | Shale |
|  | Sandstone |
|  | High Plasticity Clay |

## Soil Samplers

| | |
|---|---|
|  | Auger |
|  | Standard Penetration Test |

**SECTION 02 41 00**
**DEMOLITION**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Abandonment and removal of existing utilities and utility structures.

### 1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

E. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

F. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.

G. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

H. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

### 1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2022, with Errata (2021).

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Site Plan: Indicate:
   1. Areas for temporary construction and field offices.

C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
   1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
   2. Summary of safety procedures.

D. Demolition firm qualifications.

E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Fill Material: See Section 31 23 23.

## PART 3 EXECUTION

### 3.01 DEMOLITION

A. Remove paving and curbs required to accomplish new work.

B. Remove all other paving and curbs within site boundaries.

C. Remove concrete slabs on grade within site boundaries.

D. Remove other items indicated, for salvage and relocation.

E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 22 00.

## 3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
   6. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements to remain in place and not removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

E. Hazardous Materials:

F. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

## 3.03 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

## 3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
   1. Verify construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and required to accomplish new work.
   1. Remove items indicated on drawings.

C. Services including, but not limited to, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
   1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.

D. Protect existing work to remain.
   1. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   2. Repair adjacent construction and finishes damaged during removal work.
   3. Patch to match new work.

**3.05 DEBRIS AND WASTE REMOVAL**

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

**SECTION 03 30 00**
**CAST-IN-PLACE CONCRETE**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes cast-in-place concrete and supplementary items necessary to complete work required for their installation.

B. Related Sections:
   1. Division 03 Section "Concrete Forming".
   2. Division 03 Section "Concrete Accessories" for items including but not limited to inserts, waterstops, expansion anchors, and adhesive anchors.
   3. Division 03 Section "Concrete Reinforcement".
   4. Division 03 Section "Concrete Finishing" for items including but not limited to tolerances, curing, protection, and surface repairs.
   5. Division 07 Section "Below Slab Vapor Retarder".
   6. Division 32 Sections for concrete paving and walks.

### 1.02 SUBMITTALS

A. Laboratory Test Reports for Concrete Materials and Mix Designs: As specified herein and in accordance with Division 01 Sections "Quality Assurance" and "Quality Control".

B. Material Certificates: As specified herein when required. Certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturer that chloride content complies with specification requirements, and admixture is compatible with other required or proposed admixtures.

C. Sleeve Locations: Submit plan showing proposed sleeve dimensioned locations and sizes for review by Architect and Engineer prior to concrete placement.

### 1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with following codes, specifications, and standards, except where more stringent requirements are shown or specified:
   1. American Concrete Institute (ACI) 301, “Specifications for Structural Concrete”.
   2. ACI 318, “Building Code Requirements for Structural Concrete”.
   3. ACI 306.1, “Std. Specification for Cold Weather Concreting”.
   4. ACI 117, “Std. Specifications for Tolerances for Concrete Construction and Materials”.
   5. Concrete Reinforcing Steel Institute (CRSI), “Manual of Std. Practice”.
   6. ASTM E 1155, “Std. Test Method for Determining Floor Flatness and Levelness Using F-Number System”.
   7. ACI 503.1, “Std. Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with Multi-Component Epoxy Adhesive”.
   8. ACI 503.2, “Standard Specification for Bonding Plastic Concrete to Hardened Concrete with Multi-Component Epoxy Adhesive”.
      a. Paragraph 2.3.7.1 of above code is hereby replaced in its entirety with following:
         1) Independent Testing Laboratory approved by Architect/Engineer shall evaluate bonding of fresh concrete to existing concrete after fresh concrete has cured for not less than 28 days. Written report prepared by Independent Testing Laboratory shall be submitted to Architect/Engineer for review.

B. Document Conflict and Priority: In case of concrete work conflict between documents, including drawings and specifications, notify Architect prior to submitting proposal. Most stringent criteria shall govern and be given priority, unless otherwise indicated by Architect in writing.

C. Compatibility of Concrete Admixtures and Surface Treatments: Contractor shall be responsible for selection of admixtures and surface treatments compatible with one another and with specified requirements of concrete work including final surface treatments. Contractor shall be

responsible for following product manufacturer's instructions for use, limitations, and precautions.

D. Concrete Plant Certification and Qualifications: Certified in accordance with National Ready Mixed Concrete Association (NRMCA) Plant Certification Checklist. Minimum of 5 years successful experience in manufacturing ready-mixed concrete complying with ASTM C94 requirements for facilities and equipment.

E. Concrete Contractor Qualifications: Minimum of 5 years successful experience with installation and finishing of concrete similar in materials, system, and project scope to that indicated for this Project.

F. Concrete Testing Service: Engage testing service acceptable to Architect to perform material evaluation tests and to design concrete mixes.

G. Testing/Retesting of Materials and Installed Work: May be required at any time during progress of Work as directed by Architect. Such tests/retests, not indicated to be performed at Owner's expense, will be at Contractor's expense.

H. Concrete Pre-construction Conference:
   1. At least 15 days prior to start of concrete construction, Contractor shall hold meeting to review detailed requirements of concrete mix designs and to determine procedures for producing proper concrete construction. Additionally, review requirements for submittals, Status of Coordinating Work, availability of materials and procedures for materials inspection, testing, certifications, and floor flatness/levelness. At minimum, discuss following items as pertains to project.
      a. Requirements for submittals.
      b. Status of Coordinating Work.
      c. Availability of materials and procedures for materials inspection.
      d. Testing.
      e. Certifications.
      f. Floor flatness/levelness.
      g. Curing and finishing of floor surfaces.
      h. Control of concrete moisture/wetness and the affects of moisture vapor transmission (MVT) on finish flooring materials.
   2. Contractor shall require responsible representatives of every party who is concerned with concrete work to attend conference, including but not limited to following:
      a. Contractor's superintendent.
      b. Contractor's Laboratory responsible for concrete mix design(s).
      c. Owner's Laboratory responsible for field quality control.
      d. Concrete subcontractor.
      e. Ready-mix concrete producer.
      f. Admixture manufacturer.
      g. Concrete pumping subcontractor.
      h. Owner's and Architect's/Engineer's representative.
      i. Floor Consultant and Floor Flatness Inspector.
      j. Finish flooring subcontractor(s).
   3. Minutes of meeting shall be recorded, typed and printed by Contractor and distributed by him to parties concerned within 5 days of meeting. One copy of minutes shall also be transmitted to following for information purposes.
      a. Owner's representative.
      b. Architect.
      c. Engineer of record.
      d. Floor Consultant.
      e. Owner's Laboratory responsible for field quality control.
   4. Engineer will be present at conference. Contractor shall notify Engineer at least 7 days prior to scheduled date of conference.

## 1.04 TOLERANCES

A. Tolerances for Concrete Construction and Materials shall conform to requirements of ACI 117, Standard Specifications for Tolerances for Concrete Construction and Materials, except as modified by requirements of these Contract Documents.

B. Floor finish tolerances for surfaces designated to receive troweled finish shall be measured in accordance with ACI 117, Section 4.5.6, except as modified by these Contract Documents. Refer to Division 03 Section “Concrete Finishing” for Flatness and Levelness Inspection and finished surface F-number requirements.

# PART 2 PRODUCTS

## 2.01 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Engineer, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section “Substitution Procedures”.

## 2.02 MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III.

B. Portland Cement at Concrete Exposed to Sulfates:
   1. Moderate Sulfate Exposure: ASTM C 150, Type II.
   2. Severe Sulfate Exposure: ASTM C 150, Type V.

C. Supplementary Cementitious Materials
   1. Fly Ash: ASTM C 618, Class C or F.
   2. Ground Granulated Blast-Furnace Slag (GGBFS): ASTM C 989, Grade 100 or 120.
   3. Silica Fume: ASTM C 1240, Amorphous Silica.

D. Blended Hydraulic Cements: ASTM C 595, Type “IP”, or Type “IS”.

E. Fine Aggregate: ASTM C 33, natural sand, manufactured sand, or combination thereof, washed and screened, consisting of hard, durable, uncoated particles free of deleterious matter, and shall be so graded from coarse to fine as to produce minimum percentage of voids.

F. Coarse Aggregate:
   1. Normal Weight Aggregate: ASTM C 33, gravel or crushed stone suitably washed and screened, and shall consist of hard, durable particles without adherent coatings.
   2. Lightweight Aggregate: ASTM C 330, suitably processed, washed and screened, and shall consist of durable particles without adherent coatings.

G. Water: ASTM C 94, paragraph 4.1.3.
   1. Free of foreign matter that may be harmful to concrete, reinforcement, or concrete accessories, including but not limited to oils, acids, alkalies, salts, and organic materials.
   2. Free of deleterious amounts of chloride ions.

H. Admixtures:
   1. General: Calcium chloride, thiocyanates, or admixtures with more than 0.05 percent chloride ions are not permitted.
   2. Specific admixtures, or manufacturer listed under each item below is “acceptable” only if manufacturer can evidence product compatibility with other products comprising concrete mix.
   3. Air-Entraining Admixture: ASTM C 260
      a. Provide air entraining agent in sufficient quantity to assure controlled entrainment within specified percentage limits required herein.
      b. Manufacturers and Products:
         1) BASF; MB-VR Standard or Micro Air
         2) Euclid Chemical Company; Air-Mix or AEA 92
         3) Grace Construction Products; Darex AEA or Daravair

4) Sika Corporation; AER

4. Water-Reducing Admixture: ASTM C 494, Type A.
   a. Certified by manufacturer as Lignin-Free.
   b. Manufacturers and Products:
      1) BASF; Pozzolith 200N or Pozzolith 322N
      2) Euclid Chemical Company; Eucon WR-75 or WR91
      3) Grace Construction Products; WRDA or Daracem
      4) Sika Corporation; Plastocrete 161
5. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F or G.
   a. Manufacturers and Products:
      1) BASF; Rheobuild 1000
      2) Euclid Chemical Company; Eucon 37
      3) Grace Construction Products; Daracem 100
      4) Sika Corporation; Sikament 300
6. Water-Reducing Accelerating Admixture: ASTM C 494, Type E.
   a. Non-corrosive, non-chloride.
   b. Manufacturers and Products:
      1) BASF; Pozzutec 20
      2) Euclid Chemical Company; Accelguard 80
      3) Sika Corporation; Plastocrete 161FL
7. Water-Reducing Retarding Admixture: ASTM C 494, Type D.
   a. Manufacturers and Products:
      1) Euclid Chemical Company; Eucon Retarder-75
      2) Grace Construction Products; Daratard-17
      3) BASF; Pozzolith R
      4) Sika Corporation; Plastocrete 161MR or Plastiment
8. Shrinkage-Reducing Admixture: Admixture which reduces concrete drying shrinkage by reduction of capillary tension of pore water.
   a. Non-corrosive, non-chloride.
   b. Consult with admixture manufacturers when used with air-entrained concrete mixes.
   c. Manufacturers and Products:
      1) BASF; Tetraguard AS20 (at non-air-entrained concrete only)
      2) Grace Construction Products ; Eclipse (at non-air-entrained concrete only)
      3) Grace Construction Products; Eclipse Plus (at air-entrained concrete only)

I. Chloride Ion Content:
   1. Limit water soluble chloride ion concentrations in hardened concrete, at ages from 28 to 42 days, from ingredients including water, aggregates, cementitious materials, and admixtures as indicated by Table 4.4.1, ACI 318.
   2. Consider concrete placed on metal deck to be within same category as prestressed concrete in Table 4.4.1, ACI 318, regarding maximum chloride ion concentrations in hardened concrete.
   3. Provide certification for each mix design that chloride ion content does not exceed specified limits when tested in accordance with ASTM C 1218.

**2.03 RELATED MATERIALS**

A. Bonding Compounds: Use in strict conformance with manufacturer's written recommended application limitations, precautions, and directions for use, including, but not limited to, surface preparation, mixing, placing, curing, and compatibility with substrate conditions.
   1. Latex Bonding Agents, Admixtures, and Adhesives: ASTM C 1059, Type II.
      a. Acceptable at non-structural and structural bonding applications, interior or exterior, unless noted otherwise in Contract Documents.
      b. Use only acrylic or styrene butadiene latex based adhesives.

c. Manufacturers and Products:
1) Euclid Chemical Company; SBR Latex
2) L & M Construction Chemicals; Everbond
3) W.R. Meadows, Inc.; ACRY-LOK

2. Polyvinyl Acetate Bonding Agents: ASTM C 1059, Type I
a. Acceptable at non-structural and structural bonding applications, interior surfaces not subject to water exposure or high humidity during construction or in-service.
b. Manufacturers and Products:
1) Euclid Chemical Company; Euco Weld
2) L & M Construction Chemicals; Everweld
3) W.R. Meadows, Inc.; Intralok

3. Epoxy-Resin Bonding Adhesives: ASTM C 881, Types I, II, IV, and V.
a. Types I and II: Acceptable at non-structural bonding applications.
b. Types IV and V: Acceptable at structural load-bearing bonding applications.
c. Suitable for use on dry or damp surfaces.
d. Epoxy Adhesive for Bonding Plastic Concrete to Hardened Concrete: Conform to requirements of ACI 503.2-92 (R97), unless modified herein.
e. Epoxy Adhesive for Bonding Hardened Concrete, Steel, Wood, Brick, and other Materials to Hardened Concrete: Conform to requirements of ACI 503.1-92 (R97), unless modified herein.
f. Manufacturers (Consult with supplier for specific product and compatibility with substrate conditions. Subject to Engineer's review and approval):
1) BASF
2) Euclid Chemical Company
3) Sika Corporation
4) W.R. Meadows

B. Overlay and Repair Mortar: Use of overlay and repair mortar shall be in accordance with manufacturer's application limitations, precautions, and directions for use, including but not limited to surface preparation, mixing, placing, curing, and compatibility with substrate conditions.
1. Epoxy Mortar: ASTM C 881, Types I, and IV.
a. Acceptable at interior applications only, unless otherwise directed by Engineer.
b. Appropriate applications include locations susceptible to high wear or high corrosion.
c. Type I: Acceptable at non-structural applications.
d. Type IV: Acceptable at structural applications.
e. Manufacturers (Consult with supplier for specific product and compatibility with substrate conditions. Subject to Engineer's review and approval):
1) BASF
2) Euclid Chemical Company
3) Sika Corporation

2. Polymer Modified Cementitious Mortar: ASTM C 1059, Type II:
a. Acceptable at structural and non-structural applications, interior or exterior.
b. Manufacturers (Consult with supplier for specific product and compatibility with substrate conditions. Subject to Engineer's review and approval):
1) BASF
2) Euclid Chemical Company
3) Sika Corporation

C. Self-Leveling Underlayment Compound: Specified in Division 03 Section "Concrete Finishing".

## 2.04 PROPORTIONING AND DESIGNING MIXES

A. Types of concrete, minimum 28-day compressive strength (f'c), and maximum nominal coarse aggregate sizes are shown in drawings.

B. Prepare design mixes for each type and strength of concrete by either field experience methods or by laboratory trial batch methods. Mix design testing shall be furnished by Contractor. Selection of concrete proportions for each mix shall be certified by an Independent Testing Laboratory hired by Contractor.

C. Field Experience Method: Provide prior established mix designs proportioned in accordance with ACI 211, accompanied by test data indicating acceptable strength history in accordance with ACI 318, part 5.3, unless otherwise modified herein. Data shall be certified by Independent Testing Laboratory.
   1. Temperature of concrete in test data shall be within 5 degrees F. of maximum temperature specified for this project.
   2. Strength of concrete used in supporting test data shall vary no more than plus 1000 psi or minus 500 psi from that specified for this project.
   3. Shrinkage limits for each mix proposed for walls and horizontal surfaces shall be as specified by D.5.d. below. Proof of meeting shrinkage limits shall accompany mix designs.

D. Laboratory Trial Batch Method: Establish proportions in accordance with ACI 211, and ACI 318 paragraph 5.3.3.2, unless otherwise modified herein.
   1. Test cylinders at seven days and at twenty-eight days in accordance with ASTM C 39.
   2. Where required design strength is 6,000 psi or greater, test additional set of cylinders at fifty-six days.
   3. Temperature of concrete used in trial batches shall be maximum temperature specified herein.
   4. Cement content and mix proportions used shall be such that this water-cement ratio is not exceeded when slump is maximum permitted. Control in field shall be based upon maintenance of proper cement content, water-cement ratio, slump, and air content.

E. Mix Design Information: Include following as part of mix design submittals:
   1. Project identification name.
   2. Specific location, member, etc....for mix usage. Affix code, mix design number, or other specific identification symbol to each mix design.
   3. Type of concrete, i.e....normal weight, lightweight, etc....
   4. Dry unit weight, (pcf).
   5. Aggregate type, gradation, and source.
   6. Admixture types, product identification, and supplier. Include manufacturer's literature for each admixture.
   7. Cement type and brand, including fly ash [and micro silica fume] when applicable.
   8. Placement method intended.
   9. Other characteristics including, but not limited to, 28-day compressive strength, slump, W/C ratio, and proportions of each material in mix.
   10. 28-day shrinkage data for concrete at walls and horizontal surfaces.

F. Water-to-Cement Ratio (W/C):
   1. Water content and W/C ratio shall be lowest possible value consistent with maximum consolidation, workability, and density.
   2. Intent of this specification is to achieve low porosity concrete, minimize shrinkage, and to minimize cracking, thus minimizing harmful moisture or ion penetrations, and thereby protecting reinforcement.
   3. Maximum W/C ratios for following normal weight concrete classes are as follows, unless otherwise noted herein:
      a. Concrete Type
         1) Air-entrained Non-Air-entrained
         2) 0.50 0.55
         3) 0.45 0.45
            (a) 0.40 0.45

4. Maximum W/C ratio for building retaining walls with habitable space below grade (basement walls) shall conform to note F.3. above, but in no case greater than 0.48.
5. Severe Exposure: Maximum W/C ratio at concrete subject to “severe exposure” shall be 0.40. Following locations are hereby classified as “severe exposure” conditions:
    a. Garage Topping Slabs and Topping Slabs.
    b. Truck Dock Slab.
    c. Basin Walls, Slabs, and Pit Walls at Cooling Tower.

G. Supplementary Cementitious Materials:
1. Use supplementary cementitious materials described below to improve consistency, placement, finishing, and economics. Use is at Contractor’s option, unless otherwise indicated.
2. Mixes with higher percentage than specified below for supplementary cementitious materials may be proposed by Contractor, but are subject to Engineer’s approval and limitations herein. If proposed, include following as minimum for consideration:
    a. Total cost savings to be realized.
    b. Previous experience of satisfactory performance, using materials from identical sources as proposed for this project.
    c. Affect, if any, on concrete finishing.
    d. Affect, if any, on air-entrainment.
    e. Affect, if any, on concrete shrinkage properties.
    f. Amount of water content change.
    g. Any other comments based on Contractor’s and concrete supplier’s experience supportive of proposed percentage increase.
3. Do not exceed specified percentage limits for concrete subject to exposure to de-icing chemicals.
4. When supplementary cementitious materials are used in mixes, it shall be understood that time required for setting and strength gain may be longer than required for similar mix with Portland Cement only, therefore precautions to avoid premature finishing shall be considered and undertaken.
5. Limits below represent percentage of total cementitious material in mix, by weight.
6. Fly Ash: 25 percent.
7. Ground Granulated Blast-Furnace Slag (GGBFS): 50 percent, except as follows. If used in hydraulic blend with other supplementary cementitious materials, reduce GGBFS percentage such that sum of supplementary cementitious materials does not exceed 50 percent of total cementitious materials, by weight.
8. Silica Fume: 10 percent.

H. Slump Limits: Proportion and design mixes to limit concrete slump at point of deposit as follows:
1. 5” max., 2” min.
2. 4” max., 1” min.
3. Elevated Slabs, Slabs-on-grade,
    a. 4” max., 1” min.
4. Flowable Conc. req’d. (see below)
5. 4” max., 1” min.
6. 8” max. after add’n of superplasticizer.
7. 3” max. slump prior to addition.

I. Admixtures:
1. Use approved WATER-REDUCING ADMIXTURE conforming to ASTM C 494, Type A, D, E, F, or G in concrete, unless otherwise noted herein.
2. Use approved SUPERPLASTICIZER where Flowable Concrete is specifically indicated and as required to improve placement and workability; to lower W/C ratio; or for shrinkage or permeability reduction.
3. Use high-range, water reducing admixture in concrete with a water/cement ratio of 0.42 and less.

4. Use approved AIR-ENTRAINING ADMIXTURE as follows:
    a. Normalweight concrete exposed to weather. Air content percent per ACI 318, Table 4.2.1, (exposure as follows) unless noted otherwise herein. Reduce air content percent indicated by 1 percent where concrete 28-day f'c is greater than 5,000 psi.
    b. Lightweight Concrete Mixes: Air content percent as recommended by concrete supplier, but, not less than 4 percent.
    c. Provide air content percent in accordance with ACI 318, Table 4.2.1, (exposure as follows) unless noted otherwise herein.
    d. Reduce air content percent for normalweight concrete at unformed surfaces scheduled to receive troweled finish or dry shake hardeners to 3 percent.
5. Use admixtures in compliance with manufacturer's directions. Control dosage rates. Do not overdose mixes.

J. Cement Content:
1. Minimum cement content of concrete mixes to be placed where severe exposure conditions exist or exposure to deicing chemicals will occur shall be 520 lbs. per cu. yd. meeting ASTM C 150 or C 595.
2. Parking Garage Structure: Provide minimum cement content in parking garage slab and beam mixes.

K. Non-Shrink Grout: Material shall be ready-to-use non-metallic or metallic aggregate product requiring only addition of water at jobsite and shall produce flowable cementitious grouting material having no drying shrinkage at any age. Material shall conform to requirements of ASTM C 1107.
1. Use non-metallic grout for exposed conditions, unless indicated otherwise.
2. Compressive strength at 7 days: 6,000 psi minimum.
3. Compressive strength at 28 days: 8,000 psi minimum.
4. Subject to compliance with requirements, acceptable non-shrink grouts are as follows:
    a. BASF; Masterflow 928 Grout
    b. Euclid Chemical Company; Euco N-S
    c. W.R. Meadows, Inc.; 588 Precision Grout

## PART 3 EXECUTION

### 3.01 GENERAL

A. Coordination with Other Products/Trades:
1. Give various trades and subcontractors ample notification and opportunity to furnish anchors, nailers, pipes, conduits, boxes, inserts, thimbles, sleeves, frames, vents, wires, supports, or other items required to be built into concrete by provisions of Drawings or of Specifications governing work of those trades and subcontractors, or as may be necessary for proper execution of their work.
2. Obtain suitable templates or instructions for installation of those items which are required to be placed in forms.

B. Concrete Characteristics:
1. Slump: Concrete shall not be placed when its plasticity, as measured by slump tests, is outside limits specified.
2. Classes: Concrete of several classes required shall have characteristics shown on Drawings or as specified herein.

C. Mixing: Batch, mix, and transport ready-mixed concrete in accordance with the requirements of ASTM C 94. Concrete shall not be transported or used after period in excess of 90 minutes has elapsed after introduction of water into mixer. When concrete temperature exceeds 86 degrees F, time shall be reduced to 45 minutes. Agency supplying ready-mixed concrete shall have plant of sufficient capacity, and adequate transportation facilities, to assure continuous delivery at rate required. Plant equipment and facilities shall conform to "Certification of Ready Mixed Concrete Production Facilities (Checklist with Instructions)" of National Ready Mixed Concrete

Association. Frequency of deliveries to site of work must be so as to provide for placing concrete continuously throughout one (1) pour.

D. Conveying Concrete: Convey concrete from mixer to place of final deposit by methods which will prevent separation or loss of ingredients. Concrete to be conveyed by pumping will require approval of Architect for each class of concrete specified before being used.
   1. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of size and design as to assure practically continuous flow of concrete at delivery end without separation of materials.
   2. Use of gravity flow or aluminum chutes or conveyors for transporting concrete horizontally is not permitted.

E. Control of Water: Control water at all times during mixing, placing, finishing, curing, and after completion of curing phase. Excess water during mixing and placing phases effects properties of concrete, including but not limited to strength, shrinkage/cracking, set time, and long-term durability. Excess water after curing phase effects drying of hardened concrete with direct affect on application of finish materials applied with adhesives sensitive to moisture and/or water vapor. Control of water includes water at place of mixing, truck water, water at jobsite, and moisture due to rain, ice, or snow. Contractor is responsible for control of water and affects on concrete and material(s) to be applied to hardened concrete.

**3.02 JOINTS**

A. General: Locate joints as indicated on Drawings or, if not shown, at locations approved by Architect/Engineer. Intent of this Specification is to locate joints so as not to adversely affect either structural integrity or appearance of structure, and to control cracking.

B. Construction Joints: Place construction joints perpendicular to main reinforcement. Locate joints within middle third of span and continue reinforcement across construction joint unless otherwise indicated by Drawings. Provide dowels across construction joints as indicated by Drawings. Dowels shall be supported during concreting operations so as to remain parallel with slab or wall surface and perpendicular to joint. Additional criteria is as follows:
   1. Keyways: 1-1/2” deep x d/3 x continuous in walls, slabs, and between walls and footings, where “d” denotes specified wall or slab thickness, unless otherwise indicated by Drawings.
   2. Waterstops: Refer to Division 03 Section "Concrete Accessories".
   3. Walls: Space construction joints as follows:
      a. Horizontal Spacing = 60 feet maximum.
      b. Vertical Spacing = as shown on Drawings.
   4. Structural Slabs, Beams, and Girders: Horizontal unit of placement shall not exceed 90 feet in each direction. Girder construction joints shall not occur at face, inner or outer, of intersecting beam. Offset girder joint dimension equal to twice beam width from beam face. This requirement is not applicable to slabs-on-grade.
   5. Slabs-on-Metal-Deck: Horizontal unit of placement shall not exceed 90 feet in each direction.
   6. Avoid construction joints at areas specified to receive either thin-set tile or resilient floor finish materials. If unavoidable, Contractor shall make reasonable effort to minimize such occurrences. Slab grinding, chipping, filling at such occurrences to achieve specified floor tolerances will be at Contractor’s expense.
   7. Contact surfaces of construction joints shall be cleaned and intentionally roughened. [by removing the entire surface and exposing clean aggregate solidly embedded in mortar matrix. The contact surface must be thoroughly cleaned by chipping or sand-blasting the entire surface not earlier than five (5) days after initial pour or by an approved method that will provide equal bond, such as a thorough hose-washing of surface not less than two or more than four hours after the concrete is placed (depending on setting time) with all wash water and chalk-like material being entirely cleaned from surface.] In event that contact surface becomes coated with earth or sawdust, after being cleaned, entire surface so coated shall be recleaned.

8. Do not make additional construction joints without Architect's written approval.

C. Crack Control Joints in Slabs-on-Grade: Crack control shall be provided by construction joints at perimeter of LARGE BLOCK PLACEMENTS with checkerboarded interior control joints thereby defining "slab panels". As option, use LANE PATTERN PLACEMENT having longitudinal construction joints with transverse control joints, thereby defining "slab panels". Use following additional criteria:
   1. Construction Joints in slabs-on-grade shall be vertically formed, keyed, and doweled as indicated by Drawings. Finish with edging tool having radius of 1/8″.
   2. Control Joints in slabs-on-grade shall be either sawcut or formed with continuous inserts at Contractor's option, as follows:
      a. Sawcut Option: Initial sawcuts shall be performed no later than 3 hours after final surface finishing of slab with equipment specifically suited and designed for early concrete sawcutting (dry cut saw) without dislodging aggregate. Perform Final Sawcuts as soon as possible where required to achieve specified joint size. Additional criteria is as follows:
         1) Initial Sawcuts: 1/8" min. width x 1" min. depth.
         2) Final Sawcuts: 1/8" min. width x t/4 min. depth where "t" denotes specified slab thickness.
         3) Final joint width of joints to receive sealant or grout shall be 1/4".
         4) If Initial Sawcuts can be installed to achieve final required control joint size, this is allowed.
   3. Locate crack control joints at column centerlines and at intermediate intervals to restrict "slab panel" size to following limits:
      a. 145 square feet at 4" slabs-on-grade.
   4. "Slab panels" shall be approximately square, with no side longer than following:
      a. 12 feet at 4" slabs-on-grade.
   5. If LARGE BLOCK PLACEMENT is used, maximum permitted placement size shall be 10,000 sf. Plan geometry shall be approximately rectangular where possible, with no edge longer than 1.5 times shortest edge. LARGE BLOCK PLACEMENT criteria shall not operate to relieve Contractor of time limit for initial sawcutting crack control joints, where sawcut option is used. Reduce placement size as required to conform with initial sawcutting time limit.
   6. If LANE PATTERN PLACEMENT is used, lanes shall be one "slab panel" in width. Length may be full width of slab in direction of lane placement, however, this shall not operate to relieve Contractor of time allotted for initial sawcutting crack control joints, where sawcut option is used. Reduce placement lane length as required to conform with initial sawcutting time limit.

D. Expansion Joints and Isolation Joints: Construct as specifically shown by Drawings, typically without dowels, unless otherwise indicated.

**3.03 CONCRETE PLACEMENT**

A. General:
   1. Concrete shall not be placed until forms and reinforcement have been inspected and preparations for placement have been completed.
   2. Deposit concrete in forms as nearly in its final position as is possible to avoid rehandling.
   3. Place concrete in reasonably uniform layers, approximately horizontal, and no deeper than 18 inches except that slabs shall be placed in single layer. Placement shall be in manner to avoid vertical or inclined construction joints or other planes of weakness.
   4. Do not pile up concrete in forms in manner that will cause separation or loss of its ingredients.
   5. Place concrete at rate that concrete is plastic at all times and flows readily into spaces between reinforcement.
   6. Do not place concrete that has partially hardened or has been contaminated by foreign materials.

7. Do not retemper concrete or remix after initial set.
8. Do not place concrete on previously deposited concrete which has partially set or hardened sufficiently to cause formation of seams or planes of weakness. If section cannot be placed continuously, provide appropriate construction joint as specified herein.
9. Remove debris and hardened or partially hardened concrete which has accumulated on forms or reinforcement before work proceeds.
10. Do not permit concrete to drop freely greater than 6 feet. Use suitable equipment such as chute, tremie, or other approved conveyance where longer drops are necessary.
11. Do not pour directly into excavations where water is standing, unless specific procedures and mix design specifically planned in advance and suited for underwater concrete placement have been made.
12. Maintain reinforcement in proper position during concreting operations.

B. Vibration: Thoroughly consolidate each layer of concrete as soon as it is deposited with mechanical vibrators and suitable hand tools, to work mixture well into parts and corners of forms, and entirely around reinforcement and embedded items. Equipment and procedures for consolidation shall conform to ACI 309, unless modified herein.
1. Do not overvibrate or use vibrators to transport concrete within forms.
2. Insert and withdraw vibrators in vertical manner at sufficient points no farther apart than visible effectiveness of vibrator. Vibrator shall penetrate rapidly to bottom of placed layer and at least 6 inches into preceding layer if there is such. Duration of vibration at each point shall be sufficient to consolidate concrete but not excessive so as to cause segregation.
3. Do not insert vibrator into lower layers that have begun to set.
4. Maintain spare vibrator on job site during concrete operations.

C. Bonding:
1. Prepare for bonding of fresh concrete to previously deposited concrete where contact surface is specifically noted on Drawings to be “Intentionally Roughened”, as follows:
   a. Before depositing new concrete on or against previously deposited concrete which has partially or entirely set, roughen surface of concrete in manner which will expose aggregate uniformly and leave contact surface clean, free of laitance, dust, loosened particles of aggregate or otherwise damaged aggregate concrete, or other bond-inhibiting material. Intentionally roughen surface to achieve amplitude of approximately 1/4 inch.
   b. Prepared surface of previously deposited concrete shall be dampened (but not saturated) immediately prior to placing fresh concrete.
2. Hardened concrete of horizontal joints in exposed work; horizontal construction joints in beams, girders, joists, and slabs; [and horizontal construction joints in work designed to contain liquids] shall be prepared same as described above for “Intentionally Roughened” surfaces. Additional requirements are as follows:
   a. Apply approved Bonding Compound to roughened and cleaned surface of set concrete.
   b. Mix and apply Bonding Compound in accordance with written instructions of manufacturer.
   c. Apply fresh concrete to prepared surface within time limit recommended by Bonding Compound manufacturer.

D. Hot Weather Concreting:
1. Definition: Conditions requiring hot weather concrete practices are defined as any combination of high ambient temperature, high concrete temperature, low relative humidity, wind speed, and solar radiation that tend to impair quality of freshly mixed or hardened concrete by accelerating rate of moisture loss and rate of cement hydration, or otherwise causing abnormal or detrimental results.
   a. Maximum acceptable concrete temperature at truck discharge point is 95 degrees F, unless otherwise specified.

b. When conditions occur which cause rate of evaporation of 0.2 lb./sq.ft./hr. or higher, as determined by ACI 305, Figure 2.1.5, precautions to avoid plastic shrinkage cracking shall be taken.

2. Records: Maintain records of outside air temperature, concrete temperature per ASTM C 1064, wind speed, relative humidity, and other general weather conditions that might impair concrete quality or strength during hot weather conditions as defined.
3. When hot weather conditions exist, as defined, following items, all or in part as required, shall be undertaken by Contractor to maintain acceptable concrete temperature and to minimize possibility of plastic shrinkage cracking:
   a. Design concrete mixes specifically for hot weather conditions, utilizing fly ash, ground granulated blast-furnace slag, or both as partial replacements for Portland Cement.
   b. Schedule concrete placement for early morning, late afternoon, or night, unless not permitted by Owner or other governing authority.
   c. Cool ingredients before mixing to maintain concrete temperature at truck discharge point to below 95 degrees F. Mixing water may be chilled or use chopped ice to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
   d. Cover reinforcing steel with water-soaked burlap such that steel temperature will not exceed ambient air temperature sufficiently in advance of embedding in concrete.
   e. Fog spray forms, reinforcing steel, and subgrade just prior to placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
   f. Use water-reducing retarding admixture when required by conditions.
   g. Minimize time between mixing and placement of concrete.
   h. Do not add water to ready-mixed concrete at job site unless it is part of amount initially required for proportioned mix design maximum W/C ratio and specified slump. Addition of water in excess of proportioned maximum water-cementitious material ratio to compensate for loss of workability is prohibited.
   i. Plan concrete placements so that reinforcement has been placed and inspected, and forms, equipment and workers are ready to receive and handle concrete.
   j. Keep equipment cool by spraying with water, including chutes, conveyors, pump lines, tremies, and buggies, however do not permit cooling water to effect water content and properties of fresh concrete.
   k. Protect slab concrete during stages of placing and finishing against moisture loss due to rapid evaporation by applying fog mist spray above surface and applying monomolecular film, evaporation retarding agent.
   l. Provide continuous curing, preferably moist curing during first 72 hours using absorptive blankets kept continuously wet, or, at appropriate pre-planned locations by applying curing compound complying with ASTM C 309, with moisture loss not exceeding 0.39 kg. per sq. meter in 72 hr. period. Use of curing compounds at floors to receive adhered floor coverings shall be in accordance with Div. 3 Section "Concrete Finishing" and shall be evaluated by Contractor prior to use for implications on concrete drying and satisfactory floor covering installation. Continue curing for minimum of 7 days. Do not change curing methods until concrete is at least 3 days old.
   m. Loosen forms as soon as possible and run curing water down inside. When forms are removed, provide wet blanket curing cover to newly exposed surfaces for minimum of 7 days curing period. After curing period, covering should stay in place without wetting for additional 4 days.
4. Mass Concrete Requirements: Special batching, curing, and protection measures shall be used for concrete identified as "mass concrete". Batch mass concrete in accordance with paragraph above, "Mass Concrete Batching", and deliver to forms at temperature not less than 50 degrees F, but sufficient to control maximum temperature of 85 degrees F. Curing time and procedure is dependent on ambient conditions anticipated at time of placement, and therefore shall be developed by Contractor with consideration to applicable criteria of ACI 207.1R. Utilize fly ash, ground granulated blast-furnace slag, or both as partial

replacements for Portland Cement. Subject to Engineer's approval.

E. Cold Weather Concreting:
   1. Definition:
      a. Do not place concrete when outside air temperature is 40 degrees F. or less unless cold weather concreting practices are followed as specified below. Use cold weather concreting practices whenever following conditions exist for more than 3 consecutive days:
         1) Average daily air temperature is less than 40 degrees F., where average daily air temperature is average of highest and lowest temperatures occurring during period from midnight to midnight.
         2) Air temperature is not greater than 50 degrees F. for more than one half of any 24 hour period.
      b. Concrete temperature at time that concrete is mixed and delivered to jobsite shall conform to following temperature ranges:
         (a) Minimum Concrete Temperature
            (1) 60 F.
         (b) 65 F.
         (c) 70 F.
      c. Minimum temperature of concrete during placement and curing shall be 55 degrees F.
      d. Maximum temperature of concrete at point of placement when heated by artificial means shall not exceed 90 degrees F.
      e. Maximum allowable temperature drop of concrete surfaces during first 24 hours after end of protection period shall not exceed following requirements:
         (a) Maximum Allowable
            (1) Temperature Drop
         (b) 50 degrees F.
            (1) 40 degrees F.
            (2) 30 degrees F.
   2. Specification: Cold weather concreting practices required to maintain concrete temperatures as specified above shall be followed according to ACI 306.1.
   3. Records:
      a. Maintain records of date, time, outside air temperature, temperature of concrete as placed and general weather conditions during cold weather conditions.
      b. Record air temperature and concrete temperature at regular intervals, but not less than 4 times per 24 hour period. Record concrete temperature at several locations on surface, corners, and edges of concrete to monitor effectiveness of protection provided. Use lowest reading to represent temperature of section at that time.
      c. Record maximum and minimum temperature readings for each 24 hour period.
   4. Following items are considered minimum steps that shall be undertaken by Contractor during cold weather conditions to maintain acceptable concrete temperature. Other actions and procedures to satisfactorily protect concrete during cold weather conditions may be necessary and are responsibility of Contractor.
      a. Design concrete mixes specifically for cold weather conditions. Use air entrainment (where acceptable), limit W/C ratio to 0.45, and obtain high early strength by using higher cement content, high early strength Portland Cement (Type III) or non-chloride, non-corrosive accelerator as specified.
      b. Heat mixing water and adjust mixing water temperature by blending hot and cold water to obtain concrete temperature within specified acceptable range.
      c. Uniformly heat aggregates to eliminate ice, snow, and frozen lumps of aggregate and to prevent moisture variation in stockpile.
      d. Cover thawed or heated stockpiles with tarpaulins to retain heat.

e. Add air-entraining admixture to batch after water temperature has been reduced by contact with cooler solid materials.
f. Submit detailed procedures for production, transportation, placement, protection, curing, and temperature monitoring of concrete during cold weather.
g. Frozen subgrade shall be thawed prior to concrete placement.
h. Remove snow, ice, and frost such that it does not occupy space intended to be filled with concrete.
i. Cover metal embeds and wrap protruding reinforcing bars with insulation to avoid heat drain from fresh concrete and prevent localized freezing of concrete.

**3.04 SCREEDING CONCRETE (AT ELEVATED FLOOR SURFACES)**

A. Act of striking off surface of concrete to predetermined grade conforming to elevations shown on Drawings shall be accomplished with use of rigid screed guides. Use of wet screed guides is to be avoided on elevated surfaces. Additional requirements and suggestions are as follows:

B. Concrete on Metal Deck and Steel Beam Framing System:
1. Grade for strike off shall be set at predetermined distance above top surface of steel floor members. Metal deck continues to deflect for short period after strike off; subsequent restraightening of surface often moves concrete paste from over beams into resulting depressions. It is suggested that Contractor plan for initial slab thickness over beams of design depth plus 1/8 inch. This should provide sufficient material to restraighten surface and still maintain adequate concrete cover over beams.
2. It is anticipated that occasional areas will be identified where actual deflection of steel beams during concreting operations differs from that anticipated by Engineer. At such locations, modify procedures by one or combination of following:
a. Residual camber after concrete placement: Modify fabricated camber in shop where possible. Where this is not possible, maintain initial thickness at midspan and increase slab thickness at each end of beam by 1/2 of amount of residual camber. In case of beam with 1/2 inch of residual camber, slab thickness at ends of this beam only might be increased by 1/4 inch.
b. Over-deflection of beam during concrete placement: Modify fabricated camber where possible. Where this is not possible, two options are suggested. Option one is to attach shore to underside of this beam only at midspan. Leave initial gap below shore equal to beam camber. As beam deflects during concrete placement, shore will stop deflection at desired point. Option two is to maintain initial concrete slab thickness at each end of this beam only, and to increase slab thickness at midspan by amount of over deflection experienced.
3. Bench mark shall be provided on each column for use by finishers as guide when they are completing finishing in these areas. It is suggested that mark be placed at predetermined distance above design grade (trowels are 16 inches long) for use by finishers in the removal of excess material as needed.
4. Contractor shall include in his bid any additional concrete required to achieve specified slab surface finish tolerance. Finish floor tolerances shall be as specified in Division 03 Section “Concrete Finishing”.

C. Cast-in-Place Concrete Framing System:
1. Grade for strike off shall be set at predetermined distance above top surface of formwork. Minimum slab thickness, as specified on Drawings, shall be maintained throughout slab surface. Formwork continues to deflect for short period after strike off; subsequent restraightening of surface often moves concrete paste from over beams into resulting depressions. It is suggested that Contractor plan for initial slab thickness of design depth plus 1/8 inch. This should provide sufficient material to restraighten surface and still maintain adequate concrete cover over reinforcing steel.
2. It is anticipated that occasional local areas will be identified where actual deflection of formwork during concreting operations differs from that anticipated by Contractor. In these isolated areas only, adjustments in concrete thickness may be indicated or necessary.

Minimum slab thickness, as specified on Drawings, shall be maintained throughout slab surface. Modify formwork camber where possible. Where over deflection of formwork occurs, maintain concrete slab design thickness at each end of affected beams and increase slab thickness at mid-span by amount of over deflection experienced.

3. Contractor shall include in his bid any additional concrete required to achieve specified slab surface finish tolerance. Finish floor tolerances shall be as specified in Division 03 Section “Concrete Finishing”.

**3.05 MISCELLANEOUS CONCRETE ITEMS**

A. Floor Toppings: Place bonded and unbonded topping slabs indicated by Contract Documents conforming to following guidelines:
   1. Bonded Toppings: Topping slabs less than 3 inches thick shall be considered to be bonded toppings unless specifically indicated otherwise. Topping slabs 3 inches thick and greater that are considered as bonded toppings are specifically noted as such in Drawings. Satisfactorily pre-plan and prepare for placement of bonded topping slabs as follows:
      a. Finish surface of base concrete shall consist of “scratch finish” obtained when base course is partially set by brushing with coarse wire broom. No troweling permitted.
      b. If base course has not been prepared with noted “scratch finish”, then roughening of base slab surface by sandblasting or other approved mechanical methods to achieve satisfactory surface amplitude will be required. Surface amplitude shall not be less than 1/8” or as otherwise recommended by overlay installer and approved by Engineer.
      c. Base slab roughening technique/equipment shall be a process selected by Contractor, however, certain high impact techniques, (including but not limited to scarifying, scabbling, and rotomilling), are known to result in “bruising” and/or “micro-cracking”, thereby weakening tensile/bond strength of substrate to receive bonded overlay. Where high impact surface preparation techniques are used, follow with sandblasting or other approved method.
      d. Remove deteriorated concrete, dirt, oil, grease, dust, and other bond-inhibiting materials from surface.
      e. Dampen prepared surface with clean water . Surface should be at moisture condition of saturated surface dry with no standing or glistening water at time of topping placement.
      f. Apply product “scrub-coat”, bonding agent, or bonding adhesive as recommended by overlay product manufacturer’s written instructions. Where manufacturer’s instructions do not require pre-dampening of prepared surface, omission of this step may be considered, but only with approval of Engineer.
      g. Use following concrete topping products:
         (a) Product
         (b) Polymer-Modified Cementitious Mortar. (Use of other pre-mixed cement based mortars specifically manufactured for thin overlay applications may be considered but only with approval of Engineer.)
         (c) but Polymer-Modified Cementitious Mortar extended
         (d) with 3/8” maximum aggregate. (Use of other pre-mixed cement based mortars with aggregate extension specifically suited for thin overlay applications may be considered but only with approval of Engineer.)
         (e) Conventional Concrete as specified in Drawings with bonding compound applied to base concrete.
      h. No topping shall be less than 1/2 inch in total thickness.
   2. Unbonded Toppings: Topping slabs 3” thick and greater shall be considered as unbonded toppings unless specifically indicated otherwise. Prepare for placement of unbonded topping slabs as follows:
      a. Broom and vacuum clean base surface to receive topping.

b. Apply appropriate bond breaker compound to base surface when indicated on Drawings.
c. Use conventional concrete as specified in Drawings.

B. Filling in: Fill in holes and openings left in concrete work for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

C. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to hard, dense finish with corners, intersections, and terminations slightly rounded.

D. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

E. Column Base Plates, Equipment Bases, and Foundations: Grout column base plates, equipment bases and foundations as indicated using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless noted otherwise.

F. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on Drawings. Screed, tamp, and finish as required by Division 03 Section “Concrete Finishing”.

**3.06 CURING, PROTECTING, AND FINISHING CONCRETE**

A. Refer to Division 03 Section “Concrete Finishing”.

B. Protect freshly placed concrete from washing by rain or flowing water.

C. Do not allow concrete to dry out from time it is deposited in forms until expiration of curing period.

D. Protect floor slabs, platforms, and steps whenever scaffolding, shoring, formwork, masonry, concrete, or other work is being done or above finished concrete slabs.

E. Satisfactorily replace imperfect or damaged work, or material damaged or determined to be defective, before final completion and acceptance of entire job, in conformity with requirements of Drawings and Specifications, at Contractor’s expense.

F. After curing phase, control water at areas to receive adhesives, coatings, or other finish material(s) sensitive to moisture or water vapor.

**3.07 FLOOR FLATNESS/LEVELNESS MEASUREMENT AND TOLERANCES**

A. Refer to Division 03 Section “Concrete Finishing” for required floor flatness and levelness criteria and Quality Control.

**3.08 CLEANING**

A. Remove forms, equipment, protective coverings and rubbish resulting there from premises upon completion of work.

B. Leave finished concrete surfaces in clean and undamaged condition, free of mortar, concrete droppings, loose dirt and mud, and satisfactory to Owner.

C. Promptly, effectively and satisfactorily repair damage to floors.

**3.09 FIELD QUALITY CONTROL**

A. The Owner will employ and pay a qualified independent testing agency to perform the following testing for field quality control, including special inspections required by local building code. Retesting of materials failing to meet specified requirements shall be done at Contractor’s expense. Specific items and testing to be performed at Contractor’s expense are noted as such.

1. Tests of Concrete required to determine compliance with this specification shall be made by a certified ACI Concrete Field Testing Technician, Grade I or equivalent.
2. The technician performing the strength tests shall be certified as an ACI Concrete Laboratory Testing Technician, Grade I or II or by an equivalent written and performance test program.
3. The laboratory performing the tests shall conform to the requirements of ASTM C 1077.

B. Structural Concrete Control and Testing:
1. Secure composite samples in accordance with ASTM C 172. Each sample shall be obtained from different batch of concrete on random basis, avoiding selection of test batch other than by number selected at random before commencement of concrete placement.
2. Perform sampling at following locations:
   a. Adjacent to concrete mixer as concrete is delivered from mixer to conveying vehicle, unless otherwise noted.
   b. At end of discharge hose, when concrete is pumped. Location shall be in reasonable close proximity to placement area, so as to satisfactorily simulate conditions at end of hose.
3. Concrete shall be tested as follows:
   a. Mold and cure four specimens (one strength test) from each sample in accordance with ASTM C 31.
   b. Two specimens shall be tested at seven days for information and two shall be tested at 28 days for acceptance. Acceptance test results shall be average of two specimens at 28 days.
   c. Refer to Division 03 Section “Concrete Forming” for testing requirements for early formwork removal.
4. Deviations from requirements of ASTM Specifications shall be recorded in test report. Test concrete specimens in accordance with ASTM C 39.
5. Make at least one strength test for each 100 cu. yd. or fraction thereof or for each 5,000 square feet of floor slab or wall area, of each mix design of concrete placed in one day. Determine slump of concrete sample for each strength test and whenever consistency of concrete appears to vary, in accordance with ASTM C 143.
6. Make one additional strength test (four specimens) for each truck in which 2.5 gallons per cubic yard or more mixing water has been added to truck after concrete has been batched in Batch Plant. This additional strength test shall be at Contractor’s expense.
7. Verify water to cement ratio is not exceeded if water is added to concrete mix in truck or otherwise. Addition of water beyond limits given on approved mix design shall not be permitted.
8. Inspect each batch of concrete, report adjustment to amounts of mixing water and reason(s) for adjustment, in accordance with approved mix design, to assure uniform consistency from truck to truck. Check mixing time of concrete in trucks.
   a. Testing Laboratory will issue Report of Field Inspection of Concrete for each concrete pour. Report shall identify project name, client, concrete supplier, date of placement, and name and signature of inspector.
   b. Report will be in tabular form and include following information for each truck of concrete:
      1) Concrete cylinder set numbers, if cylinders were taken from that truck.
      2) Number of cylinders molded, if applicable.
      3) Time truck was dispatched and time unloaded.
      4) Number of yards of concrete in truck.
      5) Water-to-cement (W/C) ratio.
      6) Slump, air content, and admixtures.
      7) Concrete temperature.
      8) Specific location of placement. Use column grids whenever possible to describe location.
      9) Other remarks, i.e. amount of water added, if any, and reason(s).

9. Should strength of concrete fall below minimum, then additional tests may be required. These tests, if required, shall be made at Contractor's expense and shall be in accordance with ASTM C 42, and ACI 318. If core sample strength tests and/or load test results do not meet strength requirements, then structure, or part of structure shall be removed and replaced at Contractor's expense.
10. Testing Laboratory will issue timely consecutively numbered Concrete Compressive Strength Reports with following information for each set of strength test specimens:
    a. Project name, Client, and concrete supplier.
    b. Date sampled.
    c. Name of technician performing inspection with ACI certification number.
    d. Truck number and ticket number.
    e. Concrete batch weights and whether or not batch plant inspection was performed.
    f. Time concrete was batched and time sampled.
    g. Air temperature and concrete temperature at time of sampling.
    h. Slump, air content, and water-to-cement ratio.
    i. 28 day compressive strength requirement, f'c.
    j. Concrete mix designation, number, or other identification.
    k. Descriptive and graphic location of placement. Provide grid locations whenever possible to describe location.
    l. Concrete cylinder set number.
    m. Date tested, concrete age, and compressive strength results.
    n. Remarks that may affect concrete quality, including water added at site, elapsed time between start of mixing to completion of placement, and variation in curing requirements.
11. Report promptly to Architect details of non-conforming concrete. Give information concerning locations of concrete pours, quantities, date of pours and other pertinent facts concerning concrete represented by specimens.

C. Early Formwork Removal Time Control and Testing:
1. If early formwork removal is desired by Contractor, additional cylinders and testing performed for this purpose are required and shall be at Contractor's expense.
2. Testing requirements are specified in Division 03 Section "Concrete Forming".

**END OF SECTION**

**SECTION 03 30 01**
**CAST IN PLACE CONCRETE LANDSCAPE**

## PART 1 - GENERAL

### 1.01 DESCRLPTLON

A. The extent of cast-in-place concrete is shown on drawings.

B. Related work specified elsewhere:
   1. Concrete Formwork.
   2. Steel Reinforcement.
   3. Concrete Finishing.

### TESTING

A. Owner to employ and pay for an independent testing laboratory, to perform specified testing.

B. Tests required for aggregate:
   1. Test for conformance to ASTM C-33.
   2. Make one test for each 100 cubic yards of fine aggregate.
   3. Make one test for each 250 cubic yards of coarse aggregate.

C. Tests required for concrete:
   1. Make and store test specimens in conformance with ASTM C-31.
   2. Compressive strength tests: ASTM C-39:
      a. Make four (4) cylinders for each test.
      b. Break two cylinders at seven days and two at 28 days unless otherwise directed by Owner's Representative.
   3. Make one compressive strength test for each day's placement or each 50 cubic yards of concrete of each specified strength.
   4. If test strength of concrete does not comply with strength requirements of these specifications and is sufficiently low that, in opinion of Owner's Representative, performance of structure is jeopardized, the Owner's Representative may require that drilled core test specimens be cut from structure at location at which the questionable concrete was placed. Cores shall be secured and tested in accordance with ASTM C-42. If results of these tests show that actual strength of concrete is sufficiently low as to jeopardize performance of structure, the Owner's Representative may require that concrete be removed from structure, and replaced at no additional cost to Owner.
   5. Perform slump test at point of placement immediately prior to placing concrete. Test in accordance with ASTM C-143.
   6. Test for percentage of entrained air in accordance with ASTM C-231 at time of slump testing.

D. Inspection of batch plant:
   1. Batch plant operation will be inspected as required to insure that concrete delivered to the job complies with specifications. Testing laboratory engaged by Contractor will provide this service as directed by Owner's Representative.
   2. Plant inspection reports shall include:
      a. Location of plant.
      b. Job location.
      c. Concrete design mix number and strength.
      d. Concrete design proportion, source, type and amount of cement, aggregates and admixtures used, surface water added and total water used.
      e. Slump.
      f. Air content.
      g. Temperature of heated concrete.
      h. Capacity and condition of mixing truck.
      i. Percent of capacity loaded.
      j. Condition of batching installation.

k. Condition of heating installation.
l. Period of inspection.
m. Number and sizes of batches delivered.

**REFERENCE STANDARDS**

A. The following codes and manuals form a part of this specification:
1. Standard Specifications for Structural Concrete for Buildings (ACI 301-72; Rev 81).
2. Recommended Practice for Selecting Proportions for Concrete (ACI 211-77).
3. Concrete production facilities shall have a current "National Ready Mixed Concrete Association Certificate of Conformance for Concrete Production Facilities".
4. Building Code Requirements for Reinforced Concrete (ACI 318-77).

**SUBMLTTALS**

**SUBMIT PROPOSED MIX DESIGN TO OWNER'S REPRESENTATIVE FOR REVIEW. INCLUDE CERTIFICATION REQUIRED IN ADMIXTURE SPECIFICATION.**

**MOCKUPS: BEFORE CASTING CONCRETE, BUILD MOCKUPS TO VERIFY SELECTIONS MADE UNDER SAMPLE SUBMITTALS AND TO DEMONSTRATE TYPICAL FINISH OF SURFACES, TEXTURES, TOLERANCES, AND STANDARD OF WORKMANSHIP. BUILD MOCKUPS TO COMPLY WITH THE FOLLOWING REQUIREMENTS, USING MATERIALS INDICATED FOR THE COMPLETED WORK:**

**6.01 BUILD MOCKUP IN LOCATION WHERE IT CAN REMAIN UNTIL THE CONCRETE IS COMPLETE.**

**6.02 BUILD MOCKUPS THAT REPRESENT ALL THE CONDITIONS IN THE CAST-IN-PLACE CONCRETE AS SHOWN ON DRAWINGS.**

**6.03 DEMONSTRATE CURING, CLEANING, AND PROTECTING OF CAST-IN-PLACE CONCRETE, FINISHES, AS APPLICABLE.**

**6.04 IN PRESENCE OF LANDSCAPE ARCHITECT, DAMAGE PART OF THE EXPOSED SURFACE, AND DEMONSTRATE MATERIALS AND TECHNIQUES PROPOSED FOR REPAIR OF SURFACE BLEMISHES TO MATCH ADJACENT UNDAMAGED SURFACES.**

**6.05 OBTAIN LANDSCAPE ARCHITECT'S APPROVAL OF MOCKUPS BEFORE CASTING ADDITIONAL CONCRETE.**

**PART 2 - PRODUCTS**

**7.01 MATERIALS**

A. Cement: Portland Cement, (ASTM C-150, Type I. Use high early strength Portland Cement (Serial designation C-150, Type III) where specified and elsewhere at Contractor's option and at no additional cost to Owner.

B. Fine aggregate: Sand particles shall be coarse, sharp, clean and conforming to ASTM C-33.

C. Coarse aggregate:
1. Crushed limestone conforming to ASTM C-33 for normal weight concrete.
2. Light weight conforming to ASTM C-330 for semi-light weight concrete. Minimum Fsp (splitting ratio) of 6.0.

D. Water: Clean and free from injurious amounts of oil, acids, alkalines, organic materials or other deleterious substances.
1. Admixtures:
2. Water reducing admixture: ASTM C-494, Type A, containing no more chlorideions than are present in municipal drinking water.
a. Acceptable products:
1) Eucone WR-75; The Euclid Chemical Co.
2) Pozzolith ZOON: Master Builders.
3) Plastocrete 160; Sika Chemical Corp.

3. Water reducing, retarding admixture: ASTM C 494, Type D, containing no more chlorideions than are present in municipal drinking water.
    a. Acceptable products:
        1) Eucone Retarder-75: Euclid Chemical Co.
        2) Pozzolith 100XR: Master Builders.
            (a) Plastiment: Sika Chemical Co.
4. High range water reducing admixture (Superplasticizer): ASTM C-494, Type F or G, containing no more chlorideions than are present in municipal drinking water.
    a. Acceptable products:
        1) Eucon 37; The Euclid Chemical Co.
        2) Sikament; Sika Chemical Corp.
5. Non-chloride accelerator: ASTM C-494, Type C or E, containing no more chlorideions than are present in municipal drinking water.
    a. Acceptable products:
        1) Accelguard 80; The Euclid Chemical Co.
        2) Darex Set Accelerator; W. R. Grace.
6. Air entraining admixture: ASTM C-260.
7. No calcium chloride or admixtures containing more than 0.1% chloride ions will be permitted.
8. Written certification of conformance to specified requirements and the chloride ion content will be required from admixture manufacturer prior to mix design review.

E. Curing compound: ASTM C-309 for cast-in-place slabs, except those receiving concrete staining products or cementious topping. No concrete treatment shall be used without Owner's Representative's approval.
    1. Acceptable products:
        a. West Concrete Floor Treatment.
        b. Guardian Clear Bond.
        c. TRI-KOTE Concrete Treatment.
        d. Horn Clear Seal.
        e. Master Builders Master Seal.
        f. Conspec No. 1" by Conspec Marketing & Mfg. Co.

F. Furnish concrete in accordance with ASTM C-94, Alternate No. 3, Specification for Ready Mixed Concrete. Design concrete in accordance with ACI Standard Recommended Practice for the Design of Concrete Mixes (ACI 211-77) to produce strength of concrete with slumps and maximum sizes of coarse aggregate specified. Design concrete so the concrete materials will not segregate and excessive bleeding will not occur.

G. Reinforcing: As specified in Division 3.

H. Floor underlayment: Ardex K-15; Ardex, Inc., 630 Stoops Ferry Road, Corapolis, Pa. 15108, (412) 264-4240.

I. Curing agents or hardeners are not allowed for tennis courts, sport courts, playground or spraygrounds surfaces to receive color finish.

**CONCRETE MIX REQUIREMENTS**

A. Use a testing laboratory acceptable to Owner's Representative for preparing and reporting proposed mix designs. Submit written reports to Owner's Representative of each proposed mix at least 28 days prior to start of work. Do not place concrete until mixes have been reviewed and approved by Owner's Representative. The specified minimum strengths are to be exceeded in accordance with Paragraph 4.3 of Building Code Requirements for Reinforced Concrete (ACI 318-83).

B. Minimum compressive strength 28 day: 3000 psi footings; 3500 psi, all other unless specifically called out on the plans.

C. Minimum cement content: 5 sacks per cu. yd. for footings; 6 sacks per cu. yd. for other unless otherwise approved in submittals.

D. Slump: 4" plus or minus 1".

E. Maximum size aggregate: Generally 3/4".

**WATER STOP**

A. Acceptable manufacturers: Williams Products, Inc.

B. Flat, natural rubber, dumbbell type, 5" wide, 1/4" minimum center thickness, 3500 psi minimum tensile strength, 525% minimum elongation to break.

**COLORING**

A. All concrete designated as colored in plans and specifications shall contain the proper proportion of Chromix Admixture for color conditioned concrete specified and shall be used with Lithochrome Colorwax as manufactured by L. M. Scoffield Company, Los Angeles, California and comply with L.B.C. Standard No. 26-9.

**PART 3 - EXECUTION**

**11.01 PLACING**

A. Notify Owner's Representative of intent to pour at least twenty-four (24) hours prior to placing concrete.

B. Before placing concrete, clean equipment for mixing and transporting concrete. Remove debris and ice from spaces to be occupied by concrete. Forms to be removed shall be thoroughly wetted or oiled. Sprinkle sub-grade sufficiently to prevent suction, where waterproof membrane is not required. Remove excess water from place of deposit. Reinforcement, forms, membrane, fillers and ground with which concrete is to come in contact shall be free from frost. Do not deposit concrete during rain unless it is adequately protected. In that case, be prepared to protect newly placed concrete from rain until it has hardened sufficiently so that it will not be damaged. Minimum of 2 hours between placing columns and floors.

C. Before placing concrete, verify installation of all reinforcements, sleeves, waterproof membrane, forms for openings, fill materials, anchors and items related to mechanical, plumbing and electrical trades.

D. Convey from mixer to place of final deposit by methods which will prevent separation or loss of materials. Do not permit concrete to drop freely any distance greater than 4 feet. Where longer drops are necessary, use a chute, tremie or other approved conveyance to assist concrete into place without separation. Chutes shall be metal and have maximum slope of 1 vertical to 2 horizontal; minimum of 1 vertical to 3 horizontal. Chutes greater than 20 feet long will not be permitted.

E. Place concrete at a rate to keep concrete plastic and flowing readily into spaces between bars. Concrete temperature shall be 60-80□F. No concrete that is partially hardened or has been contaminated by foreign materials shall be deposited, nor shall re-tempered concrete be used.

F. Thoroughly compact concrete by suitable means during placing and work around reinforcement and into corners and recesses of forms. Use vibrators under competent supervision to aid in placement of concrete. Insert vibrators and withdraw vertically at 18" to 30" spacing for 5 to 15 seconds duration.

**HOT WEATHER CONCRETING**

A. Conform to ACI 305 when concreting during hot weather.

**COLD WEATHER CONCRETING**

A. Conform to ACI 306 when concreting during cold weather.

**FINISH FOR FORMED CONCRETE**

A. After removal of forms, if any honeycomb places or rock pockets exist, notify Owner's Representative and repair in accordance with his instructions. In general, remove all loose

material, wet surface thoroughly, and fill all voids with a stiff mixture of one part cement to two parts sand. In exposed construction, mix white Portland Cement with standard to blend patch with surrounding surface.

B. On exposed concrete, smooth off joint marks and fins and leave surface smooth, dense and free from honeycomb, prominent grain markings and bulges or depressions more than 3/16" in 4'.

C. Cork floated finish (on exposed concrete, except omit at round columns):
   1. Remove forms at an early stage, within 2 to 3 days of placement where possible. Remove ties. Remove all burrs and fins.
   2. Mix one part Portland Cement and one part fine sand with sufficient water to produce a stiff mortar. Dampen wall surface. Apply mortar with firm rubber float or with trowel, filling all surface voids. Compress mortar into voids using a slow-speed grinder or stone. If the mortar surface dries too rapidly to permit proper compaction and finishing, apply a small amount of water with a fog-sprayer. Produce the final texture with a cork float.

**FINISH FOR SLABS**

A. After suitable bulkheads, screens and, if specified, jointing materials have been positioned, concrete shall be placed continuously between construction joints, beginning at a bulkhead edge form or corner. Place each batch into the edge of previously placed concrete to avoid stone pockets and segregations. If there is a delay in casting, thoroughly spade concrete placed after the delay and consolidate at edge of that previously placed to avoid cold joints. Distribute concrete by shovels and consolidate by other suitable means. Bring concrete to correct level with a wood straightedge and strike off. Do not use wood bullfloats or darbies to smooth the surface.

B. Roughen slabs to receive toppings with stiff brushes or rakes before the final set.

C. After concrete has been properly placed, struck off and darbied or bullfloated, it shall not be worked until ready for floating. The off time between darbying and power floating may vary from 2 to 8 hours or more depending on the weather conditions, concrete temperature and concrete mixture. Begin power floating when water sheen has disappeared and mix has stiffened sufficiently that weight of a man standing on it leaves only a slight imprint on surface. If two power floating operations are necessary to bring surface to desired state, allow concrete to stiffen or become harder before beginning second floating operation.

D. Float finish: After power floating is complete, use wood float by hand to tighten the surface and achieve a medium coarse finish. Hand wood float in a circular motion. Float sufficiently to remove cement paste from surface.

E. Trowel finish: Both power and hand troweling shall be required. Begin power troweling as soon as little or no cement paste clings to blades. Continue troweling until surface is dense, smooth and free of all minor blemishes, such as trowel marks.
   1. Final hand troweling shall be required to remove slight imperfections left by troweling machines and to bring surface to a dense, smooth polished finish. Final hand troweling shall be continued until a ringing sound is heard as trowel passes over surface.

F. Give platforms and steps a light broom finish following sufficient troweling to seal the surface and remove all minor blemishes such as trowel marks.

G. Pitch all slabs to drain as indicated on drawings; finish exposed slab edges; stair nosings with 1/2" round radius.

H. Finishes shall be true to planes within 1/4" in 10 feet as determined by a 10 foot straightedge placed anywhere on the slab in any direction. If variations greater than this exist, the Owner's Representative may direct contractor to grind floor to bring surface within the requirements. Grind as soon as possible, preferably within three (3) days, but not without Owner's Representative's direction and not until concrete is sufficiently strong to prevent dislodging coarse aggregate particles. Grinding will be considered only where slabs will be covered by finish materials. Patching of low spots will not be permitted.

1. Sprinkling of dry cement or a mixture of dry cement and sand on the surface of fresh concrete to absorb water or to stiffen the mix will not be permitted during any stage of floor construction. If bleeding is excessive, remove by dragging hose just ahead of floating operation.

**CURING**

A. Protect freshly deposited concrete from premature drying and excessively hot or cold temperatures. Maintain without drying at a relatively constant temperature for the period of time necessary for hydration of cement and proper hardening of concrete.

B. Initial curing shall immediately follow finishing operation. Keep concrete continuously moist at least overnight.
   1. On slabs, use one of the following:
      a. Ponding or continuous sprinkling.
      b. Absorptive mat or fabric kept continuously wet.
      c. Sand or other covering kept continuously wet.
      d. Curing compound specified. Apply compound at the rate and in accordance with recommendations of the manufacturer. Do not use curing compound on any surface against which additional concrete or other cementitious finishing materials are to be bonded.

C. Immediately following initial curing and before concrete has dried, additional curing shall be accomplished by one of the following materials or methods:
   1. Continuing the method used in initial curing.
   2. Waterproof paper conforming to "Specifications for Waterproof Paper for Curing Concrete" (ASTM C-171).
   3. Other moisture-retaining coverings approved.

D. Continue final curing until the cumulative number of days or fractions thereof, not necessarily consecutive, during which temperature of air in contact with concrete is above 50□F has totaled seven (7) days. Prevent rapid drying at end of curing period.

E. Excessive temperature changes: Changes in temperature of concrete shall be as uniform as possible and shall not exceed 5 degrees F in any one (1) hour or 50 degrees F in any twenty-four (24) hour period.

F. Steel forms heated by sun and all wood forms in contact with concrete during final curing period shall be kept wet. If forms are to be removed during curing period, immediately employ one of above curing materials or methods. Continue such curing for remainder of curing period.

G. On completion of construction, clean all exposed slabs and apply a coat of curing compound at rate of 600 sq. ft. per gallon.

**LEVELING EXISTING SLABS**

A. Mix floor underlayment with water and apply to existing slab in accordance with manufacturer's instructions. Level floor to a tolerance of 1/8" in ten feet in any direction.

**END OF SECTION**

**SECTION 04 20 00**
**UNIT MASONRY**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Concrete block.

B. Clay facing brick.

C. Mortar and grout.

D. Reinforcement and anchorage.

E. Flashings.

F. Accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Installation of dovetail slots for masonry anchors.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

C. Section 07 92 00 - Joint Sealants:

### 1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2023.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.

E. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2022.

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.

G. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale) 2023.

H. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2023.

I. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.

J. ASTM C91/C91M - Standard Specification for Masonry Cement 2023.

K. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2023.

L. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.

M. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

N. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.

O. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale) 2022.

P. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.

Q. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.

R. ASTM C476 - Standard Specification for Grout for Masonry 2023.

S. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2023.

T. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2022.

U. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2023a.

V. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry 2019a.

W. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017 (Reapproved 2023).

X. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry 2020.

Y. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.

Z. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.

AA. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.

BB. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022, with Errata.

## 1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

## 1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
   1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.

D. Samples: Submit two samples of facing brick units to illustrate color, texture, and extremes of color range.

E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

F. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

## 1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

## 1.07 MOCK-UPS

A. Construct a mock-up at Gateway column to include mortar, accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.

B. Locate where directed.

C. Mock-up may remain as part of work.

## 1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means of that will prevent mechanical damage and contamination by other materials.

## PART 2 PRODUCTS

## 2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   2. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.
      b. Exposed Faces: Manufacturer's standard color and texture where indicated.
   3. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
      a. Performance of Units with Integral Water Repellent:
         1) Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
            (a) No water visible on back of wall above flashing at the end of 24 hours.
            (b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
            (c) No more than 25 percent of wall area above flashing visibly damp at end of test.
         2) Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
         3) Compressive Strength: ASTM C1314; maximum 5 percent decrease.
      b. Use only in combination with mortar that also has integral water repellent admixture.
      c. Use water repellent admixtures for masonry units and mortar by a single manufacturer.

## 2.02 BRICK UNITS

A. Manufacturers:
   1. Acme Brick
   2. Ryder Brick:
   3. Mid-West Brick
   4. Substitutions: See section 01 60 00 - Product Requirements.

B. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
   1. Color and texture to match Architect's sample.
   2. Nominal size: As indicated on drawings.
   3. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
   4. Compressive strength: As indicated on drawings, measured in accordance with ASTM C67/C67M.

## 2.03 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.

B. Portland Cement: ASTM C150/C150M, Type I.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144.

E. Grout Aggregate: ASTM C404.

F. Water: Clean and potable.

G. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.

1. Use only in combination with masonry units manufactured with integral water repellent admixture.
2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
3. Meet or exceed performance specified for water repellent admixture used in masonry units.

H. Packaged Dry Material for Mortar for Unit Masonry: Premixed masonry cement and mason's sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
1. Type: Type N.
2. Color: To be selected..

I. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
1. Type: Fine.

## 2.04 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
1. Blok-Lok Limited:
2. Hohmann & Barnard, Inc:
3. WIRE-BOND:
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

D. Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Truss.
2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

E. Strap Anchors: Bent steel shapes, 1-1/2 inch width, 0.105 inch thick, 24 inch length, with 1-1/2 inch long, 90 degree bend at each end to form a U or Z shape or with cross pins, hot dip galvanized to ASTM A153/A153M Class B.

F. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
3. Vertical adjustment: Not less than 3-1/2 inches.

G. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

## 2.05 FLASHINGS

A. Metal Flashing Materials: Stainless Steel, as specified in Section 07 62 00.

B. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
1. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
a. Manufacturers:
1) Hohmann & Barnard, Inc

2) WIRE-BOND:
3) York Manufacturing, Inc:

C. Termination Bars: Stainless steel; compatible with membrane and adhesives.
1. Manufacturers:
a. Hohmann & Barnard, Inc:
b. York Manufacturing, Inc:
c. Substitutions: See Section 01 60 00 - Product Requirements.

**2.06 ACCESSORIES**

A. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.

B. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.

C. Weeps:
1. Type: Polyester mesh.
2. Color(s): As selected by Architect from manufacturer's full range.
3. Manufacturers:
a. Advanced Building Products, Inc:
b. Blok-Lok Limited:
c. Hohmann & Barnard, Inc:
d. WIRE-BOND:

D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

**2.07 MORTAR AND GROUT MIXING**

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
1. Exterior, loadbearing masonry: Type N.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

**3.02 PREPARATION**

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

**3.03 COLD AND HOT WEATHER REQUIREMENTS**

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

**3.04 COURSING**

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:

1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal 8 inches.

D. Brick Units:
1. Bond: Running.
2. Coursing: Three units and three mortar joints to equal 8 inches.
3. Mortar Joints: Concave.

**3.05 PLACING AND BONDING**

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Remove excess mortar and mortar smears as work progresses.

D. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

**3.06 WEEPS/CAVITY VENTS**

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

**3.07 CAVITY MORTAR CONTROL**

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

**3.08 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY**

A. Use individual metal ties installed in horizontal joints to bond wythes together. Provide ties spaced as indicated on drawings.

**3.09 MASONRY FLASHINGS**

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

B. Extend metal flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.

**3.10 GROUTED COMPONENTS**

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

**3.11 BUILT-IN WORK**

A. As work progresses, install built-in fabricated metal frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

**3.12 TOLERANCES**

A. Install masonry within the site tolerances found in TMS 402/602.

**3.13 FIELD QUALITY CONTROL**

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

### 3.14 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

### 3.15 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**

**SECTION 04 72 00**
**CAST STONE MASONRY**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Architectural cast stone.

B. Units required are indicated on drawings as "cast stone".

### 1.02 RELATED REQUIREMENTS

A. Section 04 05 11 - Masonry Mortaring and Grouting: Mortar for setting cast stone.

B. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.

C. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

### 1.03 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary 2019 (Reapproved 2022).

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.

D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).

E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2023.

G. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.

I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).

J. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete 2021.

K. ASTM C1364 - Standard Specification for Architectural Cast Stone 2023.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Test results of cast stone components made previously by the manufacturer.

C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

D. Mortar Color Selection Samples.

E. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.

F. Source Quality Control Test Reports.

G. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
2. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

### 1.06 MOCK-UPS

A. Provide full size cast stone components for installation in mock-up of elements containing cast stone. Coordinate with architect for location and size.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

C. Approved mock-up will become standard for appearance and workmanship.

D. Mock-up may remain as part of the completed work.

E. Remove mock-up not incorporated into the work and dispose of debris.

### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Architectural Cast Stone:
1. Any current producer member of the Cast Stone Institute.
2. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural stone, complying with ASTM C1364.
1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
4. Color: Selected by Architect from manufacturer's full range.
5. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
2. Unless otherwise indicated on drawings, provide:

a. Wash or slope of 1:12 on exterior horizontal surfaces.
b. Drips on projecting components, wherever possible.
c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.
1. Pieces More than 24 inches in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

**2.03 MATERIALS**

A. Portland Cement: ASTM C150/C150M.
1. For Units: Type I, white or gray as required to match Architect 's sample.
2. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Admixtures: ASTM C494/C494M.

E. Water: Potable.

F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, galvanized.
1. Galvanized in accordance with ASTM A767/A767M, Class I.

G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

I. Mortar: Portland cement-lime, ; do not use masonry cement.

J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

**2.04 SOURCE QUALITY CONTROL**

A. Test compressive strength and absorption of specimens selected at random from plant production.
1. Test in accordance with ASTM C642.
2. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.
3. Submit reports of tests by independent testing agency, showing compliance with requirements.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

**3.02 INSTALLATION**

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
1. Drench cast stone components with clear, running water immediately before installation.
2. Set units in a full bed of mortar unless otherwise indicated.
3. Fill vertical joints with mortar.

4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

**3.03 TOLERANCES**

A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing.
   2. Remove excess mortar from face of stone before pointing joints.
   3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.

B. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

**3.04 REPAIR**

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.

B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.

C. Repair methods and results subject to Architect 's approval.

**3.05 CLEANING**

A. Keep cast stone components clean as work progresses.

**3.06 PROTECTION**

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

**END OF SECTION**

**SECTION 05 12 00**
**STRUCTURAL STEEL FRAMING**

**PART 2 PRODUCTS**

**1.01 MATERIALS**

**END OF SECTION**

**SECTION 05 12 00**
**STRUCTURAL STEEL FRAMING**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes structural steel and supplementary items necessary to complete work required for its installation.

B. Structural steel is that work defined in AISC “Code of Standard Practice” and as otherwise shown on drawings.

C. Miscellaneous metal fabrications, steel joists and metal deck are specified elsewhere in Division 5.

### 1.02 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Preliminary Connection Review with Steel Fabricator:
   1. Proposed variations in details shown on drawings will be considered and such variations must have preliminary approval prior to preparation of detailed shop drawings.

C. Submit in advance of fabrication, complete shop drawings prepared under supervision of Registered Professional Engineer necessary for fabrication of each component part of structural steel framing including following:
   1. Member size, length and camber.
   2. Bill of materials.
   3. Material specifications.
   4. Bolt hole size, bolt size and bolt type.
   5. Details of cuts, copes and bevels.
   6. Piece marks for field assembly.
   7. Splices.

D. Submit erection drawings (“E” Sheets) as part of shop drawings, showing complete information necessary for erection of each component part of structural steel framing, including following:
   1. Setting drawings, templates and directions for installation of anchor bolts and other anchorage devices embedded in concrete or masonry work.
   2. Dimensions for alignment and elevation of each member.
   3. Location of members and attachments by match-marking of piece members.
   4. Type and location of each field connection.
   5. Required number and location of shear connectors on each member.
   6. Details of each field connection or typical connection.
   7. Piece marks for field assembly.
   8. Splices.
   9. Size, length and type of bolts required in each field connection.

E. Shop drawings shall not be made by using reproductions of Contract Drawings.

F. Shop drawing shall be submitted through General Contractor to Architect. Any fabrication of material before approval of drawings will be at risk of Contractor.
   1. Fabricated material and connections shall fit within architectural constraints.
   2. Fabricator alone shall be responsible for errors of detailing and fabrication.

G. Both shop and field welding and required non-destructive testing shall be indicated on shop drawings by welding symbols and nondestructive testing symbols as shown in latest edition of AWS SPEC. A2.4 SYMBOLS FOR WELDING AND NON-DESTRUCTIVE TESTING.
   1. Special conditions shall be fully explained by added notes or details.
   2. Welding symbols for groove welds shall indicate groove depth required to obtain specified effective throat thickness for welding process and position of welding to be used.

3. Details of groove welds, joints, and preparation of base material shall be referenced to pre-qualified joint specified in AWS Code Figs. 2.9 through 2.11 and shall clearly distinguish between complete joint penetration and partial joint penetration.
4. Fillet weld symbols shall indicate required weld size to obtain required effective throat thickness and effective length.

H. Welding Procedures:
1. Welding Procedure Specification (WPS) for both shop and field welds, which are deemed prequalified in accordance with AWS Code Section 5 shall be prepared as written procedures and shall be made available to testing agency and posted next to welding equipment in Fabricator's plant.
2. Welding Procedures Specifications (WPS) and other procedures, along with tests required to qualify procedure in accordance with AWS Code Section 5.2, shall be submitted for approval prior to use.

I. Submit manufacturer's certification and test data that following items furnished conform to following specifications:
1. High strength bolts, including nuts and washers, ASTM A 325 or ASTM A 490.
2. Filler metal for welding - appropriate AWS Specification - refer to Paragraph 2.2/F.
3. Shear connectors - ASTM A 108 - stud base qualification requirements in accordance with AWS Code Appendix IX.
4. Non-shrink grout
5. Structural steel primer paint
6. Inorganic or other protective coatings.
7. Direct tension indicators.
8. Tension control bolts.

J. Fabricator/Erector shall submit to Testing Laboratory reports of non-destructive testing required of them. These reports shall be on AWS suggested forms or similar form containing same information.

K. Contractor shall submit to the Engineer and the enforcing agency, for acceptance, a quality control or inspection plan that addresses all inspection issues, including in process and final inspection that are addressed in AWS D1.1.

L. The qualification of the contractor's Inspectors and NDE personnel shall be submitted to the engineer and enforcement agency for acceptance.

**1.03 QUALITY ASSURANCE**

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges" including "Commentary".
a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:
1) "Where the fabricator must select or complete connection details, this approval constitutes acceptance by the owner's authorized representative of design responsibility for the structural adequacy of such connections. If a fabricator wishes to change a connection that is fully detailed in the contract documents, the fabricator shall submit the change for review by the owner's authorized representative in a manner that clearly indicates that a change is being requested. Approval of this submittal constitutes acceptance by the owner's authorized representative of design responsibility for the structural adequacy of the changed detail."
2. AISC "Specification for Structural Steel Buildings.
3. AISC "Specification for Structural Joints using ASTM A 325 or A 490 Bolts".
4. American Welding Society (AWS) D1.1-94 "Structural Welding Code - Steel."

5. ASTM A 6 “General Requirements for Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.”
6. Steel Structures Painting Council - “Steel Structures Painting Manual”, Volumes 1 and 2.

B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS “Qualification” requirements.
   1. Fabricator and Erector shall provide Architect and Testing Laboratory with names of welders to be employed on Work, together with certification that each of these welders has passed qualification tests using procedures covered in American Welding Society Standard D1.1, and/or D.1.3 as applicable to specific welding work to be performed.
      a. Fabrication shop welders shall be certified by qualification tests and recertified per AWS requirements within the last year.
      b. Field erection welders shall be certified by test within the last year or shown to be continuously employed by erector since initial qualification tests and recertified per AWS requirements within the last year.
   2. If recertification of welders is required to meet the above criteria, retesting will be Contractor’s responsibility.

C. Steel Erector shall have 10 years experience.
   1. Certified Welders - Refer to Paragraph “B” above.

D. Members designated on drawings (if any) as “Architectural Exposed Structural Steel” (AESS) shall comply with AISC Code, Section 10. This section covers fabrication care, erection care and dimensional tolerances of AESS members and components.
   1. Match abutting cross-section configuration so that joints align.
   2. Grind smooth all weld joints to remove weld show-through.

E. Material shall be properly identified in accordance with UBC, 1994 Edition, Section 2202.]

**1.04 PROPOSED SUBSTITUTIONS**

A. Substitutions of sections or modifications of details, if proposed by Contractor, shall be submitted for approval in sketch form prior to submission of shop drawings, and such substitutions shall be made only when approved by Architect, and at no additional cost to Owner. Total amount of credit, if any, shall be stated in writing with submission.

B. Corrections for inaccuracies that result in change from Structural Drawings or final approved shop drawing details shall be submitted in sketch form for approval. Such substitutions or corrections shall be made only when approved by Architect.

**1.05 DELIVERY, STORAGE, AND HANDLING**

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.
   1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.
   2. Store materials, other than fabricated steel, in weathertight containers until ready for use in work. Store containers in dry place.
   3. Store electrodes in rod ovens and heat in accordance with AWS Code section 4.5 prior to use in welding.

## PART 2 PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Specific product, material or manufacturer listed under each item below is “acceptable” only if manufacturer can evidence product compliance with requirements of Contract Documents.

B. For manufacturers not listed, submit as substitution according to the Conditions of the Contract and Division 1 Specification Sections.

### 2.02 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Structural Steel: Shapes, bars, plates and structural pipe as indicated on Structural Drawings conforming to one of following ASTM Specifications are approved for use under this specification. Base plates and column materials are to be inspected and tested as specified in Paragraph 2.2.B.7.

1. Structural Steel Shapes, Plates, and Bars - Carbon Steel, ASTM A 36, “Standard Specification for Structural Steel.”
2. Welded and Seamless Pipe - ASTM A 501, or ASTM A 53, Types ″E″ or ″S″, Grade B, 35,000 psi minimum yield strength.
3. Structural Tubing - ASTM A 500, Grade B, 46,000 psi minimum yield strength.
4. Structural Steel Shapes, Plates, and Bars - High Strength Steel, ASTM A 572, Grade 50, “Standard Specification for High Strength Low Alloy Columbium-Vanadium Steels of Structural Quality.
5. Supply fine grain killed steel for Group 3, 4 and 5 rolled shapes, (W14 series W14 x 145 and larger and W12 series W12 x 120 larger).
6. Steel in Group 3, 4 and 5 rolled shapes subjected to primary tensile stresses due to tension or flexure, or spliced with full penetration welds shall be supplied with Charpy V-Notch testing in accordance with ASTM A 6, Supplementary Requirement S5. Impact test shall meet minimum average value of 20 ft-lbs. absorbed energy at +70 deg. F. and shall be conducted in accordance with ASTM A 673 with following exceptions:
   a. Center longitudinal axis of specimens shall be located as near as practical to midway between inner flange surface and center of flange thickness at intersection with web mid-thickness.
7. For plates exceeding 2 inch thickness, steel shall be supplied with Charpy V-Notch testing in accordance with ASTM A 6, Supplementary Requirement S5. Impact test shall be conducted in accordance with ASTM A 673, Frequency P and shall meet a minimum average value of 20 ft.-lbs. absorbed energy at +70 deg. F.
8. Steel plates 1-1/2 inches and thicker shall be tested in mill in conformance with ASTM A 435, “Straight-Beam Ultrasonic Examinations of Steel Plates” using S1 Supplementary Requirements to assure delivery of steel plates free of gross internal discontinuities such as pipe, ruptures, and laminations.

C. High Strength Bolts and Washers:

1. High strength bolts for structural joints, including suitable nuts and plain hardened washers - ASTM A 325 SC and ASTM A 325 N where noted.
   a. Bolts and nuts for high strength bolts shall be heavy hex head conforming to ANSI Standards B18.2.1 and B18.2.2 respectively. Nuts shall conform to ASTM A 563, “Standard Specification for Carbon and Alloy Steel nuts”.
   b. Washers shall be circular, flat and smooth and shall conform to requirements of Type A washers in ANSI Standard B23.1. Washers for high strength bolts shall be hardened and conform to ASTM F 436, Specification for Hardened Steel Washers. Beveled washers for American Standard Beams and channels shall be square or rectangular, shall taper in thickness (16-2/3 percent slope) with average thickness of

5/16 inch. When an outer face of a bolted part has a slope greater than 1:20 with respect to a plane normal to bolt axis, a beveled washer shall be used.

2. Quenched and tempered alloy steel bolts for structural steel joints - ASTM A 490.
3. Direct Tension Indicator Tightening Devices and Alternate Design Fasteners shall conform to RCSC Specification for Structural Joints, except as modified below.
   a. Direct Tension Indicator washers conforming to the requirements of ASTM F 959.
      1) J.M. Turner, Inc.
      2) Applied Bolting Technology
   b. Tension Control Bolts Conforming to AISC RCSC, Section 2 d), using pre-assembled sets of nut, washer and bolt.
      1) Bristol Machine Company
      2) NSS Industries and Lohr Structural
      3) Le Jeune
   c. Each diameter, grade, and production lot shall have pre-installation testing preformed by testing lab prior to the fasteners being installed in the structure.
4. Bolts shall be new and shall not be reused.
5. Bolts shall be well lubricated at time of installation. Dry, rusty bolts will not be allowed. Bolts shall be lubricated at time of installation per ASTM A 325/A 490 and AISC RCSC.
6. Galvanized Bolts: Provide bolts, nuts and washers that are hot dip galvanized according to ASTM A 153, Class C when used to connect steel called for on drawings or in specifications as hot dip galvanized after fabrication.

D. Automatic End Welded Studs Used as Shear Connectors or Headed Stud Anchors for Concrete Embeds:
   1. Automatic end welded studs shall be Nelson Granular Flux-filled Shear Connector or Anchor Studs (or approved equal).
   2. Studs shall be manufacturer of cold-finished carbon steel which conforms to ASTM A108, Grade 1015 or 1020. Minimum tensile strength: 60,000 psi; Minimum elongation: 20 percent in two inches, AWS Table 7.1, Type B.
   3. Dimensional tolerances of shear connectors shall be in accordance with Fig. 7.1 of AWS Code. Size and length shall be as indicated on Structural Drawings.
   4. Arc shield ferrule of heat-resistant ceramic material shall be furnished with each stud.
   5. Suitable deoxidizing and arc-stabilizing flux for welding shall be furnished with each stud of 5/16 inch diameter or larger. Studs less than 5/16 inch in diameter may be furnished with or without flux.
   6. Only studs with qualified stud bases in accordance with AWS Appendix IX shall be used. See Submittals.
   7. Ceramic ferrules used in stud welding process shall be completely removed by Fabricator/Erector from area where concrete is to be placed.

E. Anchor Bolts: Carbon steel externally and internally threaded standard fasteners - ASTM A 307, unless noted otherwise, or ASTM A 449 where noted.

F. Filler Metal for Welding: Provide filler metal having a notch toughness not less than 20 ft.-lbs. at -20 degrees F. as measured by Standard Charpy V-Notch Test, ASTM E 23. The minimum required energy absorption is 20 ft-lb. average. One specimen may be less than the minimum average, but not less than 15 ft.-lbs. All electrodes shall meet code quality.
   1. Conform to following AWS Specifications for welding process used:
      a. Shielded Metal Arc Welding (SMAW) - AWS A5.1.
      b. Flux Core Arc Welding - Self shielded (FCAW-SS) - AWS A5.20 or A5.29.
      c. Flux-Core Arc Welding - Gas shielded (FCAW-G) - AWS A 5.20.
   2. Maximum diameter of electrodes allowed for SMAW is per AWS D1.1, Section 4.6. Maximum diameter of electrodes allowed for FCAW is per AWS D1.1, Section 4.14 except that the maximum diameter for the flat and horizontal position should be limited to 7/64 inch. Welding materials must be used within the positions, thicknesses, temperatures

and other parameters provided by the manufacturer.

3. Maximum width and thickness of weld layers shall be per AWS D1.1, Section 4.6 for SMAW and Section 4.14 for FCAW except that at the maximum width of a layer in any position should not exceed 5/8 inch.

G. Nonshrink Grout:
   1. Material shall be ready-to-use metallic or nonmetallic aggregate product requiring only addition of water at jobsite and shall produce flowable grouting material having no drying shrinkage at any age. Compressive strength of grout shall be not less than 6,000 psi at 7 days and 8,000 psi at 28 days.
   2. Subject to compliance with requirements, acceptable nonshrink grout are as follows:
      a. Cormix Construction Chemicals - "Supreme"
      b. Euclid Chemical Co. - "Euco N-S"
      c. Master Builders - "Master Flow 928 Grout"

H. Structural Steel Primer Paint: Fast curing, lead and chromate free, modified Alkyd Rust-Inhibitive Primer exceeding performance requirements of Federal Specification TT-P-86d, Type I. TNEMEC Company, Inc., 10-99 TNEMEC Primer, red color; 10-1009 TNEMEC Primer, Gray Color for second coat, where specified.
   1. 56 percent solids by volume.
   2. Maximum Volatile Organic Compounds, thinned: (VOC) of 3.25 lbs/gallon.
   3. Physical Test Result: ASTM B117 Salt Spray (Fog): No blistering, cracking, softening, or delamination of film. No rust creepage at scribe and no rusting at edges after 500 hours.

I. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds and repair painting galvanized steel, with dry film containing not less than 93 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.

J. Miscellaneous Materials and Accessories: As specified hereinafter under various items of work and/or as indicated on drawings or required for good construction practice.

K. [Slide Bearings: Bearing pads, upper and lower units shall be CON-SLIDE Type CSA elements as manufacturered by CON-SERV Inc., East Hanover, N.J.
   1. Sliding Surfaces shall be nominal 3/32" glass-filled virgin TFE factory bonded with a tested epoxy to a steel back-up plate. The bonding shall be done in a heated bonding press under controlled pressure.
   2. The coefficient of friction shall average 0.06 under a compressive load of 2000 psi.
   3. The compressive creep shall be a maximum of 2% at 2000 psi at 70 degrees F.
   4. Elements shall be flat, clean, and prepared for installation in the structure. Slots and holes if required shall be fabricated in the bearing manufacturer's plant.

**2.03 FABRICATION**

A. Work shall be shop-assembled insofar as possible and delivered to site complete and ready for erection. Material shall be properly marked and match-marked where field assembly is required. Sequence of shipments shall be such as to expedite erection and minimize handling of material. Fabricate structural steel in accordance with AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (Ninth Edition), [AISC Load and Resistance Factor Design Specification for Structural Steel Buildings] and AISC Code of Standard Practice (Ninth Edition).
   1. Structural steel which is used for main components and which is required to have yield stress greater than 36 ksi shall in fabrication plant be marked by painting ASTM Specification designation on piece. This identification shall remain on piece throughout erection.
   2. Rolled material before being laid out and after being worked must be straight with tolerance allowed by ASTM Specification A.6, unless noted otherwise. If straightening is necessary, it may be done by mechanical means or by application of limited amount of localized heat. Temperature of heated areas shall not exceed 1,200 deg. F. for material specified herein.

3. Beams, girders and trusses shall be cambered as indicated on Structural Drawings. Specified camber shall be within tolerance of minus zero to plus 1/2" for members 50 feet and less; and minus zero to plus 1/2" plus 1/8" for each 10 feet or fraction thereof in excess of 50 feet. Members without specified camber shall be fabricated so that after erection any minor camber due to rolling or fabrication shall be upward.
    a. Cambering shall be performed so as to result in a parabolic profile.
    b. Cold cambering may be performed where beam size is applicable. Where cold cambering will cause web or flange buckling, tearing or other damage to the beam, other means shall be employed (i.e. heat cambering).

B. Finishing of member shall be in accordance with following:
1. Column Base Plates:
    a. Rolled base plates 2 inches or less in thickness may be used without planing, provided a satisfactory contact bearing surface is obtained.
    b. Rolled base plates over 2 inches and less than 4 inches in thickness may be straightened by pressing or by milling bearing surfaces to obtain a satisfactory contact bearing surface.
    c. Bottom surface of column base plates which are grouted on foundations need not be planed.
    d. Top surfaces of base plates with columns full-penetration welded need not be pressed or milled.
    e. Anchor Bolt Holes in Baseplates shall be made oversize as follows:
        1) Hole Size
            (a) Dia. + 5/16"
                (1) Dia. + 1/2"
            (b) Dia. + 3/4"
2. Column Ends:
    a. Compression joints depending upon contact bearing shall have bearing surface prepared to common plane by milling or other approved means in accordance with AISC Standards.
    b. Milled or machined surfaces shall be protected against corrosion by a rust inhibiting coating that can be easily removed prior to erection.
    c. Members to be milled shall be completely assembled before milling.
3. Beam and Girder Ends:
    a. Oxygen cut ends shall, wherever practicable, be done by mechanically guided torch.
    b. Oxygen cut edges which are subject to stresses shall be free from gouges. Occasional gouges greater than 3/16 inch that remain from cutting shall be removed by grinding.
    c. Oxygen cut edges which are to have weld metal deposited on them shall be in accordance with AWS Code Sec. 3.2.
    d. Corners shall be smooth and rounded to minimum 1/2 inch radius, but in no case less than AISC minimum dimensions
4. Remove mill scale from columns in the area where the beam flanges will be welded to the column.

C. Splices in Structural Steel: Splicing of structural steel members in shop or field is prohibited without prior approval of Engineer. Members having splice not shown and detailed on approved shop drawings will be rejected.

D. Shop connections shall be high strength bolted (slip critical or bearing type) or welded, as indicated on Structural Drawings or approved shop drawings.

E. High strength bolted construction assembly shall be in accordance with AISC Specification for Structural Joints using ASTM A 325 or A 490 bolts.
1. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible material. Joint surfaces shall be free of burrs and other foreign materials. Hot-dip galvanized contact surfaces shall be scored by

wire brushing or blasting prior to assembly.

2. If thickness of material is not greater than normal diameter of bolt plus 1/8 inch, holes may be punched. If thickness of material is greater than normal diameter of bolt plus 1/8 inch, it shall be drilled full size or sub-punched 1/16 inch smaller than bolt diameter and reamed to full size.
3. Bolt holes shall be normal diameter not more than 1/16 inch in excess of normal bolt diameter unless otherwise specified on Structural Drawings. Slotted or oversize bolt holes, if required, shall be as specified in AISC Specification for Structural Joints Sec. 3©.
4. Beam to Beam and Beam to Column Connections: Standard shear connections shall utilize bearing-type bolts with threads allowed across the shear plane (Type N).
5. Bearing-Type Bolt Tightening: Standard shear connections utilizing bearing-type bolts need only be tightened to the snug tight condition. This is the tightness that exists when all the plies in a joint are in firm contact, generally achieved by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.
6. Slip-Critical Connections: Connections indicated as slip-critical shall utilize friction type bolts (Type SC) with [approved tightening method using Direct Tension Indicator washers installed with Tension Control Bolts] or [Direct Tension Indicators]. Bolts used in moment connections and tension members shall be considered as slip-critical fasteners.
7. A 325 or A 490 bolts, regardless of method of tightening, shall have hardened washer installed per RSCS paragraph 7.c, 1 through 8. A 490 bolts used to connect material having specified minimum yield point less than 40 ksi shall have washer installed under bolt head and one installed under nut.
8. When tightening is done by calibrated wrench method, nut or bolt rotation from snug tight shall not be greater than that permitted in Table 5 of AISC Specification for Structural Joints.

F. Holes for Other Work:
   1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members as shown on contract documents, and/or final shop drawings.
   2. Provide specialty items as indicated to receive other work.
   3. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

G. Welded construction shall be performed in accordance with AWS Structural Welding Code D1.1-94, Sections 2 thru 7, and Section 8, 9 or 10, whichever is applicable.
   1. Only welded joints deemed as being prequalified in accordance with AWS D1.1-94 Sec. 5.1, which are selected from AWS Code Figs. 2.1 thru 2.5 are approved for use.
   2. A Welding Procedure Specification (WPS) with the information required by AWS D1.1, Section 5, shall be submitted to the Owner's Engineer and the enforcement agency for acceptance prior to the start of work.
      a. The WPS shall be used in providing the required special inspection.
      b. The WPS shall contain the actual values to be used for the welding parameters and variables so that instruction is provided to welders; as a minimum the WPS shall list the position, electrode type and size, travel speed, electrode stick-out, voltage and amperage with acceptable limits, bead size, weld sequence, stress relieving, and other pertinent data.
      c. A copy of the filler metal manufacturer's technical data sheet should be submitted with each WPS.
      d. For WPS's which require qualification, Procedure Qualification Records (PQRs) shall also be submitted for acceptance. Production welding heat input shall be limited based on the PQR.
      e. The welding parameters are a function of each electrode. The written WPS should be developed by a competent welding engineer, and the individual welding parameters should be within the electrode manufacturer's range of operation.

f. Approved WPS's shall be posted at appropriate locations throughout the job site or fabricator's shop to be available to welders, supervisors and inspectors.

3. WPS's for groove welds joining the beams flanges to the column shall meet or exceed the workmanship and technique requirements of AWS D1.1. WPS's for FCAW should be qualified by testing in accordance with AWS D1.1, Section 5. The tests should include Charpy V-Notch (CVN) tests of the weld metal and the heat affected zone (HAZ). The CVN test temperature should be at least 30 degrees F colder than the Lowest Service Metal Temperature (LSMT) and not warmer than zero degrees F. The minimum required energy absorption is 20 Ft-Lbs. average. One specimen may be less than the minimum average, but not less than 15 Ft-lbs. The tests should be conducted in accordance with AWS D1.1, Appendix III.
4. For highly restrained joints, or where shrinkage is likely to cause problems, the Contractor shall submit a weld shrinkage and distortion control plan to the Engineer for review to determine compliance with design intent.
5. Welders, welding operators and tackers to be employed under this specification, shall have been qualified by test and certified by Qualified Agency or person as prescribed in AWS Code Sec. 5, Parts C, D and E, within last year. These qualifications shall be made available to Owner's Testing Laboratory for examination.
6. Welders that will make welds with restricted access, such as, but not limited to, the bottom flange to column welds through a cope hole or access hole in the beam web, or where access to the bottom of a groove is restricted by the presence of a column flange, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.
7. Welding process shall be prequalified and limited to following processes:
   a. Shielded Metal Arc Welding (SMAW)
   b. Flux-Core Arc Welding - Self Shielded (FCAW-SS)
   c. Flux-Core Arc Welding - Gas Shielded (FCAW - G)
   d. Welding process not pre-qualified must be qualified by test.
8. Maximum diameter of electrodes allowed for SMAW is per AWS D1.1, Section 4.6. Maximum diameter of electrodes allowed for FCAW is per AWS D1.1, Section 4.14 except that the maximum diameter for the flat and horizontal position should be limited to 7/64 inch. Welding materials must be used within the positions, thicknesses, temperatures and other parameters provided by the manufacturer.
9. Maximum bead width and thickness of weld layers shall be per AWD D1.1, Section 4.6 for SMAW and Section 4.14 for FCAW except that the maximum width of a bead in any position should not exceed 5/8 inch. The maximum layer thickness of all passes, except cap passes, shall be limited to 1/4".
10. Requirements for workmanship and technique shall be as specified in AWS Code Sec. 3 and 4, including preheat and interpass temperatures, in accordance with Table 4.3 for process being used.
11. Preheat, if required by the following requirement, shall be used for all welds including tack welds. Preheat and interpass temperatures should be determined in accordance with AWS D1.1-94, Appendix XI, using the hydrogen controlled method, but shall not be less than the temperatures set forth in AWS D1.1-94 Table 4.3. [Welds for section in ASTM A6 Shape Size Groups 4 and 5 and plates with a thickness greater than 2-1/2 inches should have a minimum preheat of 350 degrees F]. To ensure that the work piece is properly heated, the temperature of the part shall be measured at a distance from the axis of the weld equal to twice the thickness of the thickest part being welded, but in no case less than 3 inches in all directions, including the through thickness dimension of the part being welded, for the full length of the weld joint. Preheat should be verified by the inspector before welding commences. [The cooling rate of the weldment should be controlled with thermal insulation or other appropriate methods to a maximum of 250 degrees F./hr.]
12. All welds shall be started and ended with a full cross-section weld for a minimum length of 1.5 times the joint thickness, but not less than one inch on weld tabs ("run off" tabs) except at access boles in beam/girder webs (see AWS D1.1, Section 3.12). All weld tabs should

be removed, the affected area ground smooth and magnetic particle tested for defects.

13. If backing bars are used under the bottom beam flange to column flange CJP groove weld, the backing bar shall be removed, the removal area ground to sound, bright metal and the area magnetic particle tested for defects. A 5/16 inch fillet weld shall be placed in this location.
14. If a backing bar is used under the top beam flange to column CJP groove weld, and is not removed, the backing bar shall be attached to the column and beam flanges by either a fillet weld along the complete bar length on the under side of the bar, or by a partial penetration weld from the underside of the bar, for the full length of the bar. Other methods of welding the bar to the column and beam may be used subject to the Engineers approval.
15. Weld “dams” are not allowed. Weld “dams” are weld tabs not aligned in such a manner to provide an extension of the joint preparation per AWS D1.1, Section 3.12. Weld “dams” are typically perpendicular to proper weld tabs.
16. All tack welds shall be of the same quality as the final welds. This includes requirements for preheat. All tack welds not incorporated into the final welds shall be removed.
17. Groove welds shall be made with “stringer” passes only, no excessiving weaving allowed. “Wash” passes will not be allowed. Lay passes in horizontal layers. Each pass shall be thoroughly de-slagged and cleaned. Individual weld beads shall be completed prior to applying portions of subsequent beads. Ends of interrupted passes in way of access holes shall be staggered.
18. Fillet welds terminating at ends or sides shall be returned continuously for distance at least twice normal size of weld (end returns).
19. Intermittent and continuous welding, and straightening of built-up sections shall be done in manner to minimize internal stresses.
20. Welds not specified shall be continuous fillet welds, sufficient to transmit required forces, using minimum fillet as specified by AWS D1.1, Table 2.2.
21. [In progress visual inspection per AWS D1.1-94 is required for all welding (fit-ups, cut-outs, clean-up, root passes, fill-in passes, etc.). Ultrasonic Testing (UT) is required for all (100%) complete joint penetration groove welds of beam-to-column welds, continuity plates welds and shear tabs.

**2.04 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 (50 mm).
   2. Surfaces to be field welded.
   3. Surfaces to be high-strength bolted with slip-critical connections.
   4. Surfaces to receive sprayed-on fireproofing.
   5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
   1. SSPC-SP 2 “Hand Tool Cleaning.”
   2. SSPC-SP 3 “Power Tool Cleaning.”
   3. SSPC-SP 5 “White Metal Blast Cleaning.”
   4. SSPC-SP 6 “Commercial Blast Cleaning.”
   5. SSPC-SP 7 “Brush-Off Blast Cleaning.”
   6. SSPC-SP 8 “Pickling.”
   7. SSPC-SP 10 “Near-White Blast Cleaning.”
   8. SSPC-SP 11 “Power Tool Cleaning to Bare Metal.”

C. Priming: Immediately after surface preparation, apply primer according to manufacturer’s instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

**2.05 GALVANIZING**

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.

**2.06 SOURCE QUALITY CONTROL**

A. Access to places where material for contract is being fabricated or produced shall be provided to Architect and/or testing laboratory for purpose of inspection.

B. Architect may inspect structural steel at plant before shipment. However, Architect reserves right to reject any material, at any time before final acceptance, which does not conform to requirements of Drawings and Specifications.

C. Furnished by General Contractor, as specified in this Section, unless otherwise noted.
1. Structural Steel Mill Manufacturer/Supplier.
2. Structural Steel Fabricator.
3. Structural Steel Erector.
4. Manufacturer/Supplier of Structural products.

D. Implement special inspection requirements in AWS D1.1-94, Sections 6.1 through 6.6. Contractor is required to furnish a fabrication/erection inspector. Owner will employ verification inspector. Visual inspection means that the inspectors visually inspect the welding for adherence to approved welding procedure specification starting with fit-up and proceeding through the welding process. Reliance only upon use of non-destructive examination (NDE) at end of the welding is not permitted. Use visual inspection in conjunction with NDE for sound weld.

E. Inspection and testing by Owner's Agency is for verification and shall not relieve contractor of his responsibility to furnish materials and workmanship in accordance with Contract Documents.

F. In cases of differences of opinion between owner's Inspector and the contractor's Inspector regarding conformance of a weld with the specifications, the issue should be brought to the owner's Engineer and the enforcement agency as part of the resolution process.

**2.07 EXTENT OF QUALITY CONTROL**

A. Contractor alone shall be responsible for correct fitting of structural members and for elevation and alignment of finished steel structure. General Contractor shall be responsible for establishing, setting and maintaining control points and building lines to be used in plumbing structural steel frame in accordance with AISC Code of Standard Practice, Section 7.11 and shall verify following:
1. Verify that anchor bolts are located as specified on Drawings and are in proper relation to control points and building lines, prior to setting of structural steel.
2. Verify that structural steel members have been located, elevated, plumbed, and aligned in relation to control points and building lines, within tolerance permitted by AISC Code of Standard Practice, Sec. 7.11. Any adjustments necessary in steel frame because of fabrication, construction or erection discrepancies in elevations and alignment shall be responsibility of Contractor.

B. Structural Steel Fabricator/Erector shall provide quality control procedures to extent that he deems necessary to assure that fabrication work being performed and material or products being furnished, conform to Contract Documents, and to following extent:
1. Visually inspect column material.
2. Materials and products being furnished by Fabricator/Erector shall be received and identified in fabrication plant in such a manner that materials or products can be identified as being represented by mill test reports or manufacturer's certificates. Identification marks of materials shall remain on structural steel members through fabrication and

erection.

3. Inspect materials for compliance to ASTM A 6, prior to fabrication.
4. Inspect installation of slip-critical High Strength Bolts and proper bolt tension, as follows:
   a. When direct tension indicator method is used, observe installation of bolts to determine that bolt manufacturer's procedure is properly used and determine that correct indication of tension has been achieved.
5. Visually inspect to confirm that plies of connected elements have been brought into firm contact.
6. Visually inspect welds as specified in AWS Code, Section 6.

C. Product Manufacturer/Supplier of structural items shall inspect and test products as specified in designated ASTM Specifications; reference Submittals, this Section.

D. Structural Steel Mill/Manufacturer shall inspect and test materials as specified in designated ASTM Specifications and perform ultrasonic testing of materials required of Steel Mill Supplier, as specified in this Section; Reference submittals, this Section.

E. Structural Steel Fabricator/Erector shall provide quality control procedures during erection to extent that he deems necessary to assure that erection work being performed conforms to Contract Documents and to following extent:
1. Visually inspect welds as specified in AWS D1.1, 6.1 through 6.6.
2. Inspect installation of direct tension indicators at bolted slip-critical connections.
3. Perform bend test on shear studs as specified in accordance with AWS Code Section 4.25.

F. Adjustments necessary in steel frame because of fabrication, construction or erection discrepancies in elevations and alignment shall be responsibility of Contractor.

G. Survey Work:
1. Contractor shall employ at his expense registered professional engineer or surveyor to establish control points and layout work for Building Control Lines. Steel Contractor shall conduct layout work and elevations for erection of structural steel.
2. Check elevations of concrete and masonry bearing surfaces and anchor bolt locations prior to erection and submit discrepancies to Architect/Engineer prior to start of erection. Corrections or adjustments to structural steel shall be made and submitted for approval prior to start of erection.
3. Upon completion of erection of steel frame and before start of work by other trades that are supported, attached or applied to frame, General Contractor shall make a final survey of frame and submit report certifying compliance with specified tolerances.

## PART 3 EXECUTION

### 3.01 PREPARATION

A. Templates shall be securely in place to preclude misplacements of anchor bolts, and bolts shall be installed at locations and with projections established by approved structural steel shop drawings.

B. General Contractor and Structural Erection Contractor shall separately check and agree on correct positioning before concrete is placed.

C. Subsequent displacement of anchor bolts will be responsibility of General Contractor.

### 3.02 ERECTION

A. General:
1. Contractor shall completely outline proposed method and sequence of erection to Architect for approval before delivering material to jobsite.
2. Outline shall be prepared to avoid delay of any damage to work of other trades.
3. Contractor shall comply with state, local and Federal laws pertaining to safety requirements for steel erection.
4. Erection of structural steel members shall be in accordance with AISC Specification and AISC Code of Standard Practice, and as follows.

B. Column Base Plates and Bearing Plates:
   1. Columns with base plates attached and bearing plates for beams and similar structural members shall be set level to their proper alignment and elevation using shim packs unless noted otherwise.
   2. Loose column bases are to be set level to their proper alignment and elevation by use of shim packs, leveling bolts or as indicated on Structural Drawings.

C. Erection Tolerances:
   1. Each individual member shall be erected, plumbed, leveled and aligned within tolerance defined in Sec. 7.11 and Commentary of AISC Code of Standard Practice, except as noted. Top surface of closure angles/plates at building perimeter and at openings shall be within 1/4 inch of their proper location prior to commencement of concreting operations. Where this condition is not satisfied, 18 gage plate shall be attached to angles/plates in manner sufficient to serve as guide for strikeoff of concrete floor surface.
   2. Building lines for use in plumbing exterior columns shall be established by General Contractor. As erection progresses, General Contractor shall be responsible for accuracy of building lines off-set, maintaining and referencing building lines required to verify plumbness of structural steel framing.
   3. Elevation tolerance at beams and girders at columns to be +3/16” to -5/16” per AISC.

D. Field Erection:
   1. Erect members according to most economical method and sequence available consistent with Plans and Specifications.
      a. The structure is considered a “Non-Self Supporting Steel Frame” as defined by Section 7.9.3 in the AISC Code of Standard Practice.
   2. As erection progresses, provide temporary guy lines to properly align steel framing.
   3. Align various members accurately to lines and elevations indicated within specified erection tolerances.
   4. Make adjustments to various members prior to making permanent connections.
   5. Temporary guying or bracing shall be introduced wherever necessary to take care of loads to which structure may be subjected. This bracing shall be left in place as required by erection procedures. Adequacy of temporary bracing shall be sole responsibility of Contractor.
   6. This work shall be permanently connected as required by Structural Drawings or final shop drawings in a sequence that will minimize lock-in stress.
   7. Drift pins shall not be used to enlarge unfair holes in main material. Burning and drifting may be used to align unfair holes in secondary bracing members only upon approval of Architect. Ream holes that must be enlarged to admit bolts.
   8. High strength bolted connections shall be in accordance with this Section, Part 2.
   9. Welded construction shall be in accordance with this Section, Part 2.

E. Installation of Automatic End Welded Stud for Shear Connectors or Headed Stud Anchors for Concrete:
   1. Areas to which studs are to be attached must be free of foreign material, such as rust, oil, grease, paint, etc. When mill scale is sufficiently thick to cause difficulty in obtaining proper welds, it must be removed by grinding or sandblasting.
   2. Studs shall be automatically end welded in accordance with manufacturer’s recommendations in such manner as to provide complete fusion between end of stud and plate. There should be no porosity or evidence of lack of fusion between welded end of stud and plate. Stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch and under, and 3/16 inch for over 5/8 inch diameter. Welding shall be done only by qualified welders approved by welding inspector. Length of studs shown on drawings is length after welding.
   3. Ceramic ferrules used in stud welding process shall be completely removed from area where concrete is to be placed.

F. Grouting of Base Plates and Bearing Plates:

1. Plates shall be set and anchored to proper line and elevation. Metal wedges, shims, and/or setting nuts shall be used for leveling and plumbing structural members, including plumbing of columns. Concrete surfaces shall be rough, clean, free of oil, grease, and laitance, and shall be damp. Metal surfaces shall be clean and free of oil, grease, and rust. Addition of water, mixing and placing, shall be in conformance with material manufacturer's instructions. Grout shall be mixed by using a mortar mixer. Batches shall be of size to allow continuous placement of freshly mixed grout. Placing shall be quick and continuous. Exposed surfaces shall have smooth, dense finish.
2. Base plates shall be grouted prior to placement of structural concrete slabs.

G. Clean-Up:
1. Upon completion of erection, Contractor shall remove falsework used by him.

**3.03 FIELD QUALITY CONTROL**

A. Owner will employ and pay a qualified independent testing agency to perform following testing for field quality control, including special inspections required by local building code. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

B. Scope of Services:
1. Testing Laboratory will furnish qualified Inspectors as duly designated persons who act in behalf of Architect/Owner on inspection and quality matters within scope of AWS Code D1.1. to ascertain that fabrication and erection by welding is performed in accordance with requirements of AWS Code D1.1.
2. Testing Laboratory will furnish qualified Inspectors for inspection of Fabricator/ Erector's quality control procedures, materials and workmanship required of Owner's/Purchaser's representatives, as specified in AISC Specification M5. Such inspections are to be made to fullest extent possible in Fabricator's plant.
3. Testing Laboratory will furnish qualified Inspectors and technicians to perform inspections and tests as specified herein, interpret results and report deviations from Contract Documents.

C. Qualification of Personnel:
1. Personnel performing non-destructive testing will be qualified in accordance with current edition of American Society for Non-Destructive Testing Recommended Practice No. SNT-TC 1A. Only individuals qualified for NDT Level I and working under NDT Level II, or individuals qualified for NDT Level II may perform non-destructive testing specified.
2. Personnel performing inspections of welding work will be currently registered with American Welding Society as having successfully complied with requirements of Section 4 of A.W.S. Standards for Qualification and Certification of Welding Inspectors, QC1 may perform welding inspection specified.

D. Reports of Inspection and Tests:
1. Fabrication and Erection reports shall be issued on a weekly basis, or as conditions warrant, and will include following information:
   a. Progress of work
   b. Location and progress of inspections.
   c. Results of inspections, noting any deviations from Contract Documents.
   d. Correction of deviations.
2. Non-destructive testing reports will include following information:
   a. Reports shall be issued on suggested AWS (Appendix E) or similar forms containing same information.
   b. Interpret test results and state in test report whether or not test specimen conforms to Contract Documents.
3. Submit certified copies of tests and inspections to following:
   a. Owner (2)
   b. Architect (1)
   c. Engineer (1)

d. Contractor (2)
e. Fabricator (1)
f. Erector (1)

E. Shop Inspection and Testing of Materials:
1. Check Certified Mill Test Reports to verify structural steel being furnished conforms to appropriate ASTM Specification.
2. Verify following products being furnished are represented by manufacturer's certifications and test data.
a. High Strength bolts.
b. Filler metal for welding.
c. Shear studs used as shear connectors.
d. Direct tension indicators.
e. Tension Control Bolts

F. Shop Inspection of High-Strength Bolted Connections:
1. Inspection will be performed in accordance with AISC Specification for Structural Joints Section 9, to following extent:
a. Observe installation of bolts to verify bolts have been properly installed and tightened to selected procedure of AISC Specification for Structural Joints Section 8(c). or 8(d).
b. When direct tension indicator method is used, observe installation of bolts to determine that DTI manufacturer's procedure is properly used and determine that correct indication of tension has been achieved.

G. Shop Inspection of Welding:
1. Testing laboratory will obtain from fabricator and erector names of welders to be employed on Work, together with certification that each of these welders has passed qualification tests within last year using procedures covered in American Welding Society Standard D1.1 and as specified in Paragraph 1.3.B.
2. Inspection of welding work will be performed as specified in AWS Code Section 6, and to following extent:
a. Visual inspection of welds as specified in AWS Code, Sec. 6.5.
b. Inspection of welding procedures as specified in AWS Code, Sec. 6.3.
c. Inspection of welder's qualification as specified in AWS Code, Sec. 6.4.
3. Perform ultrasonic testing of complete penetration groove welds for entire weld length, in each designated joint, in accordance with AWS Code, Sec. 6, Part C, and to following extent:
a. 100 percent of welds splicing beams, girders, columns and braces[ where shown on drawings].
b. 100 percent of column to base plate welds at rigid frame columns only.
c. 100 percent of frame columns from 6" above joint to 6" below joint before and after welding connections.
d. 100 percent of complete joint penetration groove welds of beam-to-column welds, continuity plate welds and shear tabs.

H. Field Inspection of Alignment and Fit-Up:
1. Verify location and setting of anchor bolts by witness of Contractor's final check prior to setting of steel members.
2. As erection progresses, check connection of members for proper fit-up and adjustment prior to making permanent connections.
3. Verify plumbness of columns is within allowable tolerance specified in AISC Code Sec. 7.11 and Commentary.
4. Verify that bracing and guying/cables, if required to secure steel framing during erection, are installed in accordance with erection procedures.
5. During erection, verify specified phases of construction and steel erection are complete in accordance with erection procedure before proceeding with additional erection of

structural steel.

I. Field Inspection of High-Strength Bolted Connections:
   1. Bolts will be inspected as specified in Para. 3.3/F, Shop Inspection of High-Strength Bolted Connections to following extent:
      a. Each bolt in each slip-critical connection shall be inspected as specified above.
      b. Two bolts in each bearing type bolted connection between girders and columns shall be inspected as specified above.
      c. 10 percent of remainder of bolts, but not less than 2 in each connection, shall be inspected as specified above.
   2. Bolted connections that fail shall be retightened and remaining bolts in connection shall be retested. Cost of retests on connections that fail shall be borne by Contractor.

J. Field Inspection of Welding Work:
   1. Testing laboratory will obtain from fabricator and erector names of welders to be employed on Work, together with certification that each of these welders has passed qualification tests within last year using procedures covered in American Welding Society Standard D1.1 and as specified in Paragraph 1.3.B.
   2. Visual inspection and non-destructive examination of welding work will be performed as specified in Para 3.3/G., Shop Inspection of Welding.
   3. Visually inspect the welding for adherence to approved welding procedure specification starting with fit-up and proceeding through the welding process as the welding is being performed. Follow up visual inspection with non-destructive examination.
   4. Base metal thicker than 1-1/2 inches shall be ultrasonically inspected for discontinuities directly behind weld after joint completion. Any material discontinuities shall be accepted or rejected on basis of defect rating in accordance with (larger reflector) criteria of U.B.C. Standard No. 27-6.
   5. Ultrasonically test full-penetration, moment connection welds in accordance with AWS Code, Sec. 6, Part C, to following extent:
      a. 25 percent of welds made by each individual welder shall be tested at random as specified above.
      b. If an unacceptable weld is found, two additional welds made by same welder shall be tested at random. If either of these welds are found unacceptable, 100 percent of same welder's welds shall be tested as specified above and welder shall be recertified by Testing Laboratory, in accordance with qualification tests specified in AWS Code, Sec. 5, Part B, before being allowed to continue welding on this project.
      c. Test each weld in moment connection as specified above.
   6. Extent of testing shall be entire weld length in each designated joint.
   7. All groove welds in the steel moment frame girder-to-column connection should be ultrasonically (UT) examined for the full length. Backing bar removal areas and fillet welds on continuity plates should be examined for the full length by the magnetic particle testing (MPT) method.
   8. Welds found unacceptable shall be repaired by methods permitted by AWS Code, Sec. 3.7, and reinspected by ultrasonic testing. Cost of initial test and further testing shall be borne by Contractor.

K. Field Inspection of Shear Studs used as Shear Connectors:
   1. Inspect number and locations of shear studs for conformity to Structural Drawings.
   2. Inspection of shear stud welding will be in accordance with AWS Code, Chapter 7 and as follows:
      a. Visual inspection of shear studs shall indicate complete fusion and full 360 degrees flash weld. There will be no indication of lack of fusion.
      b. If, after welding, visual inspection reveals that a sound weld or full 360 degree flash weld has not been obtained, each stud shall be bent by hammering stud to an angle of 15 degrees from its original axis. Direction of bending shall be opposite missing flash weld. Studs that crack in weld, base metal, or shank shall be replaced.

c. Minimum of two (2) studs shall be welded at start of each production period in order to determine proper generator, control unit and stud welder setting. These studs shall be capable of being bent 45 Deg. from vertical without weld failure. After above test, weld section shall not exhibit tearing out or cracking.

d. In addition to above, six members per floor per building quadrant shall be selected at random on which 5 studs shall be hammered 15 degrees toward center of member. NOT MORE THAN ONE STUD SHALL SHOW ANY SIGN OF FAILURE. If two or more studs fail, remaining studs on member shall be hammered. Studs showing any sign of failure shall be replaced. For each beam with any defective studs, additional beam shall be tested.

L. Base Plate Grout:

1. For every ten (10) base plates grouted, grout strength will be tested with set of cubes as follows:
   a. Set of cubes will consist of two cubes to be tested at 7 days, and two cubes to be tested at 28 days.
   b. Test cubes will be made and tested in accordance with Corps of Engineers Specification for Non-Shrink Grout, CRD-C621, with exception that grout should be restrained from expansion by top plate.

**3.04 CLEANING**

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.5 mils.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

**END OF SECTION**

**SECTION 05 12 13**
**ARCHITECTURALLY-EXPOSED STRUCTURAL STEEL FRAMING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS) at arches at two Gateway entrances.

### 1.02 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: General requirements for structural steel members, including AESS framing specified in this section.

B. Section 09 96 00 - High-Performance Coatings: Finish coat requirements and coordination with primer and surface preparation specified in this section.

### 1.03 REFERENCE STANDARDS

A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2022.

B. AISC 325 - Steel Construction Manual 2017.

C. AISC 360 - Specification for Structural Steel Buildings 2022.

D. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling 2022.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

F. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS) 2015.

G. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2022.

H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.

I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).

K. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Schedule and conduct a preinstallation meeting at project site one week prior to start of work of this section; require attendance by all affected installers. Coordinate requirements for shipping, special handling, storage, attachment of safety cables and temporary erection bracing, final coating, touch-up painting, mock-up coordination, Architect's observations, and other requirements for AESS.

### 1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product data for each type of product specified. Submit paint systems in accordance with Section 09 96 00.

C. Shop Drawings: Detailing for fabrication of AESS components.
   1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
   2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
   3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.

D. AESS 1 Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating specific AESS

characteristics, including surface preparation, sharp edges ground smooth, continuous weld appearance, weld show through, and fabrication mark removal.

E. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

F. Qualification data for fabricator and erector to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, photographs showing detail of installed AESS, and other information specified.

**1.06 QUALITY ASSURANCE**

A. Fabricator Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.

B. Erector Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.

C. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work..

D. Comply with applicable provisions of AISC 303, Section 10 for the designated AESS category.

E. Owner to engage a quality assurance agency per requirements of AISC 360, Chapter N and AISC 303, Section 10.

**1.07 MOCK-UP**

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Locate mock-up in fabricator's shop. Mock-up to be full-size unless Architect approves smaller models. Alternatively, when a mock-up is not practical, the first piece of an element or connection can be used to determine acceptability.

C. Notify Architect one week in advance of dates and times when mock-up will be available for review.

D. Demonstrate applicable AESS characteristics for specified category of AESS on elements and joints in mock-up.

E. Build mock-ups using member sizes and materials indicated for final work.

F. Obtain Architect’s written approval of mock-ups before starting fabrication.

G. Retain and maintain mock-up during construction in an undisturbed condition as a standard for judging completed work.

**1.08 DELIVERY, STORAGE, AND HANDLING**

A. Handle finished pieces in accordance with Section 10 of AISC 303, using nylon-type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

A. Comply with Section 05 1200, except as amended in this section for aesthetic purposes.

**2.02 FABRICATION**

A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Architect. Detail AESS assemblies to minimize field handling and expedite erection.

B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.

C. For curved structural members, whether composed of a single standard structural shape or built-up, the as-fabricated variation from theoretical curvature to be equal to or less than standard camber and sweep tolerances permitted for straight members in applicable ASTM standard.

D. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.

E. Bolted Connections:
   1. Make in accordance with Section 05 12 00. Provide bolt type and finish as noted herein.

F. Welded Connections:
   1. Comply with AWS D1.1/D1.1M and Section 05 12 00.
   2. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding tolerances of this section.

G. Surface Preparation:
   1. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
   2. Remove backing and run out tabs.

H. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
   1. AESS 1: Basic elements.
   2. AESS 2: Feature elements viewed at a distance greater than 20 feet (feature elements not in close view).

**2.03 PAINT SYSTEM**

A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified, submitted, and approved per Sections 09 96 00. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.

B. Primer: As specified in Sections 09 96 00. Primer to comply with all federal standards for VOC, lead and chromate levels.

**2.04 SHOP PRIMING**

A. Surface Preparation:
   1. Coordinate required surface profile with approved paint submittal prior to beginning surface preparation.
   2. Prior to blasting, remove any grease and oil using solvent cleaning to meet SSPC-SP 1.
   3. Remove weld spatter, slivers and similar surface discontinuities.
   4. Ease sharp corners resulting from shearing, flame cutting or grinding.

B. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

**2.05 MATERIALS**

A. General: Meet requirements of 05 12 00 as amended below.

**2.06 SOURCE QUALITY CONTROL**

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. AESS 1 and 2 Acceptance: Architect to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Erector to check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of appearance of member. Coordinate remedial action with fabricator prior to erecting steel.

### 3.02 PREPARATION

A. Provide connections for temporary shoring, bracing and supports only where noted on approved fabrication documents. Temporary connections not shown are to be made at locations not exposed to view in final structure or as approved by Architect.

B. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain appearance of AESS through process of erection.

### 3.03 ERECTION

A. AESS 1: Basic elements; feature elements not in close view:
   1. Employ special care to handle and erect AESS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
   2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by Architect during pre-installation meeting. Obtain Architect approval of methods for removing temporary devices and finishing AESS members prior to erection.
   3. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
   4. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
   5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
   6. Remove all backing and run out tabs.
   7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.

### 3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. AESS 1 and 2 Acceptance: Architect to observe AESS in place and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

### 3.05 CLEANING

A. Touch-up Painting: Complete cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint to blend with adjacent surfaces of AESS. Perform touch-up work in accordance with manufacturer's instructions and as specified in Section 09 96 00.

**END OF SECTION**

**SECTION 05 41 00**
**COLD-FORMED STEEL FRAMING**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes: Cold-formed steel stud framing assemblies and supplementary items necessary for installation.

### 1.02 DELEGATED ENGINEERING REQUIREMENTS

A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required and shall not be construed as an engineered design. Furnish and install all Work required for a complete installation.

B. Coordination of Contract Documents and Work:
   1. Product Variations: In the event of minor differences between products and systems of available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
   2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

### 1.03 SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product and system indicated.
   1. Include manufacturer's specifications for materials, finishes, construction details, and installation instructions.

B. Welding Certificates: Written certifications for welding procedures and personnel.

C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
   1. Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness
   2. Expansion anchors.
   3. Power-actuated anchors.
   4. Mechanical fasteners.
   5. Vertical deflection clips.
   6. Miscellaneous structural clips and accessories.

D. Field Quality Control Reports: Written report of testing and inspection required by “Field Quality Control”.

E. Qualification Data: For manufacturer and installer.
   1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
   2. Architect may waive submittal of qualification data for available manufacturers listed in this Section.
   3. Architect may waive submittal of qualification data for available manufacturers listed in this Section.

## 1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with not less than 10 years experience with successful production of products and systems similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 10 years, and with sufficient production capability, facilities, and personnel to produce required Work.

B. Installer Qualifications:
   1. Experience: Installer with not less than 5 years experience in performing specified Work similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 5 years, and with sufficient production capability, facilities, and personnel to produce required Work.
   2. Supervision: Installer shall maintain a competent supervisor who is at Project during times specified Work is in progress that is experienced in installing systems similar to type and scope required for Project.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Welding: Qualify procedures and personnel according to AWS qualification requirements and following:
   1. AWS D1.1/D.1.1M, "Structural Welding Code - Steel".
   2. AWS D1.4, "Structural Welding Code - Reinforcing Steel".

## 1.05 PROJECT CONDITIONS

A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing protected with a waterproof covering, and ventilate to avoid condensation.

## 1.07 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

# PART 2 PRODUCTS

## 2.01 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## 2.02 MATERIALS

A. Steel Sheet: ASTM A 1003 / A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Grade:
      a. ST33H (ST230H) for minimum uncoated steel thickness of 0.0428 in (1 mm) and less.
      b. ST50H (ST340H) for minimum uncoated steel thickness of 0.0538 in (1.3 mm) and greater.
   2. Protective Coating: ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized coating.
   3. Conversion of Gage to Minimum Thickness for Metal Framing: When metal framing is indicated to be of a specific gage thickness, following shall be uncoated base metal thickness according to SSMAs “Product Technical Information”, 2000:

a. 18 Gage: 0.0451 in (1.15 mm) design thickness; 43 mils minimum thickness.
b. 16 Gage: 0.0566 in (1.44 mm) design thickness; 54 mils minimum thickness.
c. 14 Gage: 0.0713 in (1.81 mm) design thickness; 68 mils minimum thickness.
d. 12 Gage: 0.1017 in (2.58 mm) design thickness; 97 mils minimum thickness.
e. Minimum thickness represents 95 percent of the design thickness and is minimum acceptable thickness of material for Work.

B. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base Metal Thickness: Not less than 18 gage 0.0451 in (1.15 mm) thick.
2. Flange Width: 1-5/8 in (40 mm) minimum.

C. Steel Track (Runners): Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched (except as noted below), with unstiffened flanges, and as follows:
1. Minimum Base Metal Thickness: As required by delegated engineering, not less than 18 gage 0.0451 in (1.15 mm) thick.
2. Flange Width: Manufacturers standard deep flange, minimum 3 in (75 mm), at head of exterior walls where studs occur between structural floors, standard flange elsewhere.
3. Web: Bottom track punched with 1 in (25 mm) diameter holes at 24 in (600 mm) on center over openings to prevent track from holding water, unpunched elsewhere.

## 2.03 JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As noted on the drawings.
2. Flange Width: As noted on the drawings.

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, un-punched, with un-stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: Not less than 0.0428 in (1 mm).
2. Flange Width: 1-5/8 in (40 mm), minimum.

## 2.04 ACCESSORIES

A. Framing Components: As required by delegated engineering fabricated from ASTM A 1003 / A 1003M, Structural Grade, Type H, metallic coated, steel sheet of same grade and coating weight used for framing members.
1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Gusset plates.
5. Deflection tracks and clips.
6. Stud kickers, knee braces, and girts.
7. Reinforcing and backer plates.
8. Hole-reinforcing plates.

B. Metal Deck: 26ga (.0177 in) corrugated, ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized coating.

C. Steel Shapes and Clips: ASTM A 36 / A 36M, zinc coated by hot-dip process according to ASTM A 123 / A 123M.

D. Anchor Bolts: ASTM F 1554, grade required by delegated engineering, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153 / A 153M, Class C.

E. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.

F. Powder-Actuated Anchors: Suitable for application indicated, ANSI A10.3; low velocity, powder-actuated fasteners; drive pins and clip angles fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, an ultimate load capacity not less than 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
   1. Manufacturers:
      a. Hilti Corp.
      b. ITW Ramset/Red Head.
      c. Powers Fasteners.
      d. Simpson Strong Tie Anchor Systems.
   2. For post-tensioned concrete, anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.

G. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws; low-profile head beneath sheathing, manufacturer's standard elsewhere.

H. Welding Electrodes: Comply with AWS standards.

I. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing minimum of 94 percent zinc dust by weight.

J. Non-Metallic, Non-Shrink Grout: ASTM C 1107, premixed, non-metallic, non-corrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents with fluid consistency and 30 minute working time.

K. Shims: Load bearing, high-density, non-leaching multimonomer plastic.

L. Thermal Insulation: For boxed-in sections, ASTM C 665, Type I, unfaced mineral-fiber blankets produced by combining glass or slag fibers with thermosetting resins.

**2.05 FABRICATION**

A. Fabrication Provisions: Fabricate cold-formed steel stud framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Shop welding of 0.0747 in (1.90 mm) or thicker components is acceptable. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding Work.
      b. Screw fasteners penetrating joined members by not less than 3 exposed screw threads.
   4. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

B. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 in per 10 ft (3 mm per 3 m) (1:960) and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 in (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 in (3 mm).

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### 3.02 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
   1. AISI's "Standard for Cold-Formed Steel Framing - General Provisions".
   2. Respective manufacturer's written installation instructions.
   3. Accepted submittals.
   4. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### 3.03 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### 3.04 INSTALLATION

A. Installation Options: Cold-formed steel stud framing may be shop or field fabricated for installation, or it may be field assembled.

B. Bearing Preparation: If required, grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

C. General Installation Provisions: Install cold-formed steel stud framing and securely anchor to supporting structure as required by delegated engineering.
   1. Install framing and accessories plumb, square, and true to line, and with connections securely fastened.
      a. Cut framing members by sawing or shearing; do not torch cut.
      b. Fasten by welding, screw fastening, clinch fastening, or riveting according to delegated engineering. Wire tying of framing members is not permitted.
   2. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
   3. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
   4. Do not bridge building expansion and deflection joints with framing. Independently frame both sides of joints.
   5. Install insulation in built-up exterior framing members such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing Work.
   6. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

D. Steel Tracks: Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure at spacings not greater than 24 in (600 mm) on center using any of following:
   1. Anchor bolts.
   2. Expansion anchors.

3. Powder-actuated anchors.

E. Steel Studs: Fasten both flanges of studs to top and bottom track, unless otherwise indicated.
   1. 16 in (400 mm) maximum stud spacing, unless otherwise indicated.
   2. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
   3. Install supplementary framing, blocking, and bracing where required to support additional loads.

F. Isolation from Structure: Isolate framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install deflection tracks and anchor to building structure.
   2. Connect deflection clips to bypassing studs and anchor to building structure.

G. Headers: Install headers over wall openings wider than stud spacing. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
   1. Frame wall openings with not less than a double stud at each jamb of frame.
   2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Horizontal Bridging: Install horizontal bridging in stud system, spaced in rows not more than 54 in (1350 mm) apart. Fasten at each stud intersection.
   1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle.
   2. Deflection Track: Install row of bridging within 18 in (450 mm) of deflection track.

I. Miscellaneous Framing and Connections: Install stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide complete and stable framing.

J. Erection Tolerances: Install cold-formed metal framing plumb, level, accurately aligned, and located in reference to column lines and floor levels. Adjust Work to conform to tolerances indicated below. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   1. Maximum allowable tolerance variation of 1/8 in per 10 ft (3 mm per 3 m) (1:960).
   2. Space individual framing members no more than plus or minus 1/8 in (3 mm) from plan location.

## 3.05 FIELD QUALITY CONTROL

A. Owner’s Testing Agency Field Service: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor’s expense.

B. Field and shop welds will be subject to inspection and testing.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

## 3.06 ADJUSTMENTS

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel stud framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

**END OF SECTION**

**SECTION 05 52 13**
**PIPE AND TUBE RAILINGS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Wall mounted handrails.

B. Stair railings and guardrails.

C. Free-standing railings at steps.

D. Balcony railings and guardrails.

### 1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 05 51 00 - Metal Stairs: Attachment plates for handrails specified in this section.

C. Section 09 21 16 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.

D. Section 09 91 13 - Exterior Painting: Paint finish.

E. Section 09 91 23 - Interior Painting: Paint finish.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

C. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings 2000 (Reapproved 2006).

D. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.

E. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Metal Cable Infill: Stainless Steel cable and fittings.
   1. The Cable Connection; Ultra-tec:
   2. Feeney, Inc..
   3. Stainless Cable and Railing, Inc..
   4. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting or welding anchors.
   2. For anchorage to masonry, provide brackets to be embedded in masonry, for boltingor welding anchors.
   3. For anchorage to stud walls, provide backing plates, for bolting or welding anchors.

G. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

**2.03 STEEL RAILING SYSTEM**

A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, galvanized finish.

C. Cable at cable infill railings: Stainless Steel Type 316 with all necessary appurtenances for a complete installation. Refer to contract drawings for locations and details.

D. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

E. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

F. Exposed Fasteners: No exposed bolts or screws.

G. Straight Splice Connectors: Steel concealed spigots.

H. Galvanizing: In accordance with requirements of ASTM A123/A123M.
   1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.

I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

**2.04 FABRICATION**

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that field conditions are acceptable and are ready to receive work.

### 3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

### 3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with ADA Standards for accessible design at applicable locations.

D. Anchor railings securely to structure.

E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

### 3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

**END OF SECTION**

**SECTION 07 19 00**
**WATER REPELLENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Water repellents applied to exterior, masonry, stone, and concrete surfaces.

### 1.02 REFERENCE STANDARDS

A. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2023.

B. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete 2021.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

### 1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description and chemical composition.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.

D. Installer's Qualification Statement.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Water Repellent Material: Two gallons of type installed.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience

B. Owner reserves the right to provide continuous independent inspection of surface preparation and application of water repellent.

### 1.05 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Prepare representative surface 36 by 36 inches in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mock-up constitutes standard for workmanship.

C. Locate where directed.

D. Mock-up may remain as part of work.

### 1.06 FIELD CONDITIONS

A. Protect liquid materials from freezing.

B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

### 1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Silane, Siloxane, Silane-Siloxane Blend, and Siliconate Water Repellents:
   1. BASF Construction Chemicals:
   2. Concrete Sealers USA:

3. Pecora Corporation:
4. PROSOCO, Inc
5. Sherwin-Williams Company:
6. Tnemec Company, Inc:

**2.02 MATERIALS**

A. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
   1. Applications: Vertical surfaces and non-traffic horizontal surfaces.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify joint sealants are installed and cured.

C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

**3.02 PREPARATION**

A. Protection of Adjacent Work:
   1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
   2. Protect adjacent surfaces not intended to receive water repellent.

B. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.

C. Do not start work until masonry mortar substrate is cured a minimum of 60 days.

D. Remove loose particles and foreign matter.

E. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.

F. Scrub and rinse surfaces with water and let dry.

G. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

**3.03 APPLICATION**

A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.

B. Apply at rate recommended by manufacturer, continuously over entire surface.

C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

**END OF SECTION**

**SECTION 07 41 13**
**METAL ROOF PANELS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Metal roof panel system of preformed steel panels.

### 1.02 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Roof framing and purlins.

B. Section 07 92 00 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

### 1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.

D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.

E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2023.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

G. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference 2005 (Reapproved 2017).

H. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference 1995 (Reapproved 2018).

I. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems 2018.

J. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

E. Test Reports: Indicate compliance of metal roofing system to specified requirements.

F. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

**1.05 QUALITY ASSURANCE**

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

**1.06 MOCK-UPS**

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Provide mock-up of 100 sq ft, including associated flashings.

C. Locate as directed by Architect.

D. Mock-up may remain as part of the work.

**1.07 WARRANTY**

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Finish Warranty: Provide 5-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

C. Special Warranty: Provide 2-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

A. Architectural Metal Roof Panel Manufacturers:
   1. Berridge Manufacturing Company; R-Panel:
   2. Fabral; Hefti-Rib: www.fabral.com/#sle.
   3. MBCI; Perma-Clad Panel:

**2.02 PERFORMANCE REQUIREMENTS**

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Wind Uplift: per sructural requirements of project location and authority having jurisdiction
   4. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.

**2.03 METAL ROOF PANELS**

A. Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Metal Panels: Factory-formed panels with factory-applied finish.
   1. Steel Panels:
      a. Steel Thickness: Minimum 24 gauge, 0.024 inch.
   2. Texture: Smooth.
   3. Width: Maximum panel coverage of 24 inches.

## 2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

## 2.05 SECONDARY FRAMING

A. Miscellaneous Secondary Framing: Light gauge steel framing incidental to structural supports; fabricated from steel sheet.

B. Framing Material: ASTM A1011/A1011M Designation SS steel sheet.
   1. Profile: Manufacturer's standard cee, zee, asymmetrical zee, hat channel, plain channel, single slope eave strut, double slope eave strut, and angle.
   2. Thickness: 12 gauge, 0.1046 inch.
   3. Finish: Galvanized per ASTM A653/A653M, G90.

C. Framing Connectors: Factory-made formed steel sheet, ASTM A653/A653M SS Grade 50, with G60/Z180 hot dipped galvanized coating and factory punched holes.

## 2.06 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer’s standard line.

## 2.07 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

## 3.02 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.
   1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.

B. Accessories: Install necessary components that are required for complete roofing assembly..

C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions.

**END OF SECTION**

**SECTION 07 92 00**
**JOINT SEALANTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 07 13 00 - Sheet Waterproofing: Sealing cracks and joints in waterproofing substrate surfaces using materials specified in this section.

B. Section 09 22 16 - Non-Structural Metal Framing: Sealing between framing and adjacent construction.

C. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

### 1.03 REFERENCE STANDARDS

A. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants 2018 (Reapproved 2022).

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

C. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2023.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016 (Reapproved 2023).

E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.

F. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2022).

G. UL 263 - Standard for Fire Tests of Building Construction and Materials Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Certification by manufacturer indicating that product complies with specification requirements.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

### 1.05 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### 1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. Bostik Inc:
   2. Dow Chemical Company:
   3. Hilti, Inc:
   4. Pecora Corporation:
   5. Sika Corporation:
   6. Tremco Commercial Sealants & Waterproofing:
   7. W.R. Meadows, Inc:
   8. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between different exposed materials.
      c. Openings below ledge angles in masonry.
      d. Other joints indicated below.
   2. Do not seal the following types of joints.
      a. Intentional weepholes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.

### 2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

### 2.04 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   4. Color: To be selected by Architect from manufacturer's standard range.
   5. Cure Type: Single-component, neutral moisture curing.
   6. Manufacturers:
      a. Dow Chemical Company; 756 SMS Building Sealant:
      b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology):
      c. Sika Corporation; Sikasil WS-290:
      d. Tremco Commercial Sealants & Waterproofing; Spectrem 1:
      e. Substitutions: See Section 01 60 00 - Product Requirements.

B. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 25 percent, minimum.

2. Color: To be selected by Architect from manufacturer's standard range or match adjacent finished surfaces.
3. Cure Type: Single-component, neutral moisture curing
4. Service Temperature Range: Minus 65 to 180 degrees F.
5. Manufacturers:
    a. Dow Chemical Company; 758 Silicone Weather Barrier Sealant:
    b. Pecora Corporation:
    c. Sherwin-Williams Company; Silicone Rubber All Purpose Sealant:
    d. Sika Corporation; Sikasil GP:
    e. Substitutions: See Section 01 60 00 - Product Requirements.

C. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Manufacturers:
    a. Pecora Corporation:
    b. Sika Corporation; Sikasil GP:
    c. Substitutions: See Section 01 60 00 - Product Requirements.

D. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.
1. Color: White.
2. Manufacturers:
    a. DAP Products Inc; DYNAFLEX 800 Sealant:
    b. Substitutions: See Section 01 60 00 - Product Requirements.

E. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Color: To be selected by Architect from manufacturer's standard range or match adjacent finished surfaces.
3. Service Temperature Range: Minus 40 to 180 degrees F.
4. Manufacturers:
    a. Pecora Corporation; DynaFlex: www.pecora.com/#sle.
    b. The QUIKRETE Companies; QUIKRETE® Polyurethane Non-Sag Sealant:
    c. Sherwin-Williams Company; Stampede 2NS Polyurethane Sealant:
    d. Sika Corporation; Sikaflex-1a:
    e. Tremco Commercial Sealants & Waterproofing; Dymonic 100:
    f. W. R. Meadows, Inc; POURTHANE NS:
    g. Substitutions: See Section 01 60 00 - Product Requirements.

**2.05 ACCESSORIES**

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
3. Open Cell: 40 to 50 percent larger in diameter than joint width.
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

### 3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Concrete Slab Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

### 3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

### 3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

**END OF SECTION**

**SECTION 08 31 00**
**ACCESS DOORS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Wall-mounted access units.

### 1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware: Mortise cylinder and core hardware.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.

D. FM (AG) - FM Approval Guide Current Edition.

E. ITS (DIR) - Directory of Listed Products Current Edition.

F. UL (FRD) - Fire Resistance Directory Current Edition.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate exact position of each access door and/or panel unit.

C. Project Record Documents: Record actual locations of each access unit.

## PART 2 PRODUCTS

### 2.01 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units in Wet Areas:
   1. Location: As indicated on drawings.
   2. Panel Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
   3. Size: 16"w x 14"h
   4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   5. Masonry Mounting Criteria: Provide flush mounted frame with door surface flush with frame surface.

### 2.02 WALL-MOUNTED ACCESS UNITS

A. Manufacturers:
   1. ACUDOR Products Inc: www.acudor.com/#sle.
   2. Babcock-Davis:
   3. Best Access Doors:
   4. Cendrex, Inc
   5. Nystrom, Inc:

B. Wall-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
   1. Door Style: Single thickness with rolled or turned in edges.
   2. Heavy-Duty Frames: 14-gauge, 0.0747-inch minimum thickness.
   3. Heavy-Duty Single Steel Sheet Door Panels: 14-gauge, 0.0747-inch minimum thickness.
   4. Steel Finish: Primed.
   5. Primed and Factory Finish: Polyester powder coat; color _____.
   6. Hardware:

a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
b. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
c. Inside Latch Release: Mechanism that allows door/panel to be opened from inside.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

**END OF SECTION**

**SECTION 08 43 13**
**ALUMINUM-FRAMED STOREFRONTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Aluminum-framed storefront.

B. Infill panels of polycarbonate composition.

### 1.02 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Steel attachment members.

B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 08 80 00 - Glazing: Glass and glazing accessories.

### 1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site 2015.

B. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems 2014.

C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.

D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.

E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.

G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.

H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.

I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

### 1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, infill.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

### 1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Construct one mock-up, wher noted on drawings

C. Mock-up may remain as part of work.

### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

### 1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Aluminum-Framed Storefronts:
   1. Kawneer North America
   2. Tubelite, Inc:
   3. Trulite Glass & Aluminum Solutions, LLC:

### 2.02 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING

A. Center-Set Style:
   1. Basis of Design: Kawneer Tri-Fab Versa Glaze 4" deep x 1 3/4" sight-line,

### 2.03 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Finish: Superior performing organic coatings.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
   2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   3. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   4. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements
   1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
      a. Design Wind Loads: Comply with requirements of ASCE 7.

### 2.04 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections,
   1. Glazing Stops: Flush.

B. Glazing: Refer to drawings for 3Form Koda polycarbonate Panel designations.

C. Applied Muntins: Prefabricated simulated divided lite grid assembly with perimeter surround; designed to be adhered and fastened to storefront framing members and glazing.
   1. Material: Extruded aluminum.
   2. Profile: Manufacturer's standard, as detailed on drawings.

3. Finish: Same as storefront.

D. Infill Panels: 1/2" inch thick 3Form Koda polycarbonate panel..

**2.05 MATERIALS**

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209/B209M.

C. Fasteners: Stainless steel.

D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

**2.06 FINISHES**

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify dimensions, tolerances, and method of attachment with other work.

**3.02 INSTALLATION**

A. Install system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Install applied muntin grid assembly in accordance with manufacturer's instructions.

F. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

**3.03 FIELD QUALITY CONTROL**

A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

**3.04 CLEANING**

A. Remove protective material from pre-finished aluminum surfaces.

**END OF SECTION**

**SECTION 09 96 00**
**HIGH-PERFORMANCE COATINGS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. High performance coatings at all exposed structural steel and Architectural Exposed Structural Steel Framing.

B. Surface preparation.

### 1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting.

### 1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2023.

C. FS TT-P-28 - Coating, Heat Resisting 2021.

D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.

E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

F. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SCAQMD 1113 - Architectural Coatings 1977, with Amendment (2016).

H. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1 2016.

I. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual Volume 2 2021.

J. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals 2016.

K. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

L. SSPC-SP 5 - White Metal Blast Cleaning 2007.

M. SSPC-SP 6 - Commercial Blast Cleaning 2007.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.

C. Samples: Submit two samples 8 by 8 inch in size illustrating colors available for selection.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Maintenance Data: Include cleaning procedures and repair and patching techniques.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Coating Materials: 5 gallons of each type and color.

2. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.

**1.05 QUALITY ASSURANCE**

A. Maintain one copy of each referenced document that applies to application on site.

**1.06 MOCK-UPS**

A. See Section 01 40 00 - Quality Requirements for general requirements for mock-ups.

B. Provide mock-up truss section paint application 4feet long, illustrating coating.

C. Locate where directed.

D. Mock-up may remain as part of the work.

**1.07 DELIVERY, STORAGE, AND HANDLING**

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Coating Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

**1.08 FIELD CONDITIONS**

A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

B. Do not install materials when temperature is below 55 degrees F or above 90 degrees F.

C. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.

D. Restrict traffic from area where coating is being applied or is curing.

**1.09 WARRANTY**

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for bond to substrate.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

A. Only materials (primers, coatings, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project.

B. Provide high performance coating products from the same manufacturer.
   1. Substitution of a different high performance coating system using MPI-approved products by the same manufacturer will be considered.

C. High-Performance Coatings:
   1. Dow:
   2. PPG Paints:
   3. Sika Corporation:
   4. Sherwin-Williams Company:
   5. Tnemec Company, Inc:
   6. Substitutions: Section 01 60 00 - Product Requirements.

**2.02 HIGH-PERFORMANCE COATINGS**

A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in MPI Approved Products List.

B. Provide coating systems that meet the following minimum performance criteria, unless more stringent criteria are specified:
   1. NFPA 101, Class A rated.

C. Severe Exposure: All minimum criteria:

**2.03 TOP COAT MATERIALS**

A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.

B. Urethane Coating top coat over primer coat and epoxy second coat at Architectural Exposed Structural Steel arch way truss as shown on conract drawings.

C. Shellac: Pure, white type.

**2.04 PRIMERS**

A. Primers: Provide the following unless other primer is required or recommended by coating manufacturer.
   1. Anti-Corrosive for Metal, Epoxy; MPI #101.
      a. Products: Same manufacturer for entire coating system including primer, intermmediate coat and top coat.

**2.05 ACCESSORY MATERIALS**

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Do not begin application of coatings until substrates have been properly prepared.

C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.

D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

E. Test shop-applied primer for compatibility with subsequent cover materials.

**3.02 PREPARATION**

A. Clean surfaces of loose foreign matter.

B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.

C. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.

**3.03 PRIMING**

A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

## 3.04 COATING APPLICATION

A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in MPI - Architectural Painting and Specification Manual.

B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

## 3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for general requirements for field inspection.

B. Owner will provide field inspection.

C. Dry Film Thickness Testing: Owner will engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
   1. Touch up and restore coated surfaces damaged by testing.
   2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, and specified thickness, Contractor shall pay for retesting and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations, and specified thickness.

## 3.06 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

## 3.07 PROTECTION

A. Protect finished work from damage.

**END OF SECTION**

**SECTION 10 14 16**
**PLAQUES (ALLOWANCE)**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Plaques.

### 1.02 PRICE AND PAYMENT PROCEDURES

A. Allowances:
   1. See Section 01 21 00 - Allowances for cash allowances affecting this section.
   2. Include cash allowance for purchase and delivery but not installation.

### 1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's product literature for each type of plaque sign, indicating style, font, foreground and background colors, locations, and overall dimensions of each sign.

C. Shop Drawings: Indicate dimensions, locations, elevations, materials, text and graphic layout, and attachment details.

## PART 2 PRODUCTS

### 2.01 PLAQUES

A. Metal Plaques:
   1. Material: Bronze casting.
   2. Material Thickness: 1/8 inch, minimum.
   3. Size: As shown on contract drawings..
   4. Text and Typeface:
      a. Character Font: Helvetica, Arial, or other sans serif font. To be selected.
      b. Character Case: Upper and lower case (title case).
      c. Character Color: Contrast with background color. To be selected.
   5. Protective Coating: Manufacturer's standard clear coating.
   6. Mounting: Exposed stainless steel tamperproof fasteners as shown on contract drawings..

### 2.02 ACCESSORIES

A. Exposed Screws: Stainless steel.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

### 3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install with horizontal edges level.

C. Protect from damage; repair or replace damaged items.

**END OF SECTION**

**SECTION 10 14 19**
**DIMENSIONAL LETTER SIGNAGE (ALLOWANCE)**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Dimensional letter signage.

### 1.02 PRICE AND PAYMENT PROCEDURES

A. Allowances:
   1. See Section 01 21 00 - Allowances for cash allowances affecting this section.
   2. Include cash allowance for purchase, delivery, and installation.

### 1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. UL 879 - Electric Sign Components Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's product literature for each type of dimensional letter sign, indicating style, font, colors, locations, and overall dimensions of each sign.

C. Shop Drawings:
   1. Include dimensions, locations, elevations, materials, text and graphic layout, and attachment details.
   2. Show locations of electrical service connections.
   3. Include diagrams for power, signal, and control wiring.

D. Samples: Submit one sample of each type of dimensional letter sign of size similar to that required for project, indicating sign style, font, and method of attachment.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Package dimensional letter signs as required to prevent damage before installation.

B. Store under cover and elevated above grade.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS: TO BE DETERMINED.

### 2.02 DIMENSIONAL LETTERS

A. Applications:
   1. Use individual metal letters.
   2. Mounting Location: Exterior as indicated on drawings.

B. Metal Letters:
   1. Material: Stainless steel sheet, formed.
   2. Thickness: Manufacturer's standard for letter size.
   3. Letter Height: To be determined.
   4. Text and Typeface: To be determined.
   5. Finish: To be determined..
   6. Mounting: To be determined..

### 2.03 ACCESSORIES

A. Concealed Screws: Noncorroding metal; stainless steel.

B. Exposed Screws: Stainless steel.

C. Electrical Components and Devices: Listed and labeled as defined in NFPA 70 by a qualified testing agency.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that electrical service is correctly sized and located to accommodate dimensional letter signs.

C. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

### 3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

**END OF SECTION**

**SECTION 13 31 00**
**FABRIC STRUCTURES ALTERNATE NUMBER ONE**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Tensile membrane structures.

B. Tensile membranes.

C. Flexible structural elements.

### 1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 05 12 00 - Structural Steel Framing.

### 1.03 ABBREVIATIONS AND ACRONYMS

A. HDPE: High-density polyethylene.

### 1.04 DEFINITIONS

A. See ASCE 55 for definitions of terms used in this section.

### 1.05 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASCE 55 - Tensile Membrane Structures 2016.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.

E. ASTM A586 - Standard Specification for Metallic-Coated Parallel and Helical Steel Wire Structural Strand 2018.

F. ASTM A603 - Standard Specification for Metallic-Coated Steel Structural Wire Rope 2019.

G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.

H. ASTM D751 - Standard Test Methods for Coated Fabrics 2019.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

J. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.

K. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.

L. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs 2022.

M. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2023, with Errata.

### 1.06 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct meeting two weeks prior to commencing work of this section.
   1. Require attendance of parties directly affecting work of this section, including:
      a. Applicable subcontractors.
      b. Contractor.
      c. Membrane manufacturer field representative.
      d. Architect.
      e. Structural engineer.

f. Inspection and testing agency representative.

2. Review erection drawings, sequence, schedule, and procedures; tensile membrane handling, preparation, installation, and protection requirements, and coordination with related structural work.

## 1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For tensile membranes and flexible structural elements.

C. Shop Drawings:
1. Signed and sealed by Engineer of Record responsible for design of fabric structures.
2. Details: Include connections, anchorages, and bearing supports.

D. Erection Drawings:
1. Indicate erection plan for tensile membrane structure installation activity; include detailed sequence or work and procedures that ensure structural integrity of tensile membrane structure during erection.

E. Samples: For each membrane type, two samples, 12 inches by 12 inches in size, indicating specified color.

F. Test Reports: Indicate compliance with specified requirements for tensile membranes.

G. Designer's qualification statement.

H. Operating and Maintenance Data: Manufacturer's instructions for routine inspections, emergency repairs, and use of emergency repair materials; include repairing flexible structural elements and cleaning tensile membranes.

I. Executed warranty.

J. Project Record Documents: Indicate actual locations of connectors and repairs.

## 1.08 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located; with at least three years of documented experience.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

C. Erector Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

## 1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store products under cover, elevated above grade, and in dry, well-ventilated areas not exposed to heat or sunlight.

C. Handle fabric in accordance with manufacturer's instructions.
1. Use care in handling tensile membranes to avoid damage fabric and coating.
2. Do not damage, crush, or kink cables.

## 1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 15-year manufacturer warranty for tensile membranes and perimeter attachment system elements. Complete forms in Owner's name and register with manufacturer.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Tensile Membrane Structures:

B. USA Shade

C. Birdair, Inc: www.birdair.com.

D. Membrane Structures, Inc:

E. Tension Structures, a division of Eide Industries Inc:
   1. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 TENSILE MEMBRANE STRUCTURES

A. Tensile membrane structures consisting of tensioned membranes stretched over flexible and nonflexible structural support elements.
   1. Provide smooth uniform membrane surface with even-curved edges and interfaces; without wrinkles, cuts, abrasions, stains, marks, surface defects, or seaming aberrations.
   2. Configuration as indicated on drawings.

### 2.03 STRUCTURAL DESIGN CRITERIA

A. Comply with requirements for contractor's design-related professional design services; see Section 01 40 00 - Quality Requirements.

B. Design and install tensile membrane structures in accordance with ASCE 55. Determine loads in accordance with ASCE 7, except as modified by ASCE 55. Include provision for loads imposed on tensile membrane structures during erection and dismantling.

### 2.04 FIRE-RESISTANCE CRITERIA

A. Combustibility Testing: Noncombustible when tested in accordance with ASTM E136.

B. Flame Propagation: Complying with NFPA 701, test method 1 or 2.

C. Intermittent Flaming: Class A, when tested in accordance with ASTM E108.

D. Surface Burning Characteristics: Flame spread index of 75 or less and smoke developed index of 450 or less; when tested in accordance with ASTM E84.

### 2.05 TENSILE MEMBRANES

A. High-Density Polyethylene (HDPE) Membranes.
   1. Color: As selected from manufacturer's standard selection.

### 2.06 FLEXIBLE STRUCTURAL ELEMENTS

A. Cables, Fittings, and Anchorages:
   1. Structural Stainless Steel Cables: ASTM A666, Type 304 or Type 316.
   2. Cables in Contact with Tensile Membranes: PVC-sleeved.
   3. Cable Length Tolerance: As indicated on drawings.
   4. Swaged End Fittings, Pins, Nuts, and Washers: Electrogalvanized steel.
   5. Fasteners in Membrane Clamping Systems: Stainless steel.

B. Shackles, Rigging Screws, Clamps, and Tensioning Hardware:
   1. Stainless steel, ASTM A666, Type 304 or Type 316.

### 2.07 NONFLEXIBLE STRUCTURAL ELEMENTS

A. Concrete Foundations: See Section 03 30 00, and structural drawings.

B. Structural Steel Support Elements: See Section 05 12 00, and structural drawings.

### 2.08 FABRICATION

A. Fabricate tensile membrane structures and flexible structural elements in accordance with fabrication requirements of ASCE 55.

## 2.09 ACCESSORIES

A. Anchorage Devices: Provide anchorage devices and mechanical fasteners for securing tensile membranes and flexible structural elements to in-place construction as determined by the Structural Engineer of Record for design of tensile membrane structure.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Examine area to receive flexible structural elements and tensile membrane; notify Architect if area is not acceptable and do not begin installation until unacceptable conditions have been corrected.

B. Examine foundations and anchor bolts for location and elevation; notify Architect of inaccuracies, and do not begin installation until unacceptable conditions have been corrected.

## 3.02 ERECTION

A. Erect tensile membrane structures and flexible structural elements in accordance with erection requirements of ASCE 55.

B. Comply with approved erection plan.

C. Comply with approved erection plan.

D. Do not undertake erection of tensile membranes during inclement weather conditions; installer has sole responsibility to determine when conditions are safe for erection.

E. Install tensile membranes and flexible structural elements in accordance with manufacturer's instructions.
   1. Install to avoid damage to tensile membranes.
   2. Ensure tensile membranes surfaces are smooth, uniform, and clean, with even-curved edges and interfaces, and with no cuts, scratches, abrasions, stains, marks, blemishes, or welding irregularities.

## 3.03 REPAIR

A. Inspect tensile membranes and flexible structural elements.

B. Repair or replace defective or damaged materials as directed by Architect.

## 3.04 ADJUSTING

A. Make final adjustments to tensile membranes and flexible structural elements as required for structural integrity, and in accordance with shapes and configuration indicated on drawings.

## 3.05 CLEANING

A. Clean and touchup flexible structural elements in accordance with manufacturer's field repair recommendations.

## 3.06 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals for additional submittals.

B. See Section 01 79 00 - Demonstration and Training for additional requirements.

**END OF SECTION**

**SECTION 26 05 19**
**WIRES AND CABLES**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Wire and cable.
   2. Wiring connectors and connections.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

### REFERENCES

A. National Fire Protection Association (NFPA):
   1. ANSI/NFPA 70 - National Electrical Code.

B. Regulatory requirements:
   1. Conform to requirements of ANSI/NFPA 70.

### PROJECT CONDITIONS

A. Routing shown on Drawings is diagrammatic only. Determine exact routing and lengths required.

B. Determine required separation between cable and other work.

C. Determine cable routing to avoid interference with other work.

## PART 2 PRODUCTS

### 4.01 WIRE AND CABLE

1. Description: Single conductor insulated wire.
2. Conductor: Copper.
3. Insulation Voltage Rating: 600 Volts.
4. Insulation: ANSI/NFPA 70, Type THHN/THWN
5. Insulation Temperature Rating 90 degrees C.

B. UL Listed. Minimum size #12 for power circuits, homeruns to panels from rooms shall be minimum #10.

## PART 3 EXECUTION

### 5.01 GROUPING OF CONDUCTORS

A. Provide dedicated neutral with any new hot conductor.

B. Mixing of conductors from different voltage classes is prohibited.

### INSTALLATION

A. Swab raceway before installing wire.

B. Install products in accordance with manufacturer’s instructions.

C. Use stranded conductors for control circuits and final connections to all vibration equipment.

D. Use #10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

E. Use #10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

F. Pull all conductors into raceway at same time.

G. Protect cable from damage.

H. Clean conductor surfaces before installing lugs and connectors.

I. Make splices, taps, and terminations to carry full ampacity of conductors.

J. Use only compression connectors for copper conductor splices and taps, #6 AWG and larger.

K. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, #8 AWG and smaller 90 degrees C rated.

L. Inspect wire and cable for physical damage and proper connection.

M. Verify continuity of each branch circuit conductor.

N. Install a properly sized grounding conductor in all raceways containing power circuits.

O. Comply with the following color code or as required by local authority:

**208Y/120 VOLT SYSTEM**

**PHASE A - BLACK**

**PHASE B - RED**

**PHASE C - BLUE.**

**NEUTRAL - WHITE.**

**EQUIPMENT GROUND - GREEN.**

**480Y/277 VOLT SYSTEM**

**PHASE A - BROWN**

**PHASE B - ORANGE.**

**PHASE C - YELLOW**

**NEUTRAL - GREY.**

**EQUIPMENT GROUND – GREEN.**

A. Electrical Tests:
   1. Perform insulation resistance test on each feeder and branch circuit conductor with respect to ground and adjacent conductors. Applied potential: 1000 volts dc for 1 minute.
   2. Perform continuity test to insure proper cable connection.
   3. Minimum insulation resistance values: two megohms.

**END OF SECTION**

**SECTION 26 05 33**
**RACEWAY SYSTEMS**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Conduits, cable trays, ducts, boxes, etc.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

### REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
   2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
   3. ANSI C80.5 - Rigid Aluminum Conduit.

B. National Electrical Contractors Association (NECA):
   1. NECA "Standard of Installation."

C. National Electrical Manufacturers Association (NEMA):
   1. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
   2. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   3. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
   4. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

D. National Fire Protection Association (NFPA):
   1. ANSI/NFPA 70 - National Electrical Code.

E. Design Requirements
   1. ANSI/NFPA 70 (N.E.C.), unless noted otherwise on the Drawings.
   2. Furnish products listed and classified by Underwriters Laboratories, Inc.

### PROJECT CONDITIONS

A. Routing shown on drawings is diagrammatic only, determine exact routing and lengths required.

## PART 2 PRODUCTS

### 4.01 CONDUIT REQUIREMENTS

A. Minimum size conduit as follows:
   1. 1/2" for power and branch circuit wiring, unless noted otherwise on the Drawings.
   2. 3/4" for telephone and data, unless noted otherwise.
   3. 3/4" for all below grade/in-slab conduit.

B. Install in accordance with the following schedule
   1. In all concrete: Galvanized rigid steel (GRC) or Schedule 40 PVC as noted. Coat metallic conduit with polyvinyl polyethylene or asphalt application.
   2. Above suspended ceilings: electrical metallic tubing (EMT).
   3. In metal stud walls: electrical metallic tubing (EMT).
   4. In exposed locations indoors: Galvanized rigid steel (GRC), intermediate grade rigid steel (IMC), electrical metallic tubing (EMT). Exceptions noted on the Drawings or where prohibited by codes.
      a. Conduit in earth (no encasement): Galvanized rigid steel (GRC) or Schedule 40 PVC as noted. Coat metallic conduit with polyvinyl polyethylene or hot asphalt application.
      b. In classified areas: GRC with seals as required.
      c. MC cable may be used only where all of the following conditions are met:

5. a. final connections to fixtures and equipment
6. b. restricted to 5 feet maximum length
7. c. areas concealed from public view
8. d. areas where EMT would be acceptable.

**FITTINGS**

A. Use insulated throat connector fittings listed for the raceway on which they are used.

**CONDUIT STRAPS AND HANGERS**

A. Two (2) hole push on stamped steel straps. Use on surface areas such as concrete, masonry, wide flange beams, columns and wood.

B. Where conduits are grouped together, use trapeze hangers consisting of all thread rods sized as required 1/2" x 1-7/8" (12 gauge) with single bolt channel pipe straps and rolled strut.

**EXPANSION AND SEAL-OFF FITTINGS**

**EXPANSION FITTINGS IN CONDUITS WHERE SHOWN ON THE DRAWINGS OR WHERE REQUIRED TO PASS THROUGH EXPANSION JOINTS EMBEDDED IN CONCRETE.**

**SEALS AT ALL FREEZER/COOLER PENETRATIONS.**

**SEALS AT ALL CLASSIFIED AREAS.**

**CONDUIT**

1. Rigid Galvanized Steel Conduit (GRC): ANSI C801. UL6.
2. Intermediate Metal Conduit (IMC): UL1242.
3. Flexible Metal Conduit: Interlocked steel and aluminum construction.
4. Nonmetallic Conduit NEMA TC 2: Schedule 40 PVC.

B. Liquidtight Flexible Metal Conduit: Interlocked steel and aluminum construction with PVC jacket.

C. Electrical Metallic Tubing (EMT): ANSI C80.3.

**OUTLET BOXES**

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported.
   2. Receptacle and Switch Boxes – sized for the appropriate number of conductors.

B. Cast Boxes: NEMA FB 1, Type FD. Provide gasketed cover by box manufacturer. Provide threaded hubs.

**PULL AND JUNCTION BOXES**

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

**PART 3 EXECUTION**

**14.01 INSTALLATION**

A. Install all raceway in accordance with manufacturer's instructions.

B. Size all raceway in accordance with NEC.

C. Group related conduits; support using conduit rack. Construct rack using approved steel channel.

D. Do not support conduit with wire or perforated pipe straps in any type structure. Remove wire used for temporary supports. Steel tie wire may be used to anchor conduit down to reinforcing rods in concrete encasement only. Do not attach conduit to ceiling support wires.

E. Arrange conduit to maintain headroom and present neat appearance. Route all conduit whether exposed or concealed parallel and perpendicular to walls, ceilings, building structures, etc. Maintain adequate clearance between conduit and piping. Cut conduit square; de-burr cut ends and ream. Bring conduit to shoulder of fittings; fasten securely

F. Use conduit hubs or locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

G. Use conduit bodies to make sharp changes in direction. Telephone and computer system conduit bends shall not exceed three (3) 90 degree turns prior to installing pull box. Comply with NFPA 70 on all bends. Make conduit bends only with bending tools.

H. Avoid moisture traps; provide junction box at low points in conduit system.

I. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.

J. Provide suitable nylon pull string in each conduit except sleeves and nipples.

K. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

L. Ground and bond conduit.

M. Install knockout closures in unused box openings.

N. Support boxes independently of conduit.

O. Cap all upturned conduits during construction rough-in to prevent moisture or debris from entering. Swab to remove any and all moisture.

P. Support conduits as required by NFPA 70 (N.E.C.)

Q. Install conduit to preserve fire resistance rating of partitions and other elements with appropriately rated firestopping materials. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation. Complete installation of all raceway prior to painting of area. Any raceway installed after painted must be painted to match with the same paint to the satisfaction of the owner. All cable and wiring installed must be concealed in raceway or in cable tray so as not to be visible in public areas. Any cable or wire found visible in public spaces at final inspection shall be concealed to the satisfaction of the Owner.

**END OF SECTION**

# SECTION 26 20 01
# SERVICE AND DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Service entrance switchboard and associated items of equipment and panelboards.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

A. Work under this Section shall comply with the following:
   1. Latest edition of the National Electrical Code (NFPA-70), and interim amendments in effect. Comply with local and state, utility regulations and laws.

1.3 SYSTEM DESCRIPTION

A. Electrical System Voltages: As indicated on drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Items of electrical distribution system, including switchboards, panelboards, safety switches, etc. manufactured by one of the following, unless otherwise indicated on Drawings.
   1. General Electric.
   2. Square D.
   3. Siemens
   4. Eaton

B. Equipment will bear name and trademark of manufacturer as listed above.

2.2 SERVICE ENTRANCE EQUIPMENT

A. In general, service entrance equipment will be as indicated and/or scheduled on Drawings. Service entrance equipment will be U.L. labeled as suitable for use as service equipment. Coordinate interrupting rating with utilities available fault current level.

B. Install service entrance rated switchboard assembly as indicated on Drawings. Configure switchboard as scheduled on Drawings, including voltage, amperage, bus bracing and interrupting ratings. Install main lugs only (MLO), main circuit breaker

(MCB), or main fusible switch (MFS) and branch devices as indicated on Schedule. Switchboard will be of same manufacturer as downstream distribution equipment.

C. Equip main fusible switches or fusible switch type branch devices with rejection type fuse holders and current limiting fuses.

2.3 PANELBOARDS

A. Panelboards: Install as scheduled on Drawings, including voltage, amperage, bus bracing, and interrupting ratings.
   1. Main lugs only (MLO), main circuit breaker (MCB), or main fusible switch (MFS) panelboard and branch devices as indicated on Schedule. NEMA PB1, Tin plated aluminum or copper.
   2. Branch Circuit Protective Devices: Bolted type thermal magnetic center-trip circuit breakers for alternating current, each with single-handle common trip. Tandem or half-sized circuit breakers or load center type construction not permitted. Circuit breaker Amp Interrupting Capacity (AIC) no less than values indicated on Drawings.
   3. Cabinets: Zinc-coated sheet steel with knock-outs, UL listed and labeled. Trims and doors to have manufacturer's standard color. Trims to be fitted with hinged doors having combined lock and latch. Locks will be keyed alike and furnished with two keys for each panelboard.
   4. Directory Holder: Provide typewritten circuit directory identifying load(s) on each circuit under clear plastic cover.

2.4 ENCLOSED SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class R fuses.

B. Nonfusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

2.5 CONTACTORS

A. Description: NEMA ICS 2, AC general purpose magnetic contactor. Coil Voltage: 120 volts, 60 Hertz or as required by control systems. Poles: As required. Size: As required. Enclosure: Appropriate for the environment, NEMA 1 minimum. Contact Rating: 20 amperes.

B. Accessories required:
   1. Selector Switch in cover: ON/OFF/AUTOMATIC.
   2. Indicating Light: RED.
   3. Auxiliary Contacts: Two normally open field convertible.

2.6 MOTOR STARTERS

A. Magnetic Motor Controllers: NEMA, AC general-purpose Class A magnetic controller for induction motors rated in horsepower. Coil operating voltage: Compatible with the control system or 120V if no remote control is required. Overload Relay: NEMA ICS; melting alloy. Enclosure: NEMA 1. Auxiliary Contacts: 2 each normally open and closed field convertible contacts in addition to seal-in contact. Cover mounted pilot devices. Pushbuttons: Unguarded. Size starter and overloads appropriate for the load served. Provide in face H-O-A switch, indicating lights, and pushbutton on/off switches.

2.7 FUSES

A. Manufacturers: Bussman, Gould-Shawmet

B. Description: Dual element, current limiting, time delay, 250 or 600 volt as required, UL 198E, Class RK 1.

C. Interrupting Rating: 200,000 rms amperes.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install materials in accordance with manufacturer's recommendations, power company requirements, and as indicated on Drawings.

B. Install service in accordance with utility company's requirements, necessary to provide complete electric service as indicated on Drawings.

C. Required items include, but are not limited to, trenching and backfilling, primary and secondary conduits, service conductors (including primary conductors where required), C.T. cabinet, bussed enclosure, other associated metering hardware, and grounding system per local utility or codes.

D. Perform Work in strict compliance with local utility's requirements, with any applicable local codes and latest edition of NFPA 70.

E. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure or support from structure. Provide flexible conduit for the last two feet of conduit connections to transformers.

F. Install panelboards in accordance with NEMA PB 1.1. Height: 6 ft to top of panelboard; install panelboards taller than 6 ft with bottom no more than 4 inches above floor. Top breaker maximum height not to exceed 6’-8".

H. Provide filler plates for unused spaces in panelboards.

I. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads. The branch circuit directory shall clearly indicate load served.

J. Tighten accessible bus connections and mechanical fasteners after placing switchboard. Tighten bolted bus connections in accordance with manufacturer's instructions.

L. Adjust circuit breaker trip and time delay settings as required.

M. Install disconnect switches and fuses where indicated on drawings or where required by equipment and NFPA 70.

N. Provide permanent label on inside door of each switch indicating UL fuse class and size for replacement.

O. Install enclosed controllers where indicated, and in accordance with manufacturer's instructions.

P. Height: 5 ft to operating handle.

R. Select Motor overload elements in motor controllers to match installed motor characteristics.

S. Provide engraved plastic nameplates on all panelboards indicating name; and on all disconnects, starters, etc. indicating load name.

T. Provide neatly typed permanent label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

END OF SECTION 26 20 00

**SECTION 26 20 01**
**SERVICE AND DISTRIBUTION**

A.

**1.02**

A.

1.

B.

**1.03**

A.

1.

**1.04**

A.

B.

**1.05**

A.

1.
2.
3.
4.

B.

**1.06**

A.

B.

C.

**1.07**

A.

1.
2.
3.
4.

**1.08**

A.

B.

**1.09**

A.

B.

1.
2.
3.

**1.10**

A.

**1.11**

A.

B.

C.

D.

**1.12**

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

K.

L.

M.

N.

O.

P.

Q.

**SECTION 26 27 26**
**WIRING DEVICES**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Wall switches.
   2. Receptacles.
   3. Device plates and box covers.
   4. Photocells.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

### REFERENCES

A. National Electrical Contractors Association (NECA):
   1. NECA - Standard of Installation.

B. National Electrical Manufacturers Association (NEMA):
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

C. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories, Inc. (UL):

E. Regulatory Requirements:
   1. Conform to requirements of NFPA 70, Underwriters Laboratories.
   2. Provide Products listed and classified by Underwriters Laboratories, Inc.

## PART 2 PRODUCTS

### 3.01 MANUFACTURERS

A. Hubbell, GE, Leviton, Pass and Seymor, Tork, Intermatic

### MATERIALS

A. Color: Gray or as required by Architect. All devices commercial grade.

B. Receptacles shall be 3 wire, grounding type, side and backwired, 20A, 125V. Ground-fault receptacles shall have feed-through. Isolated ground receptacles shall be orange. All receptacles for circuits other than 125V shall be standard NEMA configuration.

C. Switches shall be 20A, 120-277V, snap type. Switches used for mechanical equipment shall have pilot lights.

D. Cover plates shall be stainless steel in all areas. Cover plates shall be jumbo/oversize style for devices mounted in CMU walls. Weatherproof where exposed to elements. Weatherproof covers shall be self-closing flip style.

E. Receptacles shall be tamper resistant style.

## PART 3 EXECUTION

### 5.01 EXAMINATION

A. Verification of existing conditions prior to beginning work.

B. Verify that outlet boxes are installed at proper height.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

**INSTALLATION**

A. Install in accordance with NECA "Standard of Installation."

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install receptacles with grounding pole on bottom.

E. Interface with other work:
   1. Coordinate locations of outlet boxes to obtain appropriate mounting heights. Work to relocate boxes will be performed at no cost to the owner where boxes were not coordinated prior to rough-in.
   2. Install wall switch 48 inches center line above finished floor.
   3. Install convenience receptacle 16 inches center line above finished floor unless noted.

F. Clean exposed surfaces to remove splatters and restore finish.

G. Operate/test that all devices are energized and work properly.

H. Clean all devices.

**END OF SECTION**

**SECTION 26 52 00**
**LUMINAIRES**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Luminaires and accessories.
   2. Emergency lighting units.
   3. Exit signs.
   4. Ballasts.
   5. Lamps.
   6. Luminaire accessories.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

### 1.02 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.
   2. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.
   3. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps

B. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electrical Code.
   2. NFPA 101 - Life Safety Code.
   3. SUBMITTALS
      a. Provide factory cutsheets including photometric data for fixtures. All cutsheets shall be labeled with fixture designation.
      b. Provide factory cutsheet including energy performance for ballasts.
      c. Provide factory cutsheet for all lamps.

## PART 2 PRODUCTS

### 2.01 LUMINAIRES

A. Fixtures are scheduled based on one manufacturer. Alternate fixtures are acceptable only if approved by architect.

### 2.02 BALLASTS

A. Manufacturers:
   1. Motorola.
      a. Advance.
      b. General Electric.

B. Ballasts shall include a three year warrantee.
   a. Ballast shall provide Independent Lamp Operation for Instant Start ballast allowing remaining lamp(s) to maintain full light output when one or more lamps fail.
   b. Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.
   c. Ballast shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency). GOPA ballasts shall operate from an input source of 347V.
   d. Ballast shall be high frequency electronic type and operate lamps at a frequency between 42 kHz and 52 kHz to avoid interference with infrared devices, eliminate visible flicker and avoid Article Surveillance System, such as anti-theft devices.
   e. Ballast shall have a Power Factor greater than 0.98 for primary lamp.

f. Ballast shall have a minimum ballast factor for primary lamp application as follows: 0.77 for Low Watt, 0.87 for Normal Light Output, and 1.18 for High Light for Instant Start ballasts or 0.71 for Low Watt and 0.88 for Normal Light Output for Programmed Start ballasts.
g. Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.
h. Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.
i. Ballast shall have a Class A sound rating for all 4-foot lamps and smaller.
j. Ballast shall have a minimum starting temperature of -29C (-20F) on Instant Start ballasts.
k. Ballast shall not contain any Polychlorinated Biphenyl (PCB).
l. Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.
m. Ballast shall comply with ANSI C62.41 Category A for Transient protection.
n. Ballast shall comply with ANSI C82.11 where applicable.
o. All ballasts for tube lamp fluorescent fixtures shall have integral disconnect means.

**LAMPS**

A. Lamp Manufacturers:
   1. General Electric.
   2. Sylvania.
   3. Phillips

**3.02 BATTERIES**

A. Exit lights shall have 90 minute battery back-ups with test buttons. Other fixtures serving as emergency lights shall be provided with 90 minute battery back-ups. Fixtures shall be powered by the battery when normal power is off.

**PART 3 EXECUTION**

**4.01 INSTALLATION**

A. Install suspended luminaires and exit luminaire signs using pendants supported from swivel hangers or in accordance with details shown on drawings. Provide pendant length required to suspend luminaire at indicated height.

B. Install surface mounted luminaires and exit luminaire signs plumb and adjust to align with building lines and with each other. Secure to prevent movement. Mount exit signs to flush box.

C. Install in accordance with manufacturer's requirements to obtain a complete operational lighting system.

D. Install exit luminaire signs at height required by local authority.

E. Aim and adjust luminaires as directed by owner and local authority.

F. Position exit luminaire sign directional arrows as required by local authority.

G. Clean photometric control surfaces.

H. Clean finishes and touch up damage.

I. Relamp luminaires that have failed lamps at Substantial Completion.

**END OF SECTION**

# SECTION 31 10 00
# CU STRUCTURAL SOIL SPECIFICATIONS

## PART 1 - GENERAL

A. The work of this section consists of all Structural Soil work and related items as indicated on the drawings or as specified herein and includes, but is not limited to, the following:

CU-Soil™ is a proprietary material patented by Cornell University (US Patent #5,849,069)

B. and marketed under the registered trademark, CU-Structural Soil®. Only licensed companies are authorized to produce this material, meeting the specifications described in this text. For a list of licensed CU-Soil™ producers, call Tim Shanahan, Minick Materials, LLC. 405-834-8280 or 405-789-2068.

## PART 2 - REFERENCES AND STANDARDS

A. The following references are used herein and shall mean:

ASTM: American Society of Testing Materials
USDA: United States Department of Agriculture
AASHTO: American Association of State Highway and Transportation Officials
Standard Specifications: Regional or Municipal Standard Specifications
Documentation for the location of proposed usage
AOAC: Association of Official Agricultural Chemists

## PART 3 - SAMPLES AND SUBMITTALS

A. At least 30 days prior to ordering materials, the installing contractor shall submit to the engineer representative samples, certificates, manufacturer's literature and test results for materials specified below. No materials shall be ordered until the required samples, certificates, manufacturer's literature, producer's current license and test results have been reviewed and approved by the landscape architect and/or engineer. The engineer reserves the right to reject any material that does not meet CU-Structural Soil® specifications. Delivered materials shall closely match the approved samples.

B. Submit from licensed producer, $^1/_2$ cubic foot representative sample of clay loam, one cubic foot representative sample of crushed stone, and one cubic foot representative sample of CU-Structural Soil® mix for approval. In the event of multiple source fields for clay loam, submit a minimum of one set of samples per source field or stockpile. The samples of all clay loam, crushed stone, and CU-Structural Soil® shall be submitted to the engineer as a record of the soil color and texture.

C. Submit soil test analysis reports for sample of clay loam from an independent soil-testing laboratory. The testing laboratory for particle size and chemical analysis may

include a public agricultural extension service agency.

1. Submit a mechanical analysis of the clay loam sample and particle size analysis including the following gradient of mineral content:

| USDA Designation | Size in mm. |
|---|---|
| Gravel | +2 mm |
| Sand | 0.05 – 2 mm |
| Silt | 0.002-0.05 mm |
| Clay | minus 0.002 mm |

Sieve analysis shall be performed and compared to USDA Soil Classification System.

Sieve analysis shall be done by a combined hydrometer and wet sieving using sodium hexametaphosphate as a dispersant in compliance with ASTM D422 after destruction of organic matter by hydrogen peroxide.

2. Submit a chemical analysis, performed in accordance with current AOAC Standards, including the following:
   a. pH and buffer pH.
   b. Percent organic matter as determined by the loss of ignition of oven dried samples. Test samples shall be oven dried to a constant weight at a temperature of 230 degrees F, plus or minus 9 degrees.
   c. Analysis for nutrient levels by parts per million.
   d. Soluble salt by electrical conductivity of a 1:2 soil/water sample measured in Millimho per cm.
   e. Cation Exchange Capacity (CEC).
   f. Carbon/Nitrogen Ratio.

D. Submit one cubic foot sample of crushed stone which will be used in production of CU-Soil™.

1. Provide particle size analysis:

| USDA Designation | Size in mm. |
|---|---|
| 3″ | +76 mm |
| $2^1/_2$″ | 63-76 mm |
| 2″ | 50-63 mm |
| $1^1/_2$″ | 37-50 mm |
| 1″ | 25-37 mm |
| ¾″ | 19-25 mm |
| Fine gravel | 2-19 mm |

2. Provide the manufacturers analysis of the loose and rodded unit weight
3. Losses from LA Abrasion tests- not to exceed 40%
4. Minimum 90% with 2 or more fractured faces

5. Percent pore space analysis

E. At the engineer's discretion, the sample of CU-Structural Soil® may be tested for the following:

1. Compaction in accordance with ASTM D698/AASHTO T99 without removing oversize aggregate
2. California Bearing Ratio in accordance with ASTM D1883- soaked CBR shall equal or exceed a value of 50
3. Measured dry-weight percentage of stone in the mixture

F. The approved CU-Structural Soil® sample shall be the standard.

G. Any deviation from the specified crushed stone and clay loam specifications shall be approved by Amereq, Inc.

## PART 4 - DELIVERY, STORAGE AND HANDLING

A. Delivered CU-Structural Soil® shall be at or near optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698) and should not be placed in frozen, wet or muddy sites.

B. Protect CU-Structural Soil® from exposure to excess water and from erosion at all times. Do not store CU-Soil™ unprotected. Do not allow excess water to enter site prior to compaction. If water is introduced into the CU-Soil™ after grading, allow water to drain to optimum compaction moisture content.

## PART 5 - EXAMINATION OF CONDITIONS

A. All areas to receive CU-Structural Soil® shall be inspected by the installing contractor before starting work and all defects such as incorrect grading, compaction, and inadequate drainage shall be reported to the engineer prior to beginning this work.

## PART 6 - QUALITY ASSURANCE

A. Qualifications of installing contractor: The work of this section should be performed by a contracting firm which has a minimum of five years experience. Proof of this experience shall be submitted as per paragraph, SAMPLES and SUBMITTALS, of this section.

# MATERIALS

## PART 7 - CLAY LOAM

A. Soil shall be a "loam" with a minimum clay content of 20% or a "clay loam" based on the "USDA classification system" as determined by mechanical analysis (ASTM D-422) and it shall be of uniform composition, without admixture of subsoil. It shall be free of stones, lumps, plants and their roots, debris and other extraneous matter. It shall

not contain toxic substances harmful to plant growth. Clay loam shall contain not less than 2% or more than 5% organic matter as determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F., plus or minus 9 degrees.

B. Mechanical analysis for the loam or clay loam shall be as follows:

| Textural Class | % of Total Weight |
|---|---|
| Gravel | less than 5% |
| Sand | 20-45% |
| Silt | 20-50% |
| Clay | 20-40% |

C. Chemical analysis: Meet, or be amended to meet the following criteria:

1. pH between 5.5 to 6.5
2. Percent organic matter 2% - 5% by dry weight
3. Adequate nutrient levels
4. Soluble salt less than 1.0 mmho/cm
5. Cation Exchange Capacity (CEC) greater than 10
6. Carbon/Nitrogen ratio less than 33:1

D. Loam or clay loam shall not come from USDA - classified prime farmland.

## PART 8 - FERTILIZER (if needed)

A. Should nutrient analysis suggest that the loam or clay loam need additional nutrients, it shall be amended by Amereq's licensed producer.

## PART 9 - SULFUR (if needed)

A. Sulfur shall be a commercial granular, 96% pure sulfur, with material and analysis appearing on the labeled container.

B. Sulfur used to lower pH shall be a ferrous sulfate formulation.

C. Application rates shall be dependent on soil test results.

## PART 10 - LIME (if needed)

A. Agricultural lime containing a minimum of 85% carbonates.

B. Application rates shall be dependent on soil test results.

## PART 11 - CRUSHED STONE

A. The size of the crushed stone shall be 0.75 inches to 1.5 inches allowing for up to

10% being greater than 1.5 inches, and up to 10% less than 0.75 inches.

B. Acceptable aggregate dimensions will not exceed 2.5:1.0 for any two dimensions.

C. Minimum 90% with two or more fractured faces.

D. Results of Aggregate Soundness Loss test shall not exceed 18%.

E. Losses from LA Abrasion tests shall not exceed 40%.

## PART 12 - HYDROGEL

A. Hydrogel shall be a coated potassium propenoate-propenamide copolymer (Gelscape® Hydrogel Tackifier) supplied by Tim Shanahan, Minick Materials, LLC. 405-834-8280 or 405-789-2068

## PART 13 - WATER

A. The installing contractor shall be responsible to furnish his own supply of water (if needed) free of impurities, to the site.

## PART 14 - CU-STRUCTURAL SOIL®

A. A uniformly blended urban tree mixture of crushed stone, clay loam and Gelscape® Hydrogel Tackifier, as produced by an Amereq-licensed company, mixed in the following proportion:

| Material | Unit of Weight |
|---|---|
| specified crushed Stone | 100 units dry weight |
| specified clay loam | 20 – 25 units (to achieve minimum CBR of 50) |
| Gelscape® Hydrogel Tackifier | 0.035 units dry weight |
| moisture | ASTM D698/AASHTO T-99 optimum moisture |

## PRODUCTION AND INSTALLATION GUIDELINES

## PART 15 - CU-SOIL™ MIXING AND QUALITY CONTROL TESTING

A. All CU-Structural Soil® mixing shall be performed at the licensed producer's yard using appropriate soil measuring, mixing and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. No mixing of CU-Structural Soil® at the project site shall be permitted.

Maintain adequate moisture content during the mixing process. Soils and mix components shall easily shred and break down without clumping. Soil clods shall easily break down into a fine crumbly texture. Soils shall not be overly wet or dry. The licensed producer shall measure and monitor the amount of soil moisture at the

mixing site periodically during the mixing process.

B. Raw materials shall be mixed off-site, only at the licensed producer's facility, on a flat asphalt or concrete paved surface to avoid soil contamination.

C. Should the independent laboratory test results of the clay loam reveal a need to amend it, to meet specifications, the amending materials should be added to the clay loam following the rates and recommendations provided by Amereq.

## PART 16 - UNDERGROUND UTILITIES AND SUBSURFACE CONDITIONS

A. The installing contractor shall notify the engineer of any subsurface conditions which will affect the contractor's ability to install the CU-Soil™.

B. The installing contractor shall locate and confirm the location of all underground utility lines and structures prior to the start of any excavation.

C. The installing contractor shall repair any underground utilities or foundations damaged during the progress of this work.

## PART 17 - SITE PREPARATION

A. Do not proceed with the installation of the CU-Structural Soil® material until all walls, curb footings and utility work in the area have been installed. For site elements dependent on CU-Structural Soil® for foundation support, postpone installation of such elements until immediately after the installation of CU-Structural Soil®.

B. Install subsurface drain lines as shown on the plan drawings prior to installation of CU-Structural Soil® material.

C. Excavate and compact the proposed subgrade to depths, slopes and widths as shown on the drawings. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not over excavate compacted subgrades of adjacent pavement or structures.

D. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings.

E. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.

F. Do not proceed with the installation of CU-Structural Soil® until all utility work in the area has been installed. All subsurface drainage systems shall be operational prior to installation of CU-Structural Soil®.

G. Protect adjacent walls, walks and utilities from damage. Use ½" plywood and/or

plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.

1. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.
2. Any damage to the paving or architectural work caused by the installing contractor shall be repaired, as directed by the engineer.

H. Maintain all silt and sediment control devices required by applicable regulations. Provide adequate methods to assure that trucks and other equipment do not track soil from the site onto adjacent property and the public right of way.

## PART 18 - INSTALLATION OF CU-STRUCTURAL SOIL® MATERIAL

A. Install CU-Structural Soil® in 6 inch lifts and compact each lift.

B. Compact all materials to at least 95% Proctor Density from a standard compaction curve AASHTO T 99 (ASTM D 698). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction if moisture content exceeds maximum allowable and protect CU-Structural Soil® during delays in compaction with plastic or plywood as directed by the engineer.

C. Bring CU-Structural Soil® to finished grades as shown on the drawings. Immediately protect the CU-Structural Soil® from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the engineer.

D. The engineer may periodically check the material being delivered, prior to installation for color and texture consistency with the approved sample provided by the installing contractor as part of the submittal for CU-Structural Soil®. If the engineer determines that the delivered CU-Soil™ varies significantly from the approved samples, the engineer shall contact the licensed producer.

E. Engineer shall ensure that the delivered structural soil was produced by the approved CU-Soil™ licensee by inspecting weight tickets showing source of material.

F. CU-Soil™ should not be stockpiled long-term. Any CU-Soil™ not installed immediately should be protected by a tarp or other waterproof covering.

## PART 19 - FINE GRADING

A. After the initial placement and rough grading of the CU-Structural Soil® but prior to the start of fine grading, the installing contractor shall request review of the rough grading by the engineer. The installing contractor shall set sufficient grade stakes for checking the finished grades.

B. Adjust the finish grades to meet field conditions as directed.

Provide smooth transitions between slopes of different gradients and direction.
Fill all dips with CU-Soil™ and remove any bumps in the overall plane of the slope.

a. The tolerance for dips and bumps in CU-Structural Soil® areas shall be a 3" deviation from the plane in 10'.

All fine grading shall be inspected and approved by the engineer prior to the installation of other items to be placed on the CU-Structural Soil®.

C. The engineer will inspect the work upon the request of the installing contractor. Request for inspection shall be received by the engineer at least 10 days before the anticipated date of inspection.

## PART 20 - ACCEPTANCE STANDARDS

A. The engineer will inspect the work upon the request of the installing contractor. Request for inspection shall be received by the engineer at least 10 days before the anticipated date of inspection.

## PART 21 - CLEAN-UP

A. Upon completion of the CU-Structural Soil® installation operations, clean areas within the contract limits. Remove all excess fills, soils and mix stockpiles and legally dispose of all waste materials, trash and debris. Remove all tools and equipment and provide a clean, clear site. Sweep, do not wash, all paving and other exposed surfaces of dirt and mud until the paving has been installed over the CU-Structural Soil® material. Do no washing until finished materials covering CU-Structural Soil® material are in place.

**END OF SECTION**

**SECTION 32 08 00**
**IRRIGATION SYSTEM**

## PART 1 – GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this Section.

B. Coordinate work of this Section with other underground utilities and with trades responsible for their installation. Refer to respective Drawings pertaining to other work.

C. All references in this Section to “Contractor” and/or “Irrigation Contractor” shall mean “Landscape Contractor or Irrigation Contractor”.

D. Carefully examine all of the Contract Documents for requirements that affect the Work of this Section.

### 1.02 WORK DESCRIPTION

A. The work under this Section consists of furnishing adequate numbers of skilled workmen who are thoroughly trained and experienced and installing all materials, equipment and services required to complete and provide a fully operational, automatic landscape irrigation system for the turf and landscape areas depicted on the final approved landscape plans.

B. The system shall automatically irrigate, using spray or rotary sprinklers as needed, on all turf areas as indicated on the landscape plan and as directed by the Owner. The system shall automatically irrigate, using spray sprinklers and/or drip irrigation, all landscape areas as indicated on the landscape plan and as directed by the Owner.
   1. The primary source of irrigation water is a domestic water supply from three (3) 1-1/2” water meters.
   2. The control system at a location determined by the Owner. Training, programming and start-up of control system shall be by a trained professional.
   3. Trench excavation, back filling and bedding materials, together with the testing and proper scheduling of the completed installation shall be included as part of this scope of work.
   4. The work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the Specifications. All parts necessary for the proper and complete execution of the work, whether the same may have been specifically mentioned or not, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.
   5. Record Drawing (As-built) as well as generation of the Operating & Maintenance Manual in accordance to these specifications shall also be included in this work.

C. At the completion of work, contractor shall perform and successfully complete the tests as outlined in Section 3.13 “SYSTEM TESTING, START-UP AND ADJUSTMENT”

### 1.03 PERMITS AND INSPECTIONS

A. The work under this Section shall comply with all ordinances and regulations of authorities having jurisdiction.

B. Obtain and pay for all permits to any agency having jurisdiction over the work required for the execution of this Section.

C. Furnish copies of Permits and Approval Notices to the Owner's Representative before requesting final payment.

D. The Contractor shall include in their bid any charges by the Water Department, Utility Company, or other authorities for work done by them and charged to the Contractor.

### 1.04 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division Specification Sections.

B. The Contractor shall provide copies of product specification sheets on all proposed equipment to be installed to the Owner's Representative for approval prior to the start of work, in accordance with the parameters of Division-1. Work on the irrigation system may not commence until product sheets are submitted and approved. Submittals shall be highlighted to show proper model, nozzles, sizes, flows, etc. Submittals not properly highlighted or marked up will be rejected. As a minimum, the following equipment shall be included in the submittal:
   1. Backflow Preventers and Enclosures
   2. Pressure Regulator
   3. Flow Sensor
   4. Normally Open Master Valve
   5. Main Line Pipe
   6. Lateral Line Pipe
   7. Schedule 40 and Schedule 80 Fittings and Nipples
   8. Swing Joints Assemblies including Swing Pipe and Fittings
   9. Manual Valves: Main Line Isolation and Control Valve Isolation and Manual Control Valves
   10. Automatic Electric Control Valves
   11. Automatic Drain Valves (Lateral Lines)
   12. PVC Check Valves (Low Head Drainage)
   13. Quick Coupling Valves, Keys and Hose Swivels
   14. Valve Boxes and Enclosures
   15. Control Wire and Waterproof Connectors
   16. Sprinkler Heads and Nozzles
   17. Controller and Communication Cartridge
   18. Sensor Decoder
   19. Valve Decoder
   20. Environmental Sensors
   21. Ground Rods, Plates and Wire
   22. Solvent Cements and Cleaner/Primers
   23. Miscellaneous Materials

**1.05 QUALITY ASSURANCE**

A. Irrigation Contractor: A firm which has at least five (5) years of experience in work of the type and size required by this Section and which is acceptable to the Owner’s Representative.

B. References: The Installation Contractor must supply three references for work of this type and size with their bid including names, phone numbers and email addresses of contact person(s).

C. Applicable requirements of accepted Standards and Codes shall apply to the Work of this Section and shall be so labeled or listed:
   1. American Society for Testing & Materials (ASTM)
   2. National Plumbing Code (NPC)
   3. National Electric Code (NEC)
   4. National Sanitary Foundation (NSF)
   5. American Society of Agricultural Engineers (ASAE)
   6. Underwriters Laboratories, Inc. (UL)
   7. Occupational Safety and Health Regulations (OSHA)
   8. American Society of Irrigation Consultants (ASIC)

**1.06 DELIVERY, STORAGE AND HANDLING**

A. Store and handle all materials in compliance with manufacturer instructions and recommendations. Protect from all possible damage. Minimize on-site storage. Contractor is responsible for the security of all stored materials on site.

**1.07 GUARANTEE**

A. The Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the

manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor may have by law.

B. In addition to the manufacturers guarantees the Contractor shall warrant the entire irrigation system, both parts and labor for a period of one (1) year from the date of acceptance by the Owner.

C. As part of the one-year warranty the Contractor shall perform the first year-end winterization and spring start-up for the irrigation system.

D. Should any problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of the Owner's Representative at no additional expense to the Owner.

E. A written warranty showing date of completion and period of warranty shall be supplied upon completion of each segment of the project.

**1.08 COORDINATION**

A. The Contractor shall at all times coordinate his work closely with the Owner's Representative to avoid misunderstandings and to efficiently bring the project to completion. The Irrigation Contractor shall also coordinate their work with that of the electrical contractor, general contractor, plumbing contractor and landscape contractor. The Owner's Representative shall be notified as to the start of work, progression and completion, as well as any changes to the drawings before the change is made. The Contractor shall also coordinate his work with that of his sub-contractors.

B. The Contractor shall be held responsible for and shall pay for all damage to other work caused by his work, workmen or sub-contractors. Repairing of such damage shall be done by the Contractor who installed the work as directed by the Owner's Representative.

**1.09 MAINTENANCE AND OPERATING INSTRUCTIONS**

A. Contractor shall include in their Bid an allowance for two (2) hours of instruction of Owner and/or Owner's personnel upon completion of check/test/start-up/adjust operations by a competent operator (The Owner's Representative office shall be notified at least one (1) week in advance of system testing, start-up and adjustment.

B. Upon completion of work and prior to application for acceptance and final payment, a three ring, hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE CHARLEY YOUNG EVENT CENTER IRRIGATION SYSTEM, shall be submitted to the Owner's Representative office. After review and approval, the copies will be forwarded to the Owner. Included in the Maintenance and Operating binder shall be:
   1. Table of Contents
   2. Written description of Irrigation System.
   3. System drawings:
      a. One (1) copy of the approved irrigation plan;
      b. One (1) reproducible copy of the Record Drawing (As-Built); Measurements on record drawings shall be surveyed or triangulated from permanent objects and recorded on Autocad compatible digital format;
      c. An Autocad compatible digital file (USB Flash Drive) of the record drawing;
   4. A complete set of "APPROVED" submittals of all irrigation equipment;
   5. A copy of the suggested "System Operating Schedule" which shall call out the controller program required (zone run time in minutes per day and days per week) in order to provide the desired amount of water to each area under "no-rain" conditions.
   6. One (1) copy of the controller/valve/rain/moisture/flow sensor system wiring diagram.

**1.10 EXAMINATION OF CONDITIONS**

A. The Contractor shall fully inform himself of existing conditions on the site before submitting his bid, and shall be fully responsible for carrying out all work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions

inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

### 1.11 PROCEDURE

A. Notify all city departments and/or public utility owners concerned, of the time and location of any work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of any utilities.

B. Provide and install temporary support, adequate protection and maintenance of all structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as directed by the Architect.

## PART 2 – PRODUCTS

### 2.01 GENERAL

A. All materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. All material overages at the completion of the installation are the property of the Contractor and shall be removed from the site.

B. No material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and written acceptance from the Owner's Representative.

### 2.02 PVC IRRIGATION PIPE AND FITTINGS

A. All pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.

B. All main line pipe, two and one-half inches (2-1/2") and smaller shall be PVC Type 1120-1220 Schedule 40, belled end solvent weld and conforming to ASTM D1784, cell class 12454 and ASTM 1785.

C. All lateral pipe 3/4" and larger shall be PVC, Class 200 Type 1120, SDR 21, solvent-weld PVC. Lateral pipe shall conform to ASTM No. D2241 as manufactured by PipeLife Jet Stream or approved equal. All 1/2" lateral pipe shall be PVC Class 315 Type 1120, SDR 13.5, solvent-weld PVC joints.

D. Fittings for solvent weld PVC pipe shall be Schedule 40 solvent weld PVC fittings as manufactured by Spears or approved equal.

E. Fittings shall bear manufacturer's name or trademark, material designation, size, and applicable I.P.S. schedule.

F. PVC Schedule 80 fittings and nipples shall be used on all fittings required between the main line tap (service tee) and the electric control valve as well as the threaded connection between the electric control valve and the lateral piping. Schedule 80 fittings shall be Spears Manufacturing or approved equal. Contractor shall use teflon tape or other sealing method according to valve, sprinkler and fitting manufacturer's recommended practice for the specific application. All Schedule 80 PVC nipples shall be supplied with machined threads.

G. PVC solvent shall be NSF approved, for Type I and Type II PVC pipe, and Schedule 40 and 80 fittings. Cement is to meet ASTM D2564 and FF493 for potable water pipes. PVC solvent cement shall be Rectorseal Gold, IPS Weld-ON 711, Oatey Medium Cement or equal, and shall be used in conjunction with the appropriate primer. Primer shall be NSF approved, and formulated for PVC and CPVC pipe applications. Primer is to meet ASTM F 656. Primer shall be Rectorseal Jim PR-2, IPS Weld-ON P-68 Clear, Oatey Purple Primer for PVC and CPVC, or equal.

### 2.03 PIPE SLEEVES

A. All pipe sleeves beneath non-soil areas (except under City of Bixby streets) shall be PVC, Schedule 40 water pipe as manufactured by PipeLife Jet Stream or equal. Sleeves shall be the larger of the minimum size stated in these specifications, shown on the contract drawings or

two (2) times larger than the total outside diameter of all the piping contained within the sleeve. All irrigation control wire shall be routed in a separate 2" minimum diameter sleeve.

B. All sleeving to protect pipe or control wires under city streets and roads or below grade crossings shall be ductile iron or steel or PVC Schedule 40 and shall meet the standards and specifications of the City of Bixby Water and Sewer Department. Sleeves shall be a minimum of 4” and shall be two (2) times larger than the total outside diameter of all the piping contained within the sleeve. All irrigation control wires shall be routed in a separate 2" minimum diameter sleeve.

C. Minimum pipe sleeve size shall be 4” diameter.

**2.04 WIRE CONDUIT**

A. Conduit for wiring beneath non-soil areas shall be PVC, SCH-40 conduit with solvent-weld joints, as manufactured by Certainteed, Cresline or equal.

B. Sweep ells shall be standard electrical type PVC schedule 40 long sweep elbows. Cap sweep ell with tri-plug with the ring for securing nylon pull rope.

C. Conduit for above ground wiring to environmental sensors, weather stations or controllers shall be galvanized, rigid metallic conduit.

**2.05 SPRAY SPRINKLERS**

A. Full and part circle pop up spray sprinklers shall be pressure regulating at 30 psi, plastic construction with ratcheting riser, removable nozzle and check valve. Nozzle size shall be as indicated on the drawing and in the legend. Pop-up height shall be 4 inches for turf and 12" for landscape planting areas. The sprinkler shall have one-half inch (1/2") IPS water connection on the bottom and side of the sprinkler.

B. Nozzle size shall be as required to provide adequate coverage and avoid over spray onto walkways, roads, buildings and other permanent structures.

C. Sprinkler shall carry a minimum 5-year exchange warranty against defects. Sprinklers shall be manufactured by Rain Bird, model 1800-SAM-PRS.

**2.06 BACKFLOW PREVENTER**

A. Provide backflow preventer meeting the requirements of the City of Bixby, OK for irrigation systems equal to Wilkins Model 975XLSE – 1-1/2”. The 1-1/2” backflow preventer shall be installed using Type L copper pipe and shall incorporate two (2) unions for ease of installation and maintenance.

B. The backflow preventer shall be protected from freeze damage by covering it with an insulated cover and using thermostatically controlled "heat tape" or heaters. The insulated box shall be constructed of fiberglass, hinged to provide full access to the preventer. The enclosure shall be designed to accommodate the heat tape, for the recommended drain size and for the size of the backflow preventer to be installed. Enclosure shall be Hubbell Model HB1.5 or approved equal.

C. The backflow preventer protective enclosure shall be installed on a concrete footing constructed of a minimum 3500 psi concrete and shall meet the requirements of the backflow preventer cover manufacturer’s recommendation for size and mounting requirements including hardware. Contractor shall reference installation detail drawings for details of the base. The ground shall be hand excavated to provide a solid surface for the concrete foundation. The surface of the concrete base must be finished level to insure proper installation of the cover.

**2.07 PRESSURE REDUCING VALVE**

A. Pressure reducing valve shall be shall be certified to NSF/ANSI 372, consisting of a low lead bronze body and bronze bell housing, a separate access cover for the plunger and a bolt to adjust the downstream pressure. The bronze bell housing and access cap shall be threaded to the body. The inlet shall be FNPT with a single union and a FNPT outlet. The assembly shall be of the balanced piston design and shall reduce pressure in both flow and no-flow conditions. The assembly shall be accessible for maintenance without having to remove the body from the

line. The Pressure Reducing Valve shall be a Zurn Wilkins Model 500XL with the HR high pressure range option.

**2.08 ELECTRIC CONTROL VALVES**

A. Electric control valves shall be remote control diaphragm type glass-filled nylon body valves with flow control and 200-psi pressure rating. Valve shall have globe configuration, 24 volt electric.

B. Valves shall be manufactured by Rain Bird model PEB or approved equal.

**2.09 MASTER VALVE**

A. A normally open master valve shall be installed downstream of the pressure regulator and in front of the flow sensor.

B. Master valve shall be cast Iron with a polyester coating, globe style with threaded ends. Valve shall be normally open unless actuated by the 24 volt AC solenoid. Cover shall be mounted to the body with 4 stainless steel bolts to permit easy access and maintenance. Diaphragm shall be nylon-fabric, reinforced natural rubber. Internal spring shall be stainless steel. Master valve shall be Bermad model IR-410-KX 1-1/2” or approved equal.

**2.10 AUTOMATIC DRAIN VALVES**

A. Automatic drain valves shall be model 22163 (1/2") or 22167 (3/4") as manufactured by King Innovation, Inc. At least four (4) drains per piping zone shall be installed at the points of lowest elevation to permit proper drainage in areas susceptible to freezing.

**2.11 QUICK COUPLING VALVES**

A. Quick Coupling Valves shall be Rain Bird model 44-RLC with spring loaded locking rubber cover. Quick coupling valve shall be prevented from rotation with Leemco Model LS-120 valve stabilizer. Provide three (3) Rain Bird model 2049 locking cover keys to owner at project completion.

B. Keys shall be 1 inch male thread and 3/4-inch female thread at the top equal to Rain Bird model 44-K. Provide three (3) quick coupler keys to Owner at project completion.

C. Hose swivels shall be 1 inch FPT x 3/4 inch MHT, Rain Bird model SH-1 or approved equal. Provide three (3) hose swivels to Owner at project completion.

**2.12 ISOLATION VALVES**

A. Main line isolation valves 2-1/2 inches and smaller in size shall be gate type, of bronze construction, US Manufacture with a 200 WOG. The valve shall meet Federal Specifications MSS SP-80 equal to Hammond Model IB645 or approved equal.

B. Electric Control Valve Isolation Valves: 2" and smaller shall be of the ball type, plastic construction, tru-union threaded ends and have a maximum pressure rating of 235 psi at 73 degrees F. The valves shall be equal to Spears Model 3629-XX size the same as the control valve.

**2.13 INLINE CHECK VALVES**

A. Inline check valves to prevent low head drainage shall be the same size as the line they are installed in. They shall be PVC, 150 PSI pressure rating at 73 degrees F. true union utility swing check style. All valves shall be maintenance free seal unit construction with EPDM seat and weighted disc. Check valves shall be equal to Spears model S1720-07 (3/4”) or S1720-10 (1”) socket with true union.

**2.14 VALVE BOXES**

A. All valve boxes and covers shall be injection molded of structural foam polyethylene with a melt index between 10 and 12 and shall be UV stabilized. All covers shall be green in color.

B. Valve box extensions shall be provided and installed as required for proper box depth. Valve box extensions shall be made by the same manufacturer.

C. Valve boxes for isolation valves, quick coupling valves, and isolation valves and in-line check valve locations shall be 10-inch round valve boxes with bolt down covers equal to Carson Industries, Inc. model 910-12 or Rain Bird model VB10RNDH. Provide manufacturer's stainless steel locking bolts and associated clips for each valve box supplied. Valve box extensions shall be constructed with 8" I.D. corrugated polyethylene pipe, as manufactured by Advanced Drainage Systems, Inc. (ADS), cut to length as required to achieve proper coverage over pipe and valves.

D. Valve boxes for automatic electric control valves (non-drip zones), flow sensors and master control valves shall be 14"x19" ("standard") valve boxes with bolt down covers equal to Carson Industries Inc. model 1419-12 with model 1419E-1 6" extensions or Rain Bird VBSTDH with model VBSTD6EXTB 6" extension. Provide manufacturer's stainless steel locking bolts and associated clips for each valve box supplied.

E. Valve boxes for wire splices shall be 10-inch round valve boxes with bolt down covers equal to Carson Industries, Inc. model 910-12, NDS model 212-BC or Rain Bird model VB10RNDH. Provide manufacturer's stainless steel locking bolts and associated clips for each valve box supplied. Valve box extensions shall be constructed with 8" I.D. corrugated polyethylene pipe, as manufactured by Advanced Drainage Systems, Inc. (ADS), cut to length as required to achieve proper coverage over pipe and valves. All splices shall be in separate valve boxes and not included with isolation valves.

**2.15 CONTROL SYSTEM**

A. The controller shall be of a hybrid type that combines electro-mechanical and micro-electronic circuitry capable of fully automatic or manual operation. The controller shall be housed in a wall-mountable, weather-resistant stainless steel cabinet with a key-locking cabinet door suitable for either indoor or outdoor installation.

1. The controller shall have a base station capacity of 50 stations with two additional expansion slots capable of receiving ESPLXD-SM75 station modules to create a controller capacity of up to 200 stations. All stations shall have the capability of independently obeying or ignoring any weather sensor as well as using or not using the master valves. Station timing shall be from 0 minutes to 12 hours. The controller shall have a Seasonal Adjustment by program which adjusts the station run time from 0 to 300% in 1% increments. The controller shall also have a Monthly Seasonal Adjustment of 0 to 300% by month. Station timing with Seasonal Adjustment shall be from 1 second to 16 hours.
2. The controller shall have 4 separate and independent programs which can have different start times, start day cycles, and station run times. Each program shall have up to 8 start times per day for a total of 32 possible start times per day. The 4 programs shall be allowed to overlap operation based on user-defined settings which control the number of simultaneous stations per program and total for the controller. The controller shall allow up to 8 valves to operate simultaneously per program and total for the controller including the master valves.
3. The controller shall have a 365-day calendar with Permanent Day Off feature that allows a day(s) of the week to be turned off on any user selected program day cycle. (Custom, Even, Odd, Odd31, & Cyclical). Days set to Permanent Day Off shall override the normal repeating schedule and not water on the specified day(s) of the week. The controller shall also have a Calendar Day Off feature allowing the user to select up to 5 dates up to 365-days in the future when the controller shall not start programs. The controller shall incorporate a Rain Delay feature allowing the user to set the number of days the controller should remain off before automatically returning to the auto mode.
4. The controller shall have Cycle+Soak water management software which is capable of operating each station for a maximum cycle time and a minimum soak time to reduce water run-off. The maximum cycle time shall not extended by Seasonal Adjustment.
5. The controller shall incorporate a FloManager feature providing real-time flow, power, and station management. FloManager shall manage the number of stations operating at any point in time based on water source capacity, station flow rate, number of valves per station; user-defined simultaneous stations per program and for the controller. The

controller shall provide station priorities to determine the order in which stations shall operate. The controller shall ignore the station number and instead operate the highest priority stations first and the lower priority stations last.

6. The controller shall offer Water Windows for each program. This function sets the allowed start and stop time where watering is allowed. If the watering cannot be completed by the time the Water Window closes, the stations with remaining run time are paused and watering automatically resumes when the Water Window opens the next time.
7. The controller shall include an integrated Flow Smart Module with flow sensing functionality. The Flow Smart Module shall accept sensor decoder input from 1 - 5 flow sensors with no flow scaling device required.
8. A FloWatch Learn Flow Utility which learns the normal flow rate of each station shall be included. Each time a station runs FloWatch compares the current real-time flow rate to the learned rate and takes user-defined actions if high flow, low flow, or no flow is detected. FloWatch shall automatically determine the location of the flow problem and isolate the problem by turning off the affected station(s) or master valve(s). FloWatch shall be compatible with both normally closed and open master valves. A Manual Master Valve Water Window shall be provided to coordinate daytime manual watering with the flow sensing. This Water Window shall offer programmable days of the week and manual watering additional flow rate.
9. The wall mount controller shall be as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California Model ESPLD Modular or approved equal with size as shown on contract drawings. Stainless steel cabinet to house controller shall be Rain Bird model LXMMSS or approved equal.

B. Flow Sensors
   1. Flow sensor downstream of the normally open master valves on each sub-main connection shall be an in-line type with a non-magnetic, spinning impeller as the only moving part. The solid state electronics housing shall be glass-filled PPS and shall have two (2) o'rings for easy removal from the meter body. The sensor electronics shall be potted in an epoxy compound designed for prolonged immersion. The sensor shall be capable of operating in flows of 1/2 feet per second up to 30 feet per second with linearity and repeatability of +/- 1 percent and in line pressures up to 400 psi and liquid temperatures up to 220 degrees F. Meter body shall be pre-installed in a brass tee. Flow sensor shall be Rain Bird model FS200B or approved equal.
   2. A two-wire sensor decoder shall be installed with each flow sensor according to manufacturer's recommendations. Two-wire sensor decoder shall be Rain Bird model SD210TURF or approved equal.

C. Field decoders shall be compatible and be of the same manufacturer as the central control system and shall have the address and solenoid capacities as shown on the drawings. The field decoders shall be as manufactured by Rain Bird, models as follows:
   1. FD101TURF: 1 address, 1 solenoid per address
   2. FD102TURF: 1 address, 2 solenoids per address
   3. FD102TURF: 2 address, 2 solenoids per address
   4. FD102TURF: 4 address, 1 solenoids per address
   5. FD102TURF: 6 address, 1 solenoids per address
   6. The decoders shall be fully waterproof, precoded address from the manufacturer, nominal voltage of 24 volts AC with a minimum voltage of 15 volts AC.

D. Line surge protectors shall be installed every 500 feet along the 2-wire path or for every 8 decoders along the two-wire path. Line surge protectors shall be Rain Bird model LSP-1 or approved equal.

**2.16 RAIN-FREEZE SENSOR**

1. The rain sensor shall shut off the irrigation system when the measured rainfall equals or exceeds the shutoff setting of the sensor device. The freeze sensor shall be adjustable between 33 degrees F. and 41 degrees F. and shall shut off the irrigation system when the temperature reaches at or below the set point. The device shall be adjustable with

positive stops from 1/8th inch to 1/2 inch. Sensor shall have quick shut-off capability to suspend irrigation during a rain event. The device shall be U.L. rated, maintenance free and shall absorb water and shall dry out at rates similar to turf. The device shall have a self-leveling bracket which can be mounted to flat surfaces or rain gutters. Sensor shall be installed within 700 feet line-of-sight between sensor and irrigation controller. The wireless device shall be manufactured by Rain Bird Mfg, Model WR2RFC or approved equal.

**2.17 WIRE AND COMMUNICATION CABLE**

A. Wire for the 2-Wire decoder system shall consist of two (2) tin coated, soft drawn bare copper, solid 14 AWG conductors. The two conductors shall be insulated with a high quality polyvinylchloride (PVC) for system applications up to 600 volts. One conductor shall be insulated red and one conductor insulated yellow. The two conductors shall be laid parallel and pressure extruded with a solid color, linear low density, sunlight resistant polyethylene (PE) outer jacket. Standard colors for the jacket shall be red, green, blue, yellow, black, purple and orange. The wire shall be rated as direct burial and shall be as manufactured by Regency Wire and Cable, model "Rain Bird" Maxi Cable or approved equivalent.

B. In ground wire connections shall be UL listed, rated for 600 Volts manufactured by Rain Bird model DBRY20 or DBT020 or approved equal. All wire connections shall be made in specified valve boxes.

C. All wire connections shall be made in specified valve boxes.

D. Wire type and method of installation shall be in accordance with local codes for NEC Class II circuits of 30-volt A.C. or less.

**2.18 SWING PIPE AND JOINTS**

A. All 1/2" inlet spray heads and 3/4” inlet rotary heads shall be connected to the irrigation piping utilizing 1/2" thick walled polyethylene tubing (Rain Bird Model SPX-FLEX100) and appropriate insert fittings (Rain Bird Models SBE-050, SBE-075, SBA-050, SBA-075). Sufficient lengths of flexible pipe shall be used to form a sweeping arc to insure that spray heads are supported properly and allow for vertical adjustment and movement during service.

B. Swing Joints: All 1" inlet quick coupling valves shall be installed on prefabricated, manufactured swing joint assembly rated for 315 psi with prelubricated buttress threads and O’ring seals equal to Spears Manufacturing Co. Series 5807-01012.

**2.19 GROUNDING EQUIPMENT**

A. Each electronic component of the control system shall be grounded to the manufacturer's recommended resistance to ground.

B. Proper grounding practices shall include both the installation of ground rods and grounding plates. Ground rods shall be copper clad, 5/8-inch diameter x 10 foot long grounding rods and connected to the electrical equipment and grounding plate with minimum #6 AWG, solid, bare copper wire. Grounding plates shall be 4-inch x 96- inch x 0.0625-inch copper as outlined below. Minimum 20-foot separation between rod and plate. Minimum 12-foot separation between controller and ground rod. All connections to rods shall be with Cadweld connectors as specified. All connections to plates shall be performed by the plate manufacturer with 25-feet of bare copper wire already attached. Each grounding rod is to be covered by a 4-inch round, grated top, plastic valve cover and six inches of 4-inch SDR35 PVC. Plates shall be installed in ground enhancement material. Plates shall be covered with 4-inch plastic grated cover with detection and minimum 36 inches of 4 inch ADS drainage pipe. Ground rods and plates shall be UL listed.

**2.20 SAND**

A. Sand used for backfilling of trenches; under, around and over PVC lines shall be as specified in SECTION: EARTHWORK.

## 2.21 CONCRETE BASES AND THRUST BLOCKS

A. Standard concrete mix shall be in accordance with ASTM C150, ASTM C-33, and ASTM C-94 with a compressive strength (28 days) of 3,500 psi.

B. All bell and gasket mainline pipe and fittings shall have thrust blocks sized and placed in accordance with pipe manufacturer's recommendations for standard concrete mix. Thrust blocks shall be installed at all tees, elbows, crosses, reducers, plugs, caps and valves. Contractor shall be responsible to insure the stability of all thrust blocks. A minimum 4 mil "visqueen" plastic poly sheeting shall be used to protect fitting and pipe from concrete during thrust block installation.

C. All concrete bases shall be standard concrete mix. Sizes shall be as indicated on the Drawings and sited in the Specifications.

## 2.22 SPARE PARTS

A. Contractor shall supply the following tools and equipment to the Owner's Representative before final observation:
   1. Two (2) tools for disassembling and adjusting each type of sprinkler head provided.
   2. Three (3) quick coupler keys, hose swivels and locking cover keys
   3. Two (2) of each type sprinkler head and pattern (PC & FC) used in the project.
   4. Two (2) of each type nozzle used in the project.
   5. Two (2) diaphragms and solenoids for each type and size of control valve used in the project.

B. Before final observation can occur, written evidence that the Owner's Representative has received the tools and equipment must be shown to the Owner.

# PART 3 – EXECUTION

## 3.01 GENERAL

A. Before work is commenced, hold a conference with the Owner's Representative to discuss general details of the work.

B. Examine all contract documents applying to this Section noting any discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.

C. Verify dimensions and grades at job site before work is commenced. Do not proceed with installation of the landscape irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, irrigation equipment legend or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to the attention of the Owner's Representative.

D. Make all field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades (landscaping and other site work trades). Project shall be laid out essentially as indicated on the Irrigation Plans, making minor adjustments for variations in the planting arrangement. Major changes shall be reviewed with the Owner's Representative prior to proceeding.

E. Coordinate installation of all sprinkler materials, including pipe, to avoid conflict with the trees, shrubs, or other plantings. Special attention shall be made to avoid damage to the root system of existing trees. Contractor shall contact Owner's Representative for guidance on trenching in this area.

F. During progress of work, a competent superintendent and all assistants necessary shall be on site. All shall be satisfactory to the Owner's Representative. The superintendent shall not be changed, except with the consent of the Owner's Representative, unless that person proves unsatisfactory and ceases to be employed. The superintendent shall represent the Contractor in his absence and all directions given to the superintendent shall be as binding as if given to the Contractor.

G. At all times, protect existing irrigation, landscaping, paving, structures, walls, footings, etc. from damage. Any inadvertent damage to the work of another trade shall be reported at once.

H. Replace, or repair to the satisfaction of the Owner, all existing paving disturbed during course of work. New paving shall be the same type, strength, texture, finish, and be equal in every way to removed paving.

**3.02 PIPE AND FITTINGS INSTALLATION**

A. Using proper width trencher chain, excavate trenches to a depth of minimum pipe coverage plus six inches. Trenches shall have sides as nearly vertical as possible. Remove all lumber, rubbish and rocks larger than 1 inch from the trenches. Provide a uniform bearing for the entire length of each pipe line to prevent uneven settlement. Wedging or blocking of pipe will not be permitted. Make the width of the trench a minimum of 1 1/2 times the diameter of the piping but not less than 4 inches.

B. Loam or topsoil encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the Drawings and stockpiled for subsequent replacement in the upper 6 inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.

C. Back filling shall be accomplished as follows: the first 10-inch of backfill material shall contain no foreign matter and no rock larger than 1-inch in diameter. Carefully place material around pipe and wire and tamp in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and tamped to compaction with mechanical equipment. Compaction in paved areas shall be to 98% standard proctor. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken area, humps, or other irregularities. Frozen material shall not be used for backfill.

D. Do backfilling when pipe is cool. During hot weather keep pipe cool by backfilling in the early part of the morning before the heat of the day.

E. Do not, under any circumstances, use truck wheels or flooding for compacting soil.

F. Restore grades and repair damage where settling occurs.

G. All solvent-weld joints shall be made in strict accordance with manufacturer's recommendations and ASTM D2855 Standard Practice. Make solvent welds with a nonsynthetic bristle brush in the following sequence: Apply an even coat of solvent to the outside of the pipe. Then apply solvent to the inside of the fittings and then re-apply a light coat of solvent to the outside of the pipe, making sure that coated area on the pipe is equal to the depth of the fitting socket. Insert pipe quickly into the fitting and turn the pipe approximately 1/4 turn to distribute the solvent and remove air bubbles. Check all tees and ells for correct position, then hold joint for approximately 15 seconds so that pipe does not push out from the fitting. Wipe off any excess of primer or solvent from each connection. Allow at least 15 minute drying time for each weld joint before moving. When the temperature is above 80º F, allow connections to set minimum 24 hours before pulling or pressure is applied to the system. When temperature is below 80º F, follow manufacturer’s recommendations. Provide and install for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see WIRING INSTALLATION).

H. The minimum cover over the pipe shall be as follows:
   1. Main line pipe - 20 inches of cover over pipe
   2. Lateral pipe – 15 inches of cover over pipe

I. Cut plastic pipe with handsaw or pipe-cutting tool, removing all burrs at cut ends. All pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's Specifications.

J. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the piping is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. All piping, which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be

laid out. Should water enter the trench during or after installation of the piping, no additional piping may be installed or back filled until all water is removed from the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 40º F or below. Pipe installed at temperatures below 40º F shall be removed and replaced at no cost to the Owner. PVC pipe shall be snaked in the trench to accommodate for expansion and contraction due to changes in temperature.

K. Carefully install system in areas of existing vegetation designated to remain to provide minimal disturbance feasible. When trenching under the drip-line of existing trees, extreme care must be given to avoid root damage. If at all possible avoid trenching inside the drip-line by going around the tree rather than under it. If trenching must occur under the drip-line, use either tunneling or hand-digging methods rather than a mechanical trencher. Minimize the impact of root severing by avoiding construction during hot, dry weather, keeping trees well watered before and after digging and covering roots with soil or mulch as soon as possible. Contractor shall contact Owner's Representative for guidance on trenching in this area. Where excavation must occur near trees, the Contractor shall provide proper root pruning and sealing methods shown in the landscape plans and specifications and approved by Owner's Representative.

L. Maintain 6-inch minimum clearance between sprinkler lines and lines of other trades. Do not install sprinkler lines directly above another line of any kind.

M. Maintain 1-inch minimum clearance between lines which cross at angles of 45 to 90 degrees.

N. Exercise care when excavating, trenching and working near existing utilities.

O. Throughout the guarantee period it will be the responsibility of the Contractor to refill any trenches that have settled due to incomplete compaction.

P. Pulling of pipe will be allowed provided soil is suitable and specified depth of bury can be maintained.

**3.03 THRUST BLOCKING**

A. All gasket joint bell-end fittings shall be blocked with an adequately sized thrust block as per ASAE Standard S376.1 and as depicted in the details. Blocking shall be in accordance with pipe and fitting manufacturer's recommendations. Thrust blocks shall be required at all changes in size and direction of bends, reducers, plugs and tees. Thrust blocks shall be installed against undisturbed soil in all cases. Concrete thrust blocks shall utilize 3,500-psi standard concrete mixture. Bricks, stones, boulders, etc. will not be accepted as thrust blocks or thrust block material. Premixed cement, sand and gravel packages "Sackcrete" will not be permitted as a thrust blocking material. Contractor to supply all material needed for thrust blocking.

B. Size of thrust block shall be determined by working pressure, size and type of fitting, and soil conditions. Calculate area required for concrete thrust block in contact with soil. Refer to ASAE 376.2 for thrust block sizing information to determine size of thrust block for each condition.

C. A minimum 4 mil "visqueen" plastic poly sheeting shall be used to protect fitting and pipe from concrete during thrust block installation.

D. Under no circumstances will concrete block be approved for thrust blocks.
   1. ELECTRICAL WIRE CONDUIT INSTALLATION

E. Electrical conduit shall be installed in all non-soil areas, as well as for all above ground wiring where wire passes under or through walls, walks and paving to controllers and other sensors.

F. Conduit shall extend 18 inches beyond edges of walls and pavement.
   1. PIPE SLEEVING INSTALLATION

G. Contractor is responsible for the supply and installation of sleeves whether shown on the drawings or not. Install sleeves under paving and other improvements prior to construction. Install where required to accommodate piping at proper depth to prevent damage by other construction activities and to provide specified burial depth for irrigation pipe. Location of sleeves to be recorded and marked.

H. Sleeving shall be installed wherever piping is going under a non-soil area, generally where indicated on the Drawings. Cover over all sleeving pipe shall be appropriate for the specified depth of the pipe passing through the sleeve. Minimum coverage shall be 20 inches.

I. Sleeving shall extend 24 inches beyond edges of walls and pavement.

J. If finished pavement is in place, the Contractor shall bore under the pavement for sleeving installation using personnel experienced in the procedure. Contractor shall be responsible for all damage to finished paving due to improper boring.

**3.04 ISOLATION VALVE INSTALLATION**

A. Install isolation valves in 10-inch round valve boxes with extensions at locations shown on the irrigation plan drawings.

B. Install all isolation valves on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench.

C. Check and tighten valve bonnet packing before valve box and backfill installation.

D. Provide and install thrust blocks for ring-tite valves as per detail.

**3.05 VALVE AND VALVE BOX INSTALLATION**

A. Furnish and install a valve access box for each electric valve, quick coupling valve, isolation valve, wire splice, flushing valve, air/vacuum relief valve, in-line check valves, etc.

B. Valves and valve boxes shall be installed where shown or directed, and shall be set plumb. Valve boxes shall be centered on the valves. Where feasible, valves shall be located outside the area of natural walkways or paths. Earth fill shall be carefully tamped around each valve box. Valve boxes should be supported by concrete blocks to ensure that any surface loads on the valve boxes will not be transmitted below to the pipe or valves and to minimize box settlement. All boxes shall have at least 6" depth of clean washed round river rock under the valve boxes for drainage.

C. Electric control valves shall be connected to the main line in a plumb position with adjusting handle and all bolts, screws and wiring accessible through the valve box opening. Sufficient clearance shall be provided for service and operation.. Valve manifolds shall be installed in such a manner that it will not be necessary to remove more the one valve when a valve is removed or replaced. The valves shall be adjusted for proper operation as required by the manufacturer for the specified performance. Adjust zone valve operation after installation using flow control device on valve.

**3.06 WIRING INSTALLATION**

A. Wiring shall be installed along with the main distribution line. Multiple wire bundles shall be cinched together at maximum 12-foot centers using plastic cable cinches and shall be laid beside, and at the same invert as, the irrigation lines. Sufficient slack for expansion and contraction shall be maintained and wiring shall at no point be installed tightly. Provide and install an additional 8 inches to 12 inches slack at all changes of direction. Wiring in valve boxes shall be a sufficient length to allow the decoder, valve solenoid, splice, and all connections to be brought above grade for servicing. This additional slack shall be coiled for neatness in the valve box.

B. All wire shall be laid in trenches and shall be carefully back-filled to avoid any damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 3 inch layer of sand or stone dust on the bottom before the wires are laid into the trench and back-filled. The wires shall have a minimum of 15 inches of cover. Wire not to be installed that day shall not be laid out.

C. An expansion curl shall be provided and installed within 6 inches of each wire connection to a solenoid. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.

D. Service wiring in connection with Drawings and local codes for 24-volt service. All in-ground wire connections shall be waterproofed with materials specified in PART 2 - PRODUCTS. All

splices shall be made in valve boxes (wire runs requiring splices between valve locations shall be provided and installed in splice box-valve box shall be used). Splice locations shall be shown on the Record Drawings.

E. Contractor shall provide a complete wiring diagram showing wire routing for the connections between the controller, sensors, valve decoders, sensor decoders and valves. See PART 1 - GENERAL for the inclusion of wiring diagram in operation and maintenance manuals.
   1. CONTROLLER INSTALLATION

F. Contractor to install all controller components, including required surge protection and grounding at the owner approved location. Contractor shall program the controller with initial irrigation program and verify data transmission and proper valve operation.

G. All 120 volt electrical supply requirements shall be provided and installed using a licensed electrician.

**3.07 SPRINKLER INSTALLATION**

A. Spray sprinklers and rotary sprinklers shall be installed on flexible connections or swing joints as specified in PART 2 - PRODUCTS and shall be set plumb and level with the final grade and In accordance with manufacturer's recommendations. Locate part circle sprinklers to maintain a minimum of 4 Inches from walls and 2 Inches from other boundaries and borders.

B. In turf areas where grass has not yet been established, sprinklers shall be initially installed on risers above grade level. When grass is established, the contractor shall lower sprinkler heads to their permanent position flush with the finish grade. This elevation is critical and care shall be taken to set them exactly at or slightly above finished grade, never below grade except as recommended by the manufacture.

**3.08 QUICK COUPLING VALVE INSTALLATION**

A. Provide quick coupling valves at locations shown on the drawings.

B. Quick coupling valves to be mounted on 1” inch PVC unitized swing joint with stabilizer.

C. Quick couplers shall be installed in 10” round valve boxes and prevented from rotation utilizing the specified stabilizer bar.

**3.09 GROUNDING INSTALLATION**

A. Contractor shall ground all electrical equipment according to the irrigation manufacturer’s requirements and specifications. Each grounding rod shall be driven into the ground its full length within 8-feet of the controller and connected via a Cadweld connection to #6 solid, bare copper wire. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 8 inches and a minimum included angle of 90 degrees. There shall be no splices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A 4-inch grated cover as specified, set a minimum of 1-inch below grade, shall be placed over the ground rod and Cadweld connection for periodic maintenance. Cover shall be installed on a minimum of 6 inches of 4-inch SDR35 PVC drainage pipe. Plates shall be installed 36 inches below grade with 50 lbs of ground enhancement material spread evenly below the plate in accordance with the manufacturer’s requirements.

B. Grounding rods shall be separated a minimum of 20 feet between grids. Grids shall be installed in an irrigated area.

C. When tested, grounding grid shall have an earth resistance no greater than 5 ohms. If earth resistance is greater than 5 ohms, additional grounding plates and enhancement material shall be added to system until desired test results have been meet.

**3.10 SYSTEM TESTING, START-UP AND ADJUSTMENT**

A. Flushing:
   1. After all piping, valves, sprinkler bodies, pipe lines and risers are in place and connected, but prior to installation of sprinkler internals, open the control valves and flush out the system under a full head of water.

2. INITIAL FLUSHING OF LINES SHALL NEVER BE THROUGH SPRINKLER HEADS OR DRIP ZONES. Sprinkler internals, flush caps and riser nozzles shall be installed only after flushing of the system has been accomplished to the full satisfaction of the Owner's Representative.
3. Contractor shall be responsible for flushing the entire system after installation is complete and will be responsible for any clogged nozzles during the warranty period.

B. Testing:
1. Leakage test: With zone valves closed, pressure test mainlines by supplying and maintaining full static pressure continuously for one full hour. Observe for evidence of leakage by monitoring flow meter and by visual inspection of the exposed lines. Repair all leaks and retest until no water flow is observed. Owner's Representative must be contacted to inspect and witness the leak testing procedures.
2. Coverage test: perform a coverage test in the presence of the Owner's Representative (notify Landscape Architect at least three (3) days in advance of scheduled coverage test). Owner's representative will determine if the water coverage and dispersion is complete and adequate. Readjust heads and/or head locations as necessary or directed to achieve proper coverage. After landscape finish grading is accomplished, install heads to finished grade in lawn and shrub areas and backfill with clean topsoil so head is stabilized and no lateral motion is exhibited during operation. Heads shall be set so the tip of the heads are 1/2" above the top of the mulch in planting beds. Heads in the turf areas shall be set flush with the finished grade and not a hazard to pedestrians and/or maintenance machinery. Set sprinkler heads to plumb within 1/16" and a minimum of 4 inches and a maximum of 6 inches from walls, walks and curbs.
3. Sprinkler heads to be spaced so as not to throw water on the buildings, walks or driveways. Heads shall be adjusted as required so that foliage of plants will not obstruct the spray and that the system has 100% coverage.
4. Contractor shall conduct a performance test of the complete system to ensure that all components are functioning properly. Performance test shall consist of operating the system through a complete irrigation cycle per day for two (2) consecutive days. Contractor shall be at the site to monitor the performance test and make any adjustments and corrections as needed during the testing period.
5. All testing shall be at the expense of the Contractor.

## 3.11 CLEANING AND ADJUSTING

A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by the operation of the system for testing.

B. Adjust sprinkler heads, valve boxes, and quick coupling valves to grade as required, so that they will not be damaged by mowing operations.

C. Continue sprinkler coverage adjustment as required by settlement, etc., throughout the guarantee period.

D. Each control zone shall be operated for a minimum of 5 minutes and all heads checked for consistency of delivering water. Adjustments shall be made to sprinklers that are not consistent to the point that they match the manufacturer's standards. All sprinklers, valves, timing devices or other mechanical or electrical components, which fail to meet these standards, shall be rejected, replaced and tested until they meet the manufacturer's standards.

## 3.12 ACCEPTANCE AND OPERATION BY OWNER

A. Upon completion of the work and acceptance by the Owner, the Contractor shall be responsible for the training of the Owner's Representative in the operation of the system (provide minimum 72 hours written notice in advance of test). The Contractor shall furnish, in addition to the Record Drawings and operational manuals, copies of all available specification sheets and catalog sheets to the Owner's personnel responsible for the operation of the irrigation system. The Contractor shall guarantee all parts and labor for a minimum period of one (1) year from date of acceptance.

B. Conditions for acceptability of work for start of maintenance by Owner issued by Owner or Owner's Representative shall include but not be limited to:
   1. Punch list items complete and approved by Owner or Owner's Representative.
   2. Landscape irrigation system complete and in place.
   3. Record drawings complete.
   4. Maintain installation and watering schedules until all conditions noted above have been completed.

**3.13 CLEAN UP**

A. Upon completion of all installation work, Contractor shall remove all leftover materials and equipment from the site in a safe and legal manner.

B. Contractor shall remove all debris resulting from work of this section.

C. Contractor shall regrade, lightly compact, and replant around sprinkler heads where necessary to maintain proper vertical positioning in relation to established grade.

D. Contractor shall fill all depressions and eroded channels with sufficient soil mix to adjust grade to ensure proper drainage. Compact lightly, and replant filled areas in accord with Owner's Representative's requirements.

**END OF SECTION**

**SECTION 32 14 00**
**CONCRETE UNIT PAVERS**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Interlocking Concrete Paver Units (manually installed).
   2. Bedding and Joint Sand.
   3. Edge Restraints.

### 1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM C 33, Standard Specification for Concrete Aggregates.
   2. ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   3. ASTM C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   4. ASTM C 144, Standard Specification for Aggregate for Masonry Mortar.
   5. ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
   6. ASTM C 979, Standard Specification for Pigments for Integrally Colored Concrete.
   7. ASTM D 698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft3 (600 kN-m/m3)).
   8. ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   9. ASTM C 1645, Standard Test Method for Freeze-thaw and De-icing Durability of Solid Concrete Interlocking Paving Units.
   10. ASTM D 2940, Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.

B. Interlocking Concrete Pavement Institute (ICPI):
   1. ICPI Tech S

### 1.03 SUBMITTALS

A. In accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Manufacturer’s drawings and details: Indicate perimeter conditions, relationship to adjoining materials and assemblies, expansion and control joints, concrete paver layout, patterns, color arrangement, installation and setting details.

C. Sieve analysis per ASTM C 136 for grading of bedding and joint sand.

D. Concrete pavers:

E. Four (4) representative full-size samples of each paver type, thickness, color, finish that indicate the range of color variation and texture expected in the finished installation.
   1. Color(s) selected by Landscape Architect from manufacturer’s available colors.

F. Accepted samples become the standard of acceptance for the work.

G. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.

H. Manufacturer’s catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

I. Paver Installation Subcontractor:

J. A copy of Subcontractor’s current certificate from the Interlocking Concrete Pavement
   1. Institute Concrete Paver Installer Certification program.

K. Job references from projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

## 1.04 QUALITY ASSURANCE

A. Paving Subcontractor Qualifications:

B. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.

C. Utilize an installer holding a current certificate from the Interlocking Concrete Pavement
   1. Institute Concrete Paver Installer Certification program.

D. Mock-Ups:

E. Install a 4ft x 8ft paver area.

F. Use this area to determine surcharge of the bedding sand layer, joint sizes, lines, laying pattern(s), color(s) and texture of the job.

G. This area will be used as the standard by which the work will be judged.

H. Subject to acceptance by owner, mock-up may be retained as part of finished work.

I. If mock-up is not retained, remove and properly dispose of mock-up.

## 1.05 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.

D. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

E. Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.

F. Unload pavers at job site in such a manner that no damage occurs to the product.

G. Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials. Store concrete paver cleaners and sealers per manufacturer's instructions.

H. Cover bedding sand and joint sand with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.

## 1.06 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

B. Do not install sand or pavers during heavy rain or snowfall.

C. Do not install sand and pavers over frozen base materials.

D. Do not install frozen sand or saturated sand.

E. Do not install concrete pavers on frozen or saturated sand.

## 1.07 MAINTENANCE

A. Extra Materials: Provide all additional materials not used on site for use by owner for maintenance and repair.
   1. Pavers shall be from the same production run as installed materials.

# PART 2 PRODUCTS

## 2.01 INTERLOCKING CONCRETE PAVERS

A. Manufacturer-Alley Paver: Keystone Hardscapes

B. Contact: Victor Mendez: victorm@keystonehardscapes.com. (817) 637-4448

C. Interlocking Concrete Pavers:

D. Paver Type: Holland Stone Series.
   1. Material Standard: Comply with material standards set forth in ASTM C 936
   2. Color: Old Town Blend. Color selection will be confirmed and finalized by samples submitted.
   3. Color Pigment Material Standard: Comply with ASTM C 979.

**D. SIZE: 3-7/8" X 7-13/16" X 2-3/8" (60 MM PAVER)**
   1. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit
      a. under 7200 psi (50 MPa) per ASTM C 140.
   2. Average Water Absorption (ASTM C 140): 5% with no unit greater than 7%.
   3. Freeze/Thaw Resistance (ASTM C 1645): 25 freeze-thaw cycles with no greater
      a. loss than 200 g/m2 of paver surface area or no greater loss than 500 g/m2 of paver surface area after 50 freeze-thaw cycles. Freeze-thaw testing requirements shall be waived for applications not exposed to freezing conditions.

**3.02 PRODUCT SUBSTITUTIONS**

A. Substitutions: No substitutions permitted.

**3.03 BEDDING AND JOINT SAND**

A. Provide bedding and joint sand as follows:

B. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.

C. Do not use limestone screenings, stone dust, or sand for the bedding sand material that does not conform to conform to the grading requirements of ASTM C 33.

D. Do not use mason sand or sand conforming to A/STM C 144 for the bedding sand.

E. Sieve according to ASTM C 136.

F. Bedding Sand Material Requirements: Conform to the grading requirements of ASTM C 33 with modifications as shown in Table 1.
   1. Table 1
      a. Grading Requirements for Bedding Sand ASTM C 33
         1) Percent Passing
         2) 100
         3) 95 to 100
         4) 85 to 100
         5) 50 to 85
         6) 25 to 60
         7) 10 to 30
         8) 2 to 10
         9) 0 to 1

G. Joint (Polymeric) Sand Material Requirements: Conform to the grading requirements of ASTM C 144 as shown with modifications in Table 2 below:
   1. Table 2
      a. ASTM C 144
         1) Manufactured Sand Sieve Size Percent Passing Percent Passing No. 4 (4.75 mm) 100 100
      b. 95 to 100 95 to 100
      c. 70 to 100 70 to 100
      d. 40 to 75 40 to 100
      e. 10 to 35 20 to 40
      f. 10 to 25
      g. 0 to 10

### 3.04 EDGE RESTRAINTS

A. Refer to construction drawings and details for Edge Restraints.

## PART 3 EXECUTION

### 4.01 EXAMINATION

A. Acceptance of Site Verification of Conditions:

B. General Contractor shall inspect, accept and certify in writing to the paver installation subcontractor that site conditions meet specifications for the following items prior to installation of interlocking concrete pavers.
   1. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
   2. Verify that geotextiles, if applicable, have been placed according to drawings and specifications.
   3. Verify that base materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
   4. Provide written density test results for soil subgrade, aggregate, cement base materials to the Owner, General
      a. Contractor and paver installation subcontractor.
   5. Verify location, type, and elevations of edge restraints, [concrete collars around] utility structures, and drainage inlets.

C. Do not proceed with installation of bedding sand and interlocking concrete pavers until base conditions are corrected by the General Contractor or designated subcontractor.

### 4.02 PREPARATION

A. Verify base is dry, certified by General Contractor as meeting material, installation and grade specifications.

B. Verify that base and geotextile is ready to support sand, edge restraints, and, pavers and imposed loads.

C. Edge Restraint Preparation:

D. Install edge restraints per the drawings

### 4.03 INSTALLATION

A. Spread bedding sand evenly over the base course and screed to a nominal 1 in. (25 mm) thickness, not exceeding 1 1/2 in. (40 mm) thickness. Spread bedding sand evenly over the base course and screed rails, using the rails and/or edge restraints to produce a nominal 1 in. (25 mm) thickness, allowing for specified variation in the base surface.

B. Do not disturb screeded sand.

C. Screeded area shall not substantially exceed that which is covered by pavers in one day.

D. Do not use bedding sand to fill depressions in the base surface.

E. Lay pavers in pattern(s) shown on drawings. Place units hand tight without using hammers. Make horizontal adjustments to placement of laid pavers with rubber hammers and pry bars as required.

F. Provide joints between pavers between per manufacturers recommendations

G. Joint (bond) lines shall not deviate more than ±1/2 in. (±15 mm) over 50 ft. (15 m) from string lines.

H. Fill gaps at the edges of the paved area with cut pavers or edge units.

I. Cut pavers to be placed along the edge with a masonry saw.

J. Do not traffic paving units with forklift equipment. Keep skid steer loaders off newly laid pavers
   1. that have not received initial compaction and joint sand.

K. Spread a thin layer of jointing sand over the paving units.

L. Use a low-amplitude plate compactor capable of at least minimum of 4,000 lbf (18 kN) at a frequency of 75 to 100 Hz. Use rubber rollers on the compactor or use neoprene mats or sheets of plywood on top of the paving units. Do not compact within 6 ft (2 m) of unrestrained edges of paving units. Do not compact paving units directly on top with a standard steel plate compactor.
   1. Remove any cracked or damaged pavers and replace with new units.

M. Post compaction, spread and sweep dry joint sand into joints continuously until full. This will require repeated sweeping in both directions. Wetting of jointing sand to completely fill paving unit joints may be required.

N. All work within 6 ft. (2 m) of the laying face must shall be left fully compacted with sand- filled joints at the end of each day or compacted upon acceptance of the work. Cover the laying face or any incomplete areas with plastic sheets overnight if not closed with cut and compacted pavers with joint sand to prevent exposed bedding sand from becoming saturated from rainfall.

O. Remove excess sand from surface when installation is complete.

P. Surface shall be broom clean after removal of excess joint sand.

**4.04 FIELD QUALITY CONTROL**

A. The final surface tolerance from grade elevations shall not deviate more than ±1/8 in. under a 10 ft (3 m) straightedge.

B. Check final surface elevations for conformance to drawings.

C. The surface elevation of pavers shall be 1/8 in. to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

D. Lippage: No greater than 1/8 in. (3 mm) difference in height between adjacent pavers.

**4.05 JOINT SAND STABILIZATION**

A. Apply polymeric joint sand stabilization materials between concrete pavers in accordance with the manufacturer’s written recommendations.

**4.06 PROTECTION**

A. After work in this section is complete, the General Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

**END OF SECTION**

**SECTION 32 30 00**
**SITE FURNISHINGS**

## PART I - GENERAL

### 1.01 DESCRIPTION

A. Work Included: Provide site furnishings where shown on Drawings, as specified herein, and as needed for a complete and proper installation of the following:
   1. Park Benches
   2. Picnic Tables
   3. Trash Recepticals

B. Related work:
   1. Cast-in-Place Concrete.

### 1.02 QUALITY ASSURANCE

A. Set items in a timely manner in accordance with manufacturer's recommendations.

### 1.03 SUBMITTALS

A. Comply with provisions of Section 01340.

B. Samples:
   1. Accompanying the Shop Drawings, submit samples of all finishes including actual materials on suitable substraits for true representation of color and textures of products called out under this Section.

### 1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in manufactures original, unopened packaging.

B. Components should be covered or otherwise protected to prevent any use until after final inspection.

## PART 2 - PRODUCTS

### 2.01 BACKED BENCHES

A. TOWNE SQUARE BENCH–BACKED–70” ALUMINUM SURFACE MOUNT, COLOR TO BE BRONZE
   1. Landcape Forms, Inc or Approved Equal
   2. 1-800-430-6206 Ex1327
   3. pattir@landscapeforms.com
   4. www.landscapeforms.com
   5. Rep: Patti Redd

### 2.02 TRASH RECEPTACLES

A. POE – TOP OPENING RECEPTACLE – 34 GALLON WITH LOCK
   1. COLOR TO BE BRONZE
   2. Landcape Forms, Inc or Approved Equal
   3. 1-800-430-6206 Ex1327
   4. pattir@landscapeforms.com
   5. www.landscapeforms.com
   6. Rep: Patti Redd

### 2.03 BAR RAIL

   1. JESSIE TABLE (BAR RAIL)–12”X106”X42”–SURFACE MOUNT
   2. COLOR TO BE BRONZE
   3. Landcape Forms, Inc or Approved Equal
   4. 1-800-430-6206 Ex1327
   5. pattir@landscapeforms.com
   6. www.landscapeforms.com

7. Rep: Patti Redd

**2.04 BAR STOOL**

1. BERNIE STOOL–20”X28”X29”–BACKLESS–SURFACE MOUNT
2. COLOR TO BE BRONZE
3. Landcape Forms, Inc or Approved Equal
4. 1-800-430-6206 Ex1327
5. pattir@landscapeforms.com
6. www.landscapeforms.com
7. Rep: Patti Redd

**PART 3 - EXECUTION**

**3.01 SURFACE CONDITIONS**

A. Examine the areas and conditions under which work of this Section will be performed. Connect conditions detrimental to timely and proper execution of the work. Do not proceed until unsatisfactory conditions are corrected.

**3.02 INSTALLATION**

A. Coordinate as required with other trades to assume proper interface with the work of this Section.

B. Install the work of this Section in strict accordance with the design, approved shop drawings and the manufacturer's recommendations,

C. Upon completion of the installation, touch-up all scratches and abrasions to be completely invisible to the unaided eye from a distance of five feet.

**END OF SECTION**

**SECTION 32 31 13**
**TEMPORARY CHAIN LINK FENCING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Posts, rails, and frames.

B. Wire fabric.

C. Accessories.

### 1.02 RELATED REQUIREMENTS

### 1.03 PRICE AND PAYMENT PROCEDURES

A. Allowances: See Section 01 21 00 - Allowances, for cash allowances affecting this section.

### 1.04 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric 2011a (Reapproved 2022).

C. ASTM A428/A428M - Standard Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles 2021.

D. ASTM A491 - Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric 2011 (Reapproved 2022).

E. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2023.

F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence 2023.

G. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric 2017 (Reapproved 2022).

H. ASTM F1665 - Standard Specification for Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Barbed Wire Used with Chain-Link Fence 2008 (Reapproved 2022).

I. CLFMI CLF-FIG0111 - Field Inspection Guide 2014.

J. CLFMI CLF-PM0610 - Product Manual 2017.

K. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric) 1990.

### 1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Chain Link Fences and Gates:
   1. Master-Halco, Inc:
   2. National Fence
   3. Allied Fence.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 COMPONENTS

A. Line Posts: 1.9 inch diameter.

B. Corner and Terminal Posts: 2.38 inch diameter.

C. Temporary Feet Bases: Line and corner feet sized as required for portable installation for phasing purposes. Refer to contract drawings for phasing plans.

D. Fabric: 2 inch diamond mesh interwoven wire, 6 gauge, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.

E. Tension Wire: 6 gauge, 0.1920 inch thick steel, single strand.

F. Tie Wire: Aluminum alloy steel wire.

**2.03 MATERIALS**

A. Posts, Rails, and Frames:
   1. Line Posts: Type I round in accordance with FS RR-F-191/1D.
   2. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.

B. Wire Fabric:

**2.04 ACCESSORIES**

A. Line Post and Corner Post Feet Bases: Products sized as required by Vestil or approved equal.

B. Fence Screen Banners: Included in Allowance Number Two and as noted on conract drawings.

**2.05 FINISHES**

A. Components and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing.

B. Accessories: Same finish as framing.

C. Color(s): Black.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

**3.02 INSTALLATION**

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

**3.03 FIELD QUALITY CONTROL**

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

**END OF SECTION**

**SECTION 32 84 00**
**LANDSCAPE IRRIGATION SYSTEM**

## PART 1 -- GENERAL

### 1.01 SCOPE:

A. Furnish all work and materials, appliances, tools, equipment, facilities, transportation, and services necessary for and incidental to performing all operations in connection with the installation of underground sprinkler irrigation system complete, as shown on drawings and/or specified herein. When the term "Contractor" is used in this section, it shall refer to the irrigation subcontractor.

### 1.02 QUALITY ASSURANCE:

A. The following Codes, Regulations, Reference Standards, and Specifications apply to work included in this section: ASTM: D2241, D2464, D2466, and D2564.

### 1.03 WARRANTY AND MAINTENANCE:

A. The Contractor shall warranty material and workmanship for one year after final acceptance including repair and replacement of defective materials, workmanship, and repair of backfill settlement.

B. Maintenance during warranty shall include, but not necessarily be limited to, the following:
   1. Adjustment of sprinkler height and plumb to compensate for settlement and/or plant growth.
   2. Backfilling of all trenches.
   3. Adjustment of head coverage (arc of spray) as necessary.
   4. Unstopping heads plugged by foreign material.
   5. Adjustment of controller as necessary to insure proper sequence and watering time.
   6. All maintenance necessary to keep the system in good operating order. Repair of damage caused by vandals, other contractors or weather conditions shall be considered extra to these specifications.

C. Warranty and maintenance after final acceptance does not include alterations as necessitated by re-landscaping, re-grading, addition of trees or the addition and/or changes in sidewalks, walls, driveways, etc.

D. Maintenance shall continue for one month after final acceptance.

### 1.04 SUBMITTALS:

A. The Contractor shall submit shop drawings or manufacturer's "cut sheet" for each type of sprinkler head, pipe, controller, valves, check valve assemblies, valve boxes, wire, conduit, fittings, and all other types of fixtures and equipment proposed to install on the job. The submittal shall include the manufacturer's name, model number, equipment capacity, and manufacturer's installation recommendation, if applicable, for each proposed item.

B. No partial submittal will be accepted, and submittals shall be neatly bound into a brochure and logically organized. After the submittal has been approved, substitutions will not be allowed except by written consent of the Landscape Architect.

C. Shop drawings shall include dimensions, elevations, construction, details, arrangements, and capacity of equipment, as well as manufacturer's installation recommendations.

### 1.05 "APPROVED EQUAL" SUBSTITUTIONS:

A. Where items on the plans are specified by a manufacturer's brand name and catalog number, followed by the phrase "or approved equal". This is not intended to unduly restrict competitive procurements or bidding but is done to assure a minimum standard of quality which is believed to be best for the item specified and to match existing equipment.

**1.06 CODES/PERMITS:**

A. All work under this section shall comply with the provisions of these Specifications, as illustrated on the accompanying drawings, or as directed by the Owner and shall satisfy all applicable local codes, ordinances, or regulations of the governing bodies and all authorities having jurisdiction over this Project.

B. Installation of equipment and materials shall be done in accordance with requirements of the National Electrical Code, City Plumbing Code, and standard plumbing procedures. The drawings and these Specifications are intended to comply with all the necessary rules and regulations; however, some discrepancies may occur, the Contractor shall immediately notify the Landscape Architect in writing of the discrepancies and apply for an interpretation. Should the discovery and notification occur after the execution of a contract, any additional work required for compliance with the regulations shall be paid for as covered by these Contract documents.

C. The Contractor shall give all necessary notices, obtain all permits, and pay all costs in connection with his work; file with all governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver to the Owner.

D. The Contractor shall include in the work any labor, materials, services, apparatus, or drawings in order to comply with all applicable laws, ordinances, rules, and regulations whether or not shown on the drawings and/or specified.

E. The installation of the irrigation system shall be made by an individual or firm duly licensed under Article No. 8751 VTCS, Titled "Licensed Irrigators Act", S.B. No. 259 as passed by the 66th Texas Legislature.

**1.07 EXISTING UTILITIES:**

A. Locations and elevations of various utilities included with the scope of this work have been obtained from the most reliable sources available and should serve as a general guide without guarantee to accuracy. The Contractor shall examine the Site and verify to his own satisfaction the locations and elevation of all utilities and availability of utilities and services required. The Contractor shall inform himself as to their relation to the work and the submission of bids shall be deemed as evidence thereof. The Contractor shall repair at his own expense, and to the satisfaction of the Owner, for damage to any utility shown or not shown on the plans.

B. Should utilities not shown on the plans be found during excavations, Contractor shall promptly notify the Owner for instructions as to further action.

C. Contractor shall make necessary adjustments in the layout as may be required to connect to existing stub-outs, should such stub- outs not be located exactly as shown and as may be required to work around existing work, at no increase in cost to the Owner. All such work will be recorded on record drawings and turned over to the Owner prior to final acceptance.

**1.08 RECORD DRAWINGS:**

A. Record dimensioned locations and depths for each of the following:
   1. Point of connection.
   2. Sprinkler pressure line routing (provide dimensions for each 100 lineal feet (maximum) along each routing, and for each change in directions).
   3. Gate valves.
   4. Sprinkler control valves (buried only).
   5. Control wire routing.
   6. Other related items as may be directed by the Landscape Architect.

B. Locate all dimensions from two permanent points (buildings, monuments, sidewalks, curbs, or pavements).

C. Record all changes which are made from the Contract drawings, including changes in the pressure and non-pressure lines.

D. Record all required information on a set of reproducible drawing files.

E. Maintain information daily. Keep Contract drawings at the Worksite at all times and available for review by the Owner's representative.

**1.09 CONTROLLER CHARTS:**

A. Do not prepare charts until record drawings have been approved by the Owner's representative.

B. Provide one controller chart for each automatic controller installed.
   1. Chart may be a reproduction of the record drawing, if the scale permits fitting within the controller door. If photo reduction prints are required, keep reduction to maximum size possible to retain full legibility.
   2. Chart shall be blackline print of the actual system, showing the area covered by that controller.

C. Identify the area of coverage of each remote control valve, using a distinctly different pastel color, drawn over the entire area of coverage.

D. Following approval of charts by the Owner's representative, they shall be hermetically sealed between two layers of 20 mil. thick plastic sheet.

E. Charts must be completed and approved prior to final acceptance of the irrigation system.

**1.10 OPERATING AND MAINTENANCE MANUALS:**

A. Provide individual bound manuals detailing operating and maintenance requirements for irrigation systems.

B. Manuals shall be delivered to the Owner's representative for review and approval no later than 10 days prior to completion of work. Revise manual as required.

C. Provide descriptions of all installed materials and systems in sufficient detail to permit maintenance personnel to understand, operate, and maintain the equipment.

D. Provide the following in each manual:
   1. Index sheet, stating Irrigation Contractor's name, address, telephone number, and name of person to contact.
   2. Duration of guarantee period.
   3. Equipment list providing the following for each item:
      a. Manufacturer's name.
      b. Make and model number.
      c. Name and address of local manufacturer's representative.
      d. Spare parts list in detail.
      e. Detailed operating and maintenance instructions of major equipment.
   4. Recommended programs for watering by season.

**1.11 CHECKLIST:**

A. Provide a signed and dated checklist and deliver to the Owner's representative prior to final acceptance of the work.

B. Use the following format:
   1. Plumbing permits: if none required, note.
   2. Material approvals: approved by and date.
   3. Pressure line tests: by whom and date.
   4. Record Drawings: received by and date.
   5. Controller charts: received by and date.
   6. Materials furnished: received by and date.
   7. Operation and maintenance manuals: received by and date.
   8. System and equipment operation instructions: received by and date.
   9. Manufacturer's warranties if required: received by and date.
   10. Written guarantee: received by and date.

11. Lowering of heads in lawn areas: if incomplete, so state.

**1.12 ELECTRIC POWER:**

A. Electric power shall be provided within five feet of each controller location by the G.C. The irrigation contractor shall provide final hardwire connection.

**1.13 WATER FOR TESTING:**

A. Unless noted otherwise on the plans or elsewhere, furnish all water necessary for testing, flushing, and jetting.

**1.14 BORINGS, SLEEVES AND ELECTRICAL CONDUITS:**

A. Sleeves and electrical conduits are the responsibility of the Irrigation Contractor to install prior to paving or related construction and should be installed as noted on the drawings and specifications. Contractors shall be responsible for locating all sleeves and conduits at no additional cost to the Authority. Borings under existing paving will be required where noted on the drawings and shall be provided at no additional cost to the Owner. Borings shall be a minimum of 18 inch depth and new pipes shall be incased in PVC sleeves as noted on the plans.

**1.15 SPARE PARTS:**

A. The Contractor shall supply the Owner with five spray heads, one for each head designated on the plan. The Contractor shall supply one additional key and hose swivel for every six quick couplers (one minimum).

**PART 2 -- PRODUCTS**

**2.01 GENERAL:**

A. Unless otherwise noted on the plans, all materials shall be new and unused. The irrigation equipment catalog numbers used for reference in these Specifications are to establish minimum quality standards and may be substituted with an "approved equal" as outlined in Paragraph 1.5 of this section.

**2.02 POLYVINYL CHLORIDE PIPE (PVC PIPE):**

A. PVC pipe manufactured in accordance with ASTM Standards noted herein.

B. Marking and Identification: PVC pipe shall be continuously and permanently marked with following information: Manufacturer's name, size, type of pipe, and material, SDR number, Product Standard number, and the NSF (National Sanitation Foundation) Seal.

C. PVC pipe fittings: Shall be of the same material as the PVC pipe specified and compatible with PVC pipe furnished. Solvent weld type fittings shall be Schedule 40.

D. PVC Pipe: Shall be as noted on the plans. Sizes up to 3” diameter shall be solvent weld type. Pipe sizes of 4” diameter and larger shall be o-ring gasket type with ductile iron gasket fittings.

E. Pipe sleeves: Shall be as noted on the plans.

**2.03 SWING JOINTS:**

A. Swing joints shall be O-ring seal type, Lasco or approved equal.

**2.04 WIRE AND SPLICES:**

A. Valve wire shall be as noted on the plans, minimum 14 gauge with type UF insulation which is Underwriters Laboratory approved for direct underground burial when used in a National Electrical Code Lass II Circuit (30 volts AC or less) as per Articles 725 and 300. Voltage drop shall be taken into consideration.

B. All connectors shall be UL listed, rated 600 volt, for PVC insulated wire. No wire splices shall be buried.

**2.05 QUICK COUPLING VALVES:**

A. Quick coupling valves shall be composed of a bronze cast body with a purple, ( NP ) cover.

B. The valve shall accept a single lug 3/4 inch bronze valve key for operation unless noted otherwise.

**2.06 MANUAL VALVES:**

A. Unless noted otherwise, manual valves 2-1/2 inches and smaller shall be all brass, globe type with composition disc rated at 150 pounds W.O.G. Manual valve size 4" and larger shall be Kennedy cast iron type.

B. All valves shall have wheel handles unless cross handles are called for on the plan.

**2.07 VALVE BOXES:**

A. A box shall be provided for all valves.

B. Valve boxes shall be made of high-strength plastic suitable for turf irrigation purposes.

C. Boxes shall be suitable in size and configuration for the operability and adjustment of the valve.

D. Extension sections will be used as appropriate to the depth of piping.

E. All valve box covers shall bolt down or have locking mechanisms and shall be colored green or black as selected by the Contracting Officer, or purple where required, as noted.

**2.08 POP-UP SPRAY, BUBBLERS AND ROTARY HEADS:**

A. Sprinkler heads are specified on the drawings. Spray heads shall have a minimum 4 inch pop-up.

B. The sprinkler body and all related parts shall be plastic cycolac or polycarbonate. They shall have a spring retraction for positive return action of the pop-up nozzle.

C. The spring for retraction and the adjustable nozzle screw shall be made of corrosion resistant materials.

**2.09 DRIP TUBE WITH PRESSURE COMPENSATING EMITTERS:**

A. Drip tube shall be of the manufacturer and model as noted on the plans. Pressure compensating emitters with internal check valves are required unless noted otherwise.

B. Barbed Insert Fittings
   1. All barbed insert fittings shall be constructed of molded, ultra-violet-resistant plastic having nominal inside dimension (I.D.) of 0.24".
   2. Each fitting shall have a minimum of two ridges or barbs per outlet with a raised barb nearest the fitting outlet. All fittings shall be of one manufacturer and shall be available in one of the following end configurations:
      a. Barbed insert fittings, or
      b. Male pipe threads (MPT) with barbed insert fittings, or
      c. Female pipe threads (FPT) with barbed insert fittings.

**2.10 ELECTRIC CONTROLLER:**

A. The electric irrigation controller shall be as noted on the plans. The system may be designed to operate multiple section valves at a time, per controller unless otherwise noted.

B. Power source shall be 110v A.C. Output for operation of companion solenoid actuated valves shall be 24 volts 60 Cycle AC.

**2.11 ELECTRIC REMOTE CONTROL VALVES:**

A. Electric remote control valves shall have plastic bodies and covers and shall be globe-type diaphragm valves of normally closed design. The valves are specified on the drawings.

B. Operation shall be accomplished by means of integrally mounted heavy-duty 24-V DC solenoid complying with National Electrical Code, Class II Circuit. Solenoid coil shall be potted in epoxy resin within a plastic coated stainless steel housing. Solenoids shall be completely waterproof, suitable for direct underground burial.

C. A flow stem adjustment shall be included in each valve.

**2.12 BACKFLOW PREVENTER:**

A. An approved backflow prevention device is required, as noted on the plans. The device shall include all materials as required by the local municipality and shall be inspected accordingly.

**2.13 TEMPERATURE SENSORS & RAIN SENSORS:**

A. Rain and freeze sensors shall be provided and installed as noted on the plans.

**PART 3 – EXECUTION**

**3.01 INSTALLATION, GENERAL:**

A. Design Pressure: This irrigation system has been designed to operate with a minimum static inlet water pressure as indicated on the drawings. The Contractor shall take a pressure reading prior to beginning construction. If the pressure reading is 5% less than above, the Contractor shall notify the Owner's Representative.

B. Contractor Responsibility: The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in equipment usage, area dimensions or water pressure exist that might not have been considered in the engineering. Such obstructions or differences shall be brought to the attention of the Owner's Representative in writing. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary.

C. Staking: Before installation is started, place a stake or flag where each sprinkler is to be located, in accordance with drawing. Staking shall be approved by the Landscape Architect before proceeding.

D. Piping Layout: Piping layout is diagrammatic. Route piping around existing trees and root zones in such a manner as to avoid damage to plantings. Do not dig within the ball of newly planted trees or shrubs.

E. In areas where trees are present, trenches will be adjusted on site to provide a minimum clearance of four times the trunk diameter of the tree (at its base) between any tree and any trench.

F. All material and equipment shall be delivered to the Worksite in unbroken reels, cartons or other packaging to demonstrate that such material is new and of a quality and grade in keeping with the intent of these Specifications.

**3.02 EXCAVATION AND TRENCHING:**

A. The Contractor shall perform all excavations to the depth indicated in these Specifications and Contract drawings. The banks of trenches shall be kept nearly vertical as practicable. Trenches shall be wide enough to allow a minimum of 4" between parallel pipelines or electrical wiring. Where rock excavation is required, or where stones are encountered in the bottom of the trench that would create a concentrated pressure on the pipe, the rock or stones shall be removed to a depth of six (6) inches minimum below the trench depth indicated. The over depth rock excavation and all excess trench excavation shall be backfilled with loose, moist earth or sand, thoroughly tamped. Whenever wet or otherwise unstable soil that is incapable of properly supporting the pipe is encountered in the trench bottom, such shall be removed to a depth and length required, and the trench backfilled to trench bottom grade as hereinafter specified, with coarse sand, fine gravel or other suitable material.

B. Bottom of trench grade shall be continued past ground surface deviations to avoid air pockets and low collection points in the line. The minimum cover specifications shall govern regardless of variations in ground surface profile and the occasional deeper excavation required at banks and other field conditions. Excavation shall be such that a uniform trench grade variation will occur in all cases where variations are necessary.

C. Trench excavation shall comprise the satisfactory removal and disposition of all materials and shall include all shoring and sheeting required to protect the excavation and to safeguard employees.

D. During excavation, material suitable for backfilling shall be stockpiled in an orderly manner a sufficient distance back from edge of trenches to avoid overloading and prevent slides or cave-ins. Material unsuitable for backfilling shall be wasted as directed by the Owner's Representative. When excavated material is of a rocky nature and the topsoil or any other layer of excavated material is suitable for pipe bedding and backfill in the vicinity of the pipe, such material shall be separately stockpiled for use in such bedding and pipe backfill operations, unless satisfactory imported material is used.

E. All excavations and backfill shall be unclassified and covered in the basic bid. No additional compensation will be allowed for rock encountered.

F. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavations to their original conditions in a manner acceptable to the Owner's Representative.

**3.03 PIPE INSTALLATION:**

A. Sprinkler Mains: Sprinkler mains are that portion of piping from water source to electric valves. This portion of piping is subject to surges since it is a closed portion of the sprinkler system. Sprinkler mains shall be installed in a trench with a minimum of 18 inches of cover.

B. Lateral Piping: Lateral piping is that portion of piping from electrical valve to sprinkler heads. This portion of piping is not subject to surges since it is an "open end" portion of the sprinkler system. Lateral piping shall be installed in a trench with a minimum of 12 inches of cover.

**3.04 PVC PIPE AND FITTING ASSEMBLY:**

A. Solvent: Use only solvent recommended by manufacturer to make solvent-welded joints following standards noted herein. Thoroughly clean pipe and fittings of dirt, dust, and moisture with an approved PVC primer before applying solvent.

B. PVC to Metal Connection: Work metal connections first. Use a non-hardening pipe dope such as Permatex No. 2 or "Teflon" tape on threaded PVC to metal joints. Use only light wrench pressure.

C. Threaded PVC Connections: Where required, use threaded PVC adapters into which pipe may be welded.

D. Remove lumber, rubbish, and rocks from trenches. Provide firm, uniform bearing for entire length of each pipeline to prevent uneven settlement. Wedging or blocking of pipe will not be permitted. Remove foreign matter or dirt from inside of pipe before welding and keep piping clean during and after laying pipe.

E. PVC pipe shall not be installed where there is water in the trench, nor shall PVC pipe be laid when temperature is 40 deg. F or below or when rain is imminent. PVC pipe will expand and contract as the temperature changes. Therefore, pipe shall be snaked from side to side of trench bottom to allow for expansion and contraction.

**3.05 HYDROSTATIC TESTS:**

A. Pressure Test: After the pipe is laid, the joints completed, and the trench partially backfilled, leaving the joints exposed for examination, the newly laid mainline pipe or any valved section of main pressure line piping shall, unless otherwise specified, be subjected for four hours to a hydrostatic pressure test of normal city water pressure. Each valve shall be opened and closed during the test. Enclosed pipe, joints, fittings, and valves shall be carefully examined during the partially open trench test. Joints showing visible leakage shall be replaced or remade, as necessary. Cracked or defective pipe, joints, fittings, or valves discovered in consequence of this pressure test shall be repeated until the test results are satisfactory. All replacement and repair shall be at contractor's cost.

**3.06 CONTROL WIRE INSTALLATION:**

A. All control wire less than 500 feet in length shall be continuous without splices or joints from the controller to the valves. Connections to the electric valves shall be made within 18 inches of the valve using connectors specified in Paragraph 2.4 of this section, unless otherwise

approved by the Owner's Representative in writing.

B. All control wires shall be installed at least 18 inches deep. Contractor shall obtain the Owner's Representative's approval for wire routing when installed in a separate ditch. Control wires may be installed in a common ditch with piping, however wires must be installed a minimum of 4 inches below or to one side of piping.

C. All wire passing under existing or future paving, sidewalk, construction, etc., shall be encased in PVC conduit extending at least 2 feet beyond edges of paving, sidewalks, or construction.

**3.07 POP-UP SPRAY, BUBBLER HEADS:**

A. Provide heads and nozzles as specified and install in locations as shown on the Contract Drawings.

B. Pop-up spray heads shall be installed with connections to rigid PVC pipe as detailed on the Contract drawings. Rotary heads shall be installed on a double swing joint connected to the lateral pipe as detailed on the drawings.

C. Heads shall be installed with underside of flange flush with the finished grade.

D. The contractor will be required to adjust heads as necessary after establishment of grass or other plant material.

**3.08 DRIP EQUIPMENT:**

A. Drip tube can be installed in one of the following methods:
   1. Over-excavation: Over-excavate the entire area to a depth of 2" to 4" below finish grade. Plant all specimen trees and shrubs 15 gallon size and larger, then place drip tube at the row spacing interval indicated on the plans.
   2. Pipe Pulling: Where ground disruption is to be minimized, pneumatic tire, pipe-pulling machinery shall be used. Potholes shall be used at the ends of each run for making connection to supply and exhaust headers of rigid PVC pipe or polyethylene pipe.
   3. Trenching: Hand or mechanically trench to the pipe depth indicated on the plans or in these specifications and backfill flush with finish grade. Avoid mechanically trenching within the dripline of existing trees. Hand-trench around existing tree roots when roots of 2" and larger are encountered. Remove all rock 1½" and larger when excavating and remove from site. Do not backfill trenches with rock that will come in direct contact with tubing or rigid PVC piping.

B. Placement of Rigid PVC Piping: Install pipe in a serpentine (snaked) manner to allow for expansion and contraction in trench before backfilling. Install pipes at temperatures over 40°F. Pipe markings shall face upward out of the trench whenever possible.

C. Drip tube: Drip tube can be installed with the water outlets facing up, down, or sideways. In irregular areas, some water outlets could end up too close to fixed improvements and may have to be capped off with a dripper plug ring.

D. Cover: Install underground piping horizontally and as evenly as possible to a maximum depth of 4", unless otherwise specified. (Typical pipe depth is 2" shrub beds, 4" in turf unless periodic aeration is anticipated, and then pipe depth should be lowered to 6".)

E. Barbed Insert Fittings: Connect drip tube to barbed insert fittings by pushing the tubing on and over both barbs of the fitting until the tubing is seated against another piece of tubing or has butted against another portion of the barbed fitting. For water pressures in excess of 30 psi, or the maximum stated system pressure for the drip tube, whichever is less, use stainless steel clamps.

F. Clamping: When design-operating pressure exceeds 30 psi, or maximum stated system pressure for the drip tube, whichever is less, stainless steel pipe clamps shall be used. Slip clamps over tubing before slipping tubing over barbed insert fitting. Place clamp between the first and second ridge of the barbed fittings and crimp the "ear" of the clamp tightly. Crimp the "ear" twice to ensure proper seating.

**3.09 QUICK COUPLING VALVES:**

A. Quick coupling valves shall be installed with the underside of flange flush with the finished grade.

B. Quick coupling valves shall be installed on a swing joint assembly as detailed on the drawings.

C. Under the warranty, the Contractor shall return after grass is established and adjust valves and valve boxes to proper grade.

**3.10 MANUAL VALVES:**

A. Manual valves shall be sized and located where shown on the Contract drawings.

B. Valve boxes shall be adjusted to be flush with finished grade. The Contractor will be required to adjust after establishment of grass.

C. Valve boxes shall be properly supported and of sufficient construction that tractors and mowers crossing over the boxes will not push boxes down and crush the pipe, valve, or box.

**3.11 VALVE AND VALVE BOX PLACEMENT:**

A. All manual, electric, and quick coupling valves shall be in boxes as specified in Paragraph 2.7 of this section and shall be set with a minimum of six (6) inches of space between their top surface and the bottom of the valve box. The base of the box shall be filled with pea gravel as shown on plan.

B. Valves shall be fully opened and fully closed to ensure that all parts are in operating condition.

C. Valve boxes shall be set plumb, vertical, and concentric with the valve stem.

D. Any valve box which has moved from this required position so as to prevent the use of the operating wheel of the valve shall be reset by the Contractor at his own expense.

**3.12 ELECTRIC CONTROLLER:**

A. Electric controller location shall be confirmed with the L.A. before installation, as shown on the plans.

**3.13 ELECTRIC REMOTE CONTROL VALVES:**

A. Remote control valves shall be located and sized as shown on the plans. All electrical connections shall be made when the weather is dry with connection kits as specified in Paragraph 2.4 of this section in strict accordance with manufacturer's recommended procedures. All remote control valves shall be installed in a horizontal position, in accordance to the manufacturer's published installation instructions.

B. It shall be the responsibility of the Contractor to furnish and install the proper size wire on each of the low voltage circuits from the master control center to the various electric remote control valves.

C. Consideration shall be given to each circuit for allowance of voltage drop and economy consistent with accepted practices of electrical installation. Under no circumstances shall the voltage of any branch circuit be reduced more than proper due to length of run exceeding the maximum allowable for the wire size used.

**3.14 BACKFILL AND COMPACTION:**

A. After system is operating and required tests and inspections have been made, the trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand, gravel, soft shale, or other approved materials, free from large clods of earth or stone. Rock, broken concrete, or pavement, and large boulders shall not be used as backfill material. The backfill shall be thoroughly compacted and evened with the adjacent soil level.

B. Compact trenches in areas to be planted by thoroughly flooding the backfill. Compact all other areas by flooding or hand tamping. The jetting process may be used in areas when flooding.

C. Backfill for all trenches, regardless of the type of pipe covered, shall be compacted to a minimum of 90% density.

D. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for compaction, then refilled and compacted with the surface restored to the required grade and left in a completed surface condition as described above.

E. Specifically tamp backfill under heads and around the flange of heads for one foot (1') by a suitable means after trench backfill has dried from flooding to prevent heads loosening in the ground.

**3.15 FINAL ADJUSTMENT:**

A. After installation has been completed, make final adjustment of sprinkler system prior to Owner's Representative's final inspection.

B. Completely flush system to remove debris from lines by removing nozzle from heads on ends of lines and turning on system.

C. Check sprinklers for proper operation and proper alignment for direction of throw.

D. Check each section for operating pressure and balance to other sections by use of flow adjustment on top of each valve.

E. Check nozzles for proper coverage. Prevailing wind conditions may indicate that arc or angle of spray should be other than as shown on drawings. In this case, change nozzles to provide correct coverage and furnish record data to Owner's Representative with each change.

F. After the system is thoroughly flushed and ready for operation, each section of sprinklers shall be adjusted to control pressure at heads. Use the following method, one section at a time:
   1. Remove last head on section and install a temporary riser above grade. Install tee with pressure gauge attached on top of riser and re-install head with nipple on to tee.
   2. Correct operating pressure at last head of each section as follows: Spray and rotor heads - 30-35 psi.
   3. After replacing head, at grade, tamp thoroughly around head.
   4. Drip zone valve pressure regulating devices shall be set at not to exceed 40 psi.

**3.16 CLEAN-UP:**

A. The Worksite shall be thoroughly cleaned of all waste materials and all unused or salvaged materials, equipment, tools, etc.

B. After completion of the work, areas disturbed shall be leveled and the Worksite shall be raked clean and left in an orderly condition.

**END OF SECTION**

**SECTION 32 93 00**
**PLANTING**

## PART 1 GENERAL

### 1.01 SCOPE:

A. Perform all work required to complete the planting as described herein and shown on accompanying drawings.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE:

### 1.03 GENERAL CONDITIONS

### 1.04 GENERAL REQUIREMENTS - DIVISION 1

### 1.05 02810 IRRIGATION

### 1.06 STRUCTURAL SOIL

### 1.07 REFERENCE STANDARDS:

A. American Joint Committee on Horticultural Nomenclature: 1942 Edition of Standard Plant Names.

B. American Standard for Nursery Stock (ANSI 260), latest edition, American Association of Nurserymen.

### 1.08 QUALITY ASSURANCE:

A. All work shall be performed by skilled personnel within the industry in a workmanlike manner and supervised by an experienced foreman.

B. The contractor, when required, will submit samples of all trees, for the Landscape Architect and/or Owners approval. When approved, these will be tagged and maintained as representative samples for all future plant materials. Rejected material shall be removed from the site immediately. The Landscape Architect reserves the right to reject any material he deems unsatisfactory.

C. When required, the contractor shall also submit for approval sufficient quantities of loam, manure, peat moss and fertilizer as to be representative. All samples must be approved by the Landscape Architect before use in the job.

### 1.09 DELIVERY, STORAGE, AND HANDLING:

A. Deliver all packaged material in original unopened and undamaged containers bearing manufacturer's label identifying name, weight, analysis and any other pertinent data.

B. Protect plant material during delivery to prevent damage to root ball and desecration of leaves. Damaged material will be rejected.

### 1.10 WARRANTY PERIOD AND REPLACEMENT:

A. All trees and shrubs shall be warranted for one (1) years after Final Acceptance. Plants shall be in full leaf for a minimum of 30 days at the end of the warranty period. Termination of the warranty period will be extended as necessary to comply.

B. Plants used for replacement shall be of the same kind and size as those originally specified. All work, including materials, labor and equipment used in replacements, shall be at no cost to the owner. Any damage, including ruts in lawn or bed areas, incurred in making replacements, shall be immediately repaired.

C. Plant material will be replaced once at the owners request and at the end of the twelfth (12th) month. A list of material to be replaced shall be submitted to the Landscape Architect and/or Owner prior to any replacements being made.

### 1.11 ACCEPTANCE:

A. Substantial completion and contract close-out shall be in accordance with Division 1.

B. Final acceptance shall be when the contractor has completed to the Landscape Architect's satisfaction, the final punch list.

**1.12 MAINTENANCE:**

A. The contractor shall maintain all plant materials under this contract by watering, cultivating, weeding, spraying and replacing as necessary to keep plants in a vigorous, healthy condition until final acceptance.

**PART II PRODUCTS**

**2.01 MATERIAL:**

A. Plants (general): All plants shall be well-formed No. 1 grade or better nursery stock and shall meet the applicable standards noted herein for nursery stock and shall be subject to rejection by the Landscape Architect. All plants shall remain the property of the contractor until final acceptance.

B. Ornamental trees: Plants shall be healthy, vigorous, bushy, well-branched, of normal habit of growth for the species, and shall be free from disease, insect eggs and larvae. The specified sizes shall be before pruning, and the plants shall be measured with their branches in normal position.

C. Shade trees: Shall be healthy, vigorous, full-branches, well-shaped, and shall meet trunk diameter and height requirements of the plant list. Balls shall be firm, neat, slightly tapered and well burlapped. Any tree loose in the ball or with broken ball at the time of planting will be rejected. Any trees are subject to approval by the Landscape Architect.

D. Topsoil: Where additional topsoil is needed, it shall be fertile, sandy loam of natural occurrence, free of rubble, stones, lumps and perennial plant root stocks. The presence of noxious weeds will be cause for rejection.

**2.02 MULCH: SHREDDED CEDAR BARK.**

A. Compost: Back to Nature, composed cotton seed hulls with iron sulfate as manufactured by Back to Nature Resources, Inc., Dallas, Texas, or approved equal.
   1. Fertilizer: Osmocote 18-6-12, or approved equal. To be paid as part of the installed plant cost.
   2. Steel bed Edging: Ryerson Steel Bed Edging, 3/16" x 4" steel landscape edging with steel stakes as manufactured by Joseph Ryerson, Dallas, Texas.

**2.03 ACCESSORIES:**

**2.04 TREE WRAP: NOT USED ON THIS PROJECT.**

**2.05 TREE STAKES: SPLIT TEE METAL FENCE POST, GREEN.**

**2.06 WIRE, EYE BOLTS: NON CORROSIVE OF SUFFICIENT STRENGTH.**

**2.07 STRAPS FOR STAKING: 2” FLEXIBLE TREE STRAP**

**PART III EXECUTION**

**3.01 PREPARATION:**

**3.02 FROM GENERAL CONTRACTOR BEFORE COMMENCING WITH WORK. BEGINNING WORK UNDER THIS SECTION INDICATES ACCEPTANCE OF EXISTING SITE CONDITIONS.**

**3.03 ALL PLANTING BEDS SHOULD HAVE A MINIMUM OF 6" OF AMENDED TOPSOIL.**
   1. Outline all planting beds for approval by the Landscape Architect. Prior to commencing with bed preparation.
   2. Stake all tree locations for approval by the Landscape Architect prior to digging tree pits.
   3. Remove all weeds and grasses from planting beds. If Bermuda grass is present, it shall be eradicated by approved means.

**3.04 COMPOST OVER ENTIRE BED AREA TO A DEPTH OF SIX INCHES (6").**
   1. Azaleas and rhododendron shall be planted in 100% pure sphagnum peat moss. Place peat moss to a height of 4" above surrounding bed grade, (12" total depth).

**3.05 1. EXCAVATE ENTIRE AREA TO BE PLANTED TO A DEPTH OF 8" AND BACKFILL WITH**

**3.06 2. PEAT MOSS SHALL BE THOROUGHLY WETTED WITH WATER PRIOR TO PLANTING.**

**3.07 3. SCARIFY ROOT BALLS SO PLANTS WILL NOT BECOME ROOT BOUND.**

1. Position plants and groundcover on prepared beds prior to planting for approval of Landscape Architect.

**3.08 INSTALLATION:**

1. Plant in Landscape Architect's approved location, setting plant with top of ball even with top of bed, and compact soil carefully around each plant ball. Water each plant thoroughly with hose to eliminate air pockets. Plants shall be carefully pruned to remove dead or broken branches, and entire bed area shall be hand raked to a smooth, even surface.

**3.09 SPREAD AN EVEN 2" LAYER OF MULCH OVER ENTIRE PLANTING BED.**

1. Shade Trees: Will be planted in tree pits twenty four inches (24") greater in diameter than the size of the ball or root system. Scarify sides and slope pit bottom.
2. Ornamental Trees: Will be planted in tree pits eighteen inches (18") greater in diameter than the size of the ball or root system. Scarify sides and slope pit bottom.
3. All trees are to be set so that top of ball is even with finish grade or if poor soil conditions and with the architect’s approval 1/4 of the root ball above finish grade.
4. On all trees the top 6" of backfill shall consist of a 1:1 mixture of compost to soil.

**3.10 ON ALL TREES THOROUGHLY WATER TO ELIMINATE AIR POCKET AND FUTURE SETTLING.**

1. Around all trees form a circular ring free of any vegetation. For trees 3" and greater in caliper form a 5' diameter ring and for trees less than 3" caliper form a 3'-6" diameter ring. Circle shall be true in form and centered on tree.
2. Cut all strings and wires, etc. from around the top of the root balls and tree trunks.

**3.11 SPREAD AN EVEN 2" LAYER OF MULCH WITHIN ALL TREE RINGS.**

**3.12 PRUNE ALL TREES AFTER PLANTING TO REMOVE DEAD AND BROKEN BRANCHES.**

1. All trees shall be staked with two (2) metal split tee green fence posts and tied north and south with wire through tree straps.
2. Apply Osmocote at a rate of 1/2 pound per tree and as per the manufacture’s Recommendations for all shrub and groundcover planting beds.

**3.13 CLEANING:**

A. During the work, the premises are to be kept neat and orderly at all times. Storage areas for planting and other materials shall be organized so that they, too, are neat and orderly. All trash, including debris from removing weeds or rocks from planting areas, preparing beds, or planting plants, shall be removed from the site daily as the work progresses. All walk and driveway areas shall be kept clean by sweeping or hosing.

**END OF SECTION**

**SECTION 33 46 00**
**SITE DRAINAGE**

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Provide site drainage as shown and specified. The work includes:

**DRAINAGE STRUCTURES AND PIPING.**

**EXCAVATING AND BACKFILLING SITE DRAINAGE WORK.**

**RELATED WORK:**

**SITE ACCESS.**

**EARTHWORK**

**QUALITY ASSURANCE**

**COMPLY WITH SECTION 02000 SITE WORK REQUIREMENTS.**

A. Materials and methods of construction shall comply with the following:
   1. Oklahoma Department of Transportation Standards and Specifications.
      a. American Society for Testing and Materials ASTM).
   2. American Association of State Highway and Transportation Officials (AASHTO).

**AMERICAN CONCRETE PIPE ASSOCIATION (ACPA).**

A. Excavating, backfilling and compacting operations: Comply with Section 02220 requirements and as specified.

B. Obtain acceptance of Owner's Representative of installed and tested site drainage system prior to installing backfill materials.

C. Identify all existing underground utilities and their location.

**SUBMITTALS**

**COMPLY WITH PROVISIONS OF SECTION 01340.**

A. Provide site drainage record drawings:
   1. Legibly mark drawings to record actual construction.
      a. Indicate horizontal and vertical locations, referenced to permanent surface improvements.
      b. Identify field changes of dimension and detail and changes made by Change Order.

B. Provide manufacturer's product data for each type of pipe material.

**PROJECT CONDITIONS**

**KNOWN UNDERGROUND AND SURFACE UTILITY LINES ARE INDICATED ON THE DRAWINGS.**

A. Protect existing trees, plants, lawns and other features designated to remain as part of the landscape work.

B. Protect excavations by shoring, bracing, sheeting, underpinning or other methods as required to prevent cave-ins or loose dirt from entering excavations. Barricade open excavations and post warning lights at work adjacent to public streets and walks in accordance with OSHA requirements.

**UNDERPIN ADJACENT STRUCTURE(S) INCLUDING UTILITY SERVICE LINES WHICH MAY BE DAMAGED BY EXCAVATION OPERATIONS.**

**PROMPTLY REPAIR DAMAGE TO ADJACENT FACILITIES CAUSED BY SITE DRAINAGE EARTHWORK OPERATIONS. COST OF REPAIR AT CONTRACTOR'S EXPENSE.**

A. Promptly notify the Owner's Representative of unexpected subsurface conditions.

**PART 2 - PRODUCT**

**16.01 MATERIALS**

A. Site drainage piping: Provide types and sizes indicated. Provide matching couplings, fittings and accessory components to ensure continuity of the site drainage system.
   a. Reinforced concrete pipe fittings: ASTM C76, Class IV pipe or of equal strength sufficient to attain D-load, 0.01" of 2,000 lbs. with ASTM C443 "O" ring seals or compression type rubber gasket joints. Sizes to 10" diameter may be non-reinforced with equivalent strength.
   b. Corrugated Polyethylene Tubing: ASTM F405 and F667. A product which meets this specification is ADS N-12 perforated corrugated polyethylene tubing by Advanced Drainage Systems, Inc., Columbus, Ohio or conform to AASHTO M252.

B. Trench drains, manholes, catch basins, inlets: Provide type and sizes indicated.
   a. Frames, grates and covers: ASTM A48 grey cast iron, asphalt coated.
   2. Concrete masonry units: ASTM C139.
      a. Brick: ASTM C32, grade MS.
   3. Precast concrete manhole barrels and cones: ASTM C478, 5" wall thickness with ASTM C443 "O" ring gasket joints.
   4. Mortar:
      a. Mortar for jointing concrete pipe and for laying and parging concrete masonry:

**1 PART PORTLAND CEMENT AND 2 PARTS SAND.**

   a. Mortar for brickwork: 1 part Portland Cement, 1/2 part hydrated lime and 4-1/2 parts sand.

B. Fine granular fill: Clean natural sand.

C. Course granular fill: ¾" crushed limestone.

D. Concrete: 3,000 psi air entrained concrete complying with requirements of Section 03300 Cast-In-Place Concrete.

E. Earth fill: Natural sandy-clay subsoil, soil-rock mixtures, or approved excavated materials, free of foreign matter, organic material and debris.
   1. Excavated materials removed in site drainage trenching operation may be used as backfill when acceptable to the Owner's Representative.

F. Soil separator: Rot resistant polypropylene filter fabric, permeable and unaffected by freezing and thawing.

**PART 3 - EXECUTION**

**18.01 DESCRIPTION**

A. Lay out site drainage work and establish extent of excavation by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels and elevations.

B. Do not cover or enclose work of this Section before obtaining required inspections, tests, approvals and location recording.

C. Remove existing paving, including base material, as required to accommodate site drainage work. Saw cut existing paving to provide uniform straight transition at intersection of new to existing paving.

**EXISTING UTILITIES**

**CONFORM TO SECTION 02000 SITE WORK.**

**INSTALLATION**

A. Perform excavating and backfilling as required to install site drainage work.

B. Provide trench wall support and pumping of surface and ground water as required to provide suitable conditions.

C. Excavate trenches to accommodate indicated bedding conditions and material. Trim and shape trench bottoms to proper line and grade, free of irregularities. Remove unstable material and replace with compacted fill.

D. Install site drainage system true to grade and alignment indicated.
   1. Provide necessary equipment for lowering pipe safely into trenches. Handle pipe and accessories to prevent damage. Damaged materials replaced at Contractor's expense.
   2. Do not place pipe in water, nor when trench or weather is unsuitable for site drainage.
      a. Remove all dirt and foreign material from pipe before installation. Provide bulkheads as required to prevent entrance of dirt or water after installation.
   3. Lay and fit pipe sections to provide a smooth, uniform invert, with sealed joints and full bearing in bedding material. Provide continuous fall in flow direction.
   4. Excavate bell holes under each bell to ensure uniform bedding for all types of bell and spigot piping.
   5. Install pipe joint gaskets in accordance with manufacturer's instructions. Install concrete pipe in accordance with ACPA "Concrete Pipe Field Manual".
   6. Cut pipe ends entering structures flush with inner face of structures.
   7. Provide soil separator over granular backfill at perforated site drainage piping.
   8. Extend site drainage system to outfall indicated and make required connection.
   9. Obtain required inspections and perform testing prior to backfilling. Remove obstructions, replace damaged components and retest as required. Provide a satisfactory free flowing drainage system.
   10. Sub-drain pipe installation: Conform to AASHTO M252-851.

E. Backfill trenches with an approved backfill material, free from large clods, stones and debris.
   1. Backfill trenches in 8" compacted layers until there is a cover of not less than 24" over piping. Place remaining backfill material in 12" compacted layers.
      a. Backfill evenly on both sides of piping for full depth. Provide thorough compaction of fill under pipe haunches.
   2. Provide granular backfill at all paved areas.
      a. Provide concrete encasement where indicated.

F. Mechanically compact backfill. Water settling, puddling and jetting as a compaction method are not acceptable.

G. Fill, compact and restore to original level and condition all settlement.

H. Replace paving, lawns and finished surfaces removed to accommodate the site drainage system, except where new surfaces are provided as part of the work.

I. Construct trench drains, catch basins, manholes, inlets and other drainage structures as indicated.
   1. Install drainage structures on a sound cast-in-place or pre-cast segmented concrete base.
   2. Lay radial and batter concrete masonry with full mortar joints completely filled with Portland cement mortar. Strike joints flush with surface of concrete masonry.
   3. Horizontal joints shall not exceed 1/2". Vertical joints shall not exceed 1/4" on their interior surface.
      a. Provide headers where required to adjust frames to grade, breaking joints between courses.
   4. Parge inside and outside face of masonry structure walls with 1/4" mortar.
   5. Construct flow channels with concrete or brick conforming to the inside diameter of connecting lines. Make changes in grade gradually and make changes in line with true curves.
   6. Set frames and covers to required grade and bed in place with mortar.

7. Cold weather protection: Provide all necessary means for heating concrete, masonry materials and mortar to protect concrete and masonry work during and after installation from damaged by frost and freezing.
8. Perform no work when the temperature is below 25 degrees F. (ambient).

**DISPOSAL OF WASTE MATERIALS**

A. Transport excess excavated materials, including rock, to designated disposal area on Owner's property. Stockpile or spread as directed. Remove from site and legally dispose of trash and debris.

**CLEANING**

A. Maintain site drainage piping and structures in workable condition during construction operations.

B. Flush site drainage system with water in sufficient volume to obtain free flow through each line. Remove all silt, trash and debris just prior to acceptance of work.

C. Upon completion of site drainage work, remove tools and equipment. Provide site clear, clean, free of debris and suitable for site work operations.

**END OF SECTION**