Competitive Sealed Proposal

Boerne High School
Courtyard Upgrades
RFCSP# 22-039

BOERNE INDEPENDENT SCHOOL DISTRICT
FACILITIES AND OPERATIONS
ENGINEERING SERVICES DEPARTMENT
235 JOHNS ROAD
BOERNE, TEXAS 78006
830-357-2000

Proposals Received at Administration Facility
235 Johns Road, Boerne, Texas 78006
Until 2:00 p.m. on April 11, 2023

March 20, 2023

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DIVISION 00

SECTION 00 21 13 INFORMATION FOR OFFERORS

1. RECEIPT OF COMPETITIVE SEALED PROPOSALS:

Competitive Sealed Proposals will be received until 2:00 p.m., Central Standard/Daylight Saving Time, Tuesday, April 11, 2023, at the Boerne Independent School District Central Office.

Boerne ISD – Administration Facility
Attention: Eddie Ashley, Director of Purchasing
235 Johns Rd
Boerne, Texas 78006

2. ACCURACY OF PROPOSALS

It is specifically required that each Offeror warrants that his/her competitive sealed proposal contains true, correct and complete information, and that the Offeror will make no claim for omission or error. Each bid is based on information derived from the Drawings, Specifications and any Addenda issued. Neither the Owner nor the design team assumes any responsibility for errors or misinterpretations resulting from the Offeror's use of incomplete bid documents. Therefore, only complete sets of bid documents will be made available.

Each Offeror shall review the Project Manual Table of Contents and List of Drawings to confirm receipt of complete Bid Documents. Notify Architect immediately if believe you have received incomplete bid documents.

By submitting a bid, each Offeror understands and acknowledges that these contract documents, including the drawings, specifications, addenda, etc. are correlative and complementary and have equal authority and priority. Although every effort has been made to coordinate the documents, items specifically mentioned in the specifications, but not shown on the drawings or items shown on the drawings but not specially mentioned in the specifications shall be provided as if they were both specified and shown in the drawings. It is the intent of these contract documents to be complete, all inclusive, and to provide an installation complete in every respect.

3. PRE-PROPOSAL CONFERENCE

A Pre-Proposal Conference meeting will be held at 8:00 a.m., Thursday, March 30, 2023, at the Boerne High School – Library, 1 Greyhound Lane, Boerne, TX 78006. All firms interested in submitting proposals may attend, ask questions, and discuss the projects with the Architect, Engineers, and Owner's representatives. Offerors are strongly encouraged to attend, but attendance is not mandatory. Information pertinent to the project will be clarified and issued in an Addendum, issued to all Bid Document holders.

4. REQUIREMENTS OF COMPETITIVE SEALED PROPOSALS

In order for your competitive sealed proposal to be evaluated it must contain the following completed information:

A. Competitive Sealed Proposal Form

B. Supplemental Proposal Form – Subcontractors

C. Contractors Qualifications Statement, A-305

D. Audited *2021* Financial Statement and *2022* Financial Statement

E. Proposal Bond or Cashier's Check for 5% of the Base Proposal (see paragraphs 9 and 10 below for additional requirements)

F. Felony Conviction notice

FELONY CONVICTION NOTIFICATION

State of Texas legislative Senate Bill No. 1, Section 44.034, Notification of Criminal History, Subsection (a), states "a person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony."

Subsection (b) states "a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract."

This Notice Is Not Required of a Publicly Held Corporation.

Contractor shall complete Felony Conviction Notification Form. Include this form as part of the proposal materials submitted.

G. List of Texas litigation for last three years. If none, provide a signed notarized affidavit stating that the Offeror has not been involved in any litigation in Texas from January 1, 2010 to the present.

H. All other information requested in the Information for Offerors Specification Section

Note: The Offeror may reproduce the Competitive Sealed Proposal Form. Submit three complete copies of all supplemental required proposal information. Multiple copies are not required of the Proposal Forms. Portable Document Format (PDF) files are available upon request from Pfluger Architects should the Offeror wish to complete the forms electronically.

5. OFFEROR'S REPRESENTATIONS: By submitting his/her competitive sealed proposal, the Offeror represents he/she:

A. Understands and has carefully read all of the Project Documents;

B. Has examined the project site, and is familiar with the conditions under which the work will be performed; and

C. Will comply with the requirements of the project documents.

6. COMPETITIVE SEALED PROPOSALS (1 ORIGINAL AND 2 COPIES)

A. Complete the "Competitive Sealed Proposal Form" included in the "Specifications," and labeled "Bid Form," and then place it in an envelope, sealed, and marked as follows:

Boerne ISD – Administration Facility
Attention: Eddie Ashely, Director of Purchasing
235 Johns Rd
Boerne, Texas 78006

B. Proposals will be received for the furnishing of all labor, materials and equipment and performing all work required and must be based upon contract documents prepared by Moy Tarin Ramirez Engineers, LLC.

C. In the event the proposal is mailed, it is the responsibility of the Offeror to allow enough time in transit for proposal to be received by owner prior to date and hour of proposal opening.

Proposal may be delivered by hand to the Superintendent of Schools office prior to opening. Telephone, telegraphic, or fax proposals or proposal modifications will not be accepted.

D. Proposals received prior to the advertised hour of opening will be kept securely sealed. The owner's representative whose duty it is to open them will decide when the specified time has arrived and no proposal received thereafter will be considered. The owner or his representatives will not be responsible for the premature opening of, or the failure to open, a proposal not properly addressed or identified.

E. In case of ambiguity or lack of clearness in the stated price in the proposal, the owner will adopt the price written in words.

F. Any proposal which is not based upon the drawings and specifications, or which contains any qualification of same, or which is not properly completed and signed by the Offeror, may be rejected by BISD, the owner.

7. EVALUATION OF COMPETITIVE SEALED PROPOSALS

Within 30 days after the opening of the competitive sealed proposals, District officials and the project Architects shall review all proposals to determine if they contain the information required in Paragraph 5, “Requirements of Competitive Sealed Proposals”. Upon confirmation of qualification contents, Boerne ISD and the Architects shall evaluate the proposals in accordance with the advertised selection criteria and Offerors submission of the following information related to each criteria. The owner reserves the right to waive any irregularities and paragraph 5, “Requirements of Competitive Sealed Proposals” as long as they do it for all Offerors.

A. Relevant Expérience / Project Support / Litigation History (20 Points)

Required Information:

1. Submit information indicating the years that the Offeror’s company has been in business as a commercial construction firm capable of bonding a single project costing equal to the amount of work the contractor is proposing to complete. Provide Contractor’s Qualification Statement AIA A305, 2020 Edition to include all required information.

2. Chronologically list all of the school projects the Offeror has completed in the past ten (10) years, stating the name of the project, the address of the project, the date the project was completed, project size and cost, the name, address and telephone number of the project architect and engineer, the owner contact and telephone number for the project, and the project PM and PS. For each project provide the original contract cost and the final cost. Also list the original contract construction time in days and the actual time it took to reach substantial completion and to submit final closeout documents.

3. List of all projects the Offeror is currently working on, stating the name of the project, the address of the project, the start date and the date of the project is to be completed, project size, the name, address and telephone number of the project architect and engineer, the owner contact for the project, and the name of the project’s PM and PS.

4. Owners and the Architects reserve the right to contact any current or past project listings.

5. Provide a list of all Texas litigation your firm has been involved with for last three years. If none, provide a signed notarized affidavit stating that the Offeror has not been involved in any litigation in Texas from January 1, 2010 to the present. List all current ongoing disputes (those that your firm has had to employ an attorney to act on your behalf) your firm has ongoing with any owner or subcontractor that is related

to a construction project. Briefly describe the situation and how you see it being resolved.

6. The Offeror's complete organizational chart showing key team members for this project, and their location (on-site or off-site) during project construction. Include information on all company owned equipment, scheduling techniques, and a current EMR Safety Rating (not a letter, but an actual certified document).

B. Project Management Ability (10 points)

Required Information:

1. The resumes of the Project Manager (PM) and Project Superintendent (PS), and the names of all projects that they have completed together.
2. Provide a chronologically organized complete list of all projects that the PM and PS have each worked on during the past ten (10) years, whether or not they were working for the Offeror's company at the time. For each project, provide the project name, period of time that it was constructed size (area), cost, contact names and telephone numbers for both the architectural firm and the owner as well as the project address including the state and county in which the project is located. State the role served by the PM and PS in each of the projects listed.

C. Past Performance (15 points)

Points will be awarded based on the evaluation committee's knowledge of the Contractor's past experience with BISD or others per the following criteria:

1. Timely Completion
2. Cooperation with Owner(s), Owner's Rep & Consultants
3. Coordination of Trades
4. Quality of Workmanship
5. Warranty Responsiveness
6. Punch List Length & Completion
7. Cooperation on Changes in Cost, Time, and Scope

D. Subcontractors and Suppliers (20 points)

1. Provide a completed schedule of Subcontractors and Suppliers per the form included in this Project Manual.
2. If the General Contractor wishes to indicate any portion of work will be self-performed, the General Contractor must indicate on AIA A-305, 2020 Edition Contractor's Qualification Statement that they are capable of performing that particular scope of work.
3. Overall points will be weighted at a factor to be distributed evenly among all proposed Subcontractors and Suppliers and averaged to equal a total of 20 points possible overall.

E. Price and Financial Stability (30 points)

1. Required Information: The prices on Offeror's completed "Competitive Sealed Proposal Form"
2. Provide a current audited financial statement (No earlier than December 2017). Also, indicate the total number of staff your firm has employed for each of the past 3 years. Separate each years total employees into the totals for office or field staff categories.

3. The owner will consider the total contract cost as part of its evaluation. The owner shall have the right to accept alternates in any order or combination unless otherwise specifically provided in the Proposal Documents.

   The offeror submitting the lowest proposed amount shall receive the highest number of points in the category, and the Offeror submitting the highest proposed amount shall receive the lowest number of points awarded in this category.

F. Overall Completeness / Quality of Submittal and Provided Information (5 points)

   The Evaluation Committee reserves the right to distribute up to 5 points at its discretion based on the completeness and quality of the submittal received.

8. PROPOSAL SURETY

Each proposal must be accompanied by a Proposal Security ("Bid Bond") on a form similar to AIA document A310 in the amount of five (5%) percent of the base proposal amount. This bond shall be paid to the owner in the event that the Offeror, if awarded the contract, should fail within (7) days following the award to execute and return the contract, together with the Performance and Payment Bonds with acceptable surety. In lieu of a Bid Bond, as Proposed Security, Owner may accept a deposit in the amount of five (5%) percent of the base proposal amount by cashiers check issued by a bank satisfactory to the owner.

9. ACCEPTABLE SURETY

"Acceptable surety" is defined as an insurance company, duly authorized to do business in the State of Texas and license by the State of Texas to issue surety bonds, and having an acceptable record, in the opinion of Owner, for faithful performance during the preceding five years of all undertaking to Owner, for faithful performance during the preceding five years of all undertaking to Owner. Notwithstanding any other law to the contrary, the Owner may establish financial criteria for the surety companies that provide payment and performance bonds.

10. RESERVATION OF RIGHTS

BISD, the owner, reserves the right to reject any and all competitive sealed proposals, and to waive any informality or irregularity in proposals, when such rejection or waiver is in the best interests of the Owner. Also, the owner reserves the right to accept any base proposal, and/or any combination of a base proposals and alternate proposals.

11. TERMINATION OF PROPOSAL

No proposal shall be withdrawn or terminated for a period of forty-five (45) days subsequent to the opening of proposals without consent of the Owner except that if a proposal is accepted and a contract executed or all proposals rejected.

12. PRICING

A. Proposal prices may not be changed after opening of proposal has occurred.

B. In accordance with the Texas Education Code, section 44.040 (e), BISD and its architect may discuss with the selected Offeror, options for a scope or time modification and any price change associated with such modification.

C. Offeror's prices are firm for forty-five (45) days after opening of the competitive sealed proposals has occurred.

D. All prices for supplies and materials shall be quoted F.O.B. Destination.

E. Where unit prices are requested, the Offeror shall state the unit price on the Proposal Form in the appropriate space.

13. OFFERORS QUESTIONS ABOUT PROJECT DOCUMENTS

Offerors shall submit any questions regarding the project documents including, but not limited to, the Specifications and Drawings, in writing, to the project architect for clarification a minimum of five (5) days prior to proposal closing.

All changes and/or additions to the project documents shall be done by a written addendum published by the architect to all Offerors, and such addendum(s) shall become a part of the Offeror's proposal.

All other oral or written interpretations, or explanations, corrections and/or approvals, do not constitute a change to the project documents, and therefore, should not be relied upon as such.

14. SUBSTITUTIONS (PRIOR TO PROPOSAL DATE)

(Note**:** See Specifications Section 01 60 00 PRODUCT REQUIREMENTS for information about processing of substitutions after bids are received.)

Where a definite product is specified, it is not necessarily the intention to discriminate against other products but rather to set a definite standard and indicate the quality and capacity of equipment found satisfactory for the owner's use. However, all proposed substitutions must be reviewed and approved by the owner prior to receipt of proposals and must be listed as approved in written addendum (verbal/oral approvals are not acceptable or binding). Sufficient information should accompany a proposed substitution to enable the owner to render a decision. Substitute items shall not deviate in basic construction and performance from the specified item. Proposed substitutions must be submitted for approval a minimum of seven (7) days prior to proposal closing. All approved substitutions will be noted in addenda. Oral approvals or approval in any manner, other than written addenda, are not acceptable and will not be recognized. All addenda noting approval of a manufacturer only and not a specific product, are with the requirement that the manufacturer produces a product that meets the original specified item in terms of materials, finishes, gauges and thickness, dimensions, quality, available color selection, etc.

15. ALTERNATE MANUFACTURERS

Where alternate manufacturers are noted as approved in specification, drawings, addenda, etc. and no specific product or model number is noted, it shall be treated and processed the same as a substitution. The manufacturer is approved; however, the specific item proposed by the manufacturer shall be submitted for approval. The item shall not deviate in basic construction, features, operation, and performance from the specified item. The approved manufacturer's proposed item shall meet the original specified item in terms of materials, finishes, gauges and thickness, dimensions, quality, available color selections, etc. Approved manufacturer's item shall be processed for approval by Owner, Architect/Engineer same as "Substitutions".

16. SALES TAX

Under Ruling No. 9, Repairment and Contractor (amended April 3, 1962) Limited Sales, Excise and Use Tax Rules and Regulations, Comptroller of Public Accounts, State of Texas, tangible personal property (materials) becoming a part of improvements and structures and incorporated in such, under lump sum contracts, are not subject to sales tax when the cost of such materials is segregated from the cost of skill, labor, and all other materials not becoming a part of the improvement of structure. Under the interpretation of this ruling, contract will state not only the lump sum but also the value of materials and value of skill, labor, etc. Proposals are to be tendered in lump sum only.

17. CONTRACT SECURITY

Performance and Payment Bonds will be required on this project. The successful proposer must deliver to the owner a fully executed Performance and Payment Bond in an amount of one hundred percent (100%) of the accepted proposal as security for the faithful performance of the contract and payment of all persons performing labor and furnishing materials in connection with this contract. The Performance and Payment Bonds shall meet the requirements of Tex.Rev.Civ.Stat.Art.5160 (The McGregor Act) as amended. All bonds shall be issued on AIA Document A-312 by a surety company licensed, listed, and authorized to issue bonds in the State of Texas by the Texas Department of Insurance. The surety company shall also provide such other information as may be necessary to document net worth, stability, total bonding capacity, other projects under coverage and to establish adequate financial capacity for this project. Should the bond amount be in excess of ten percent (10%) of the surety company's capital and surplus, the surety company issuing the bond shall certify that the surety company has acquired reinsurance, in a form and amount acceptable to the owner, to reinsure the portion of the risk that exceeds ten percent (10%) of the surety company's capital and surplus with one or more reinsurers who are duly authorized and admitted to do business in Texas and that amount reinsured by any reinsurer does not exceed ten percent (10%) of the reinsurer's capital and surplus.

The contractor shall require any attorney-in-fact who executed the required bonds in behalf of the surety to affix thereto an original certified and current copy of a Power of Attorney evidencing the authority of such attorney-in-fact to so execute such bonds within the State of Texas indicating the monetary limit of such power and authority.

18. CONTRACT FORMS

The latest edition of the following forms, appropriately completed, will be used to execute the contract between the owner and contractor.

AIA Document A312:	Performance Bond
AIA Document A312:	Payment Bond
AIA Document A101-2017:	Standard Form of Agreement Between Owner and Contractor (Stipulated Sum)

19. RETAINAGE

Article 5 of the A101-2017, Owner-Contractor Agreement, will allow 95% progress payment for the duration of the contract. Retainage will be reduced for phases of the project that are substantially completed.

20. OWNER

Whenever the term "Owner" is used in this specification, it shall refer to Boerne Independent School District, Boerne, Texas. All papers required to be delivered to the Owner, unless otherwise specified, shall be delivered to Attention:

Dr. Thomas Price, Superintendent of Schools
235 Johns Rd
Boerne, Texas 78006

21. ARCHITECT

Whenever the term "Architect" is used in this specification, it shall refer to:

Moy Tarin Ramirez Engineers, LLC
12770 Cimarron Path, Suite 100
San Antonio, Texas 78249
(210) 698-5051, Fax (210) 698-5085

who by contract is authorized by the owner to prepare all contract documents as well as administer the construction contract.

22. APPLICABLE LAW

This agreement shall be governed by the Uniform Commercial Code. Wherever the term "Uniform Commercial Code" is used, it shall be construed as meaning the Uniform Commercial Code as adopted in the State of Texas effective and in force on the date of this agreement.

23. VENUE

All parties agree that venue for any litigation arising from this contract/project shall lie in county the project resides.

24. TEXAS HOUSE BILL 1295 (SECTION 2252.908 of TEXAS GOVERNMENT CODE)

Pursuant to House Bill 1295, awarded Contractor shall complete and submit notarized Certificate of Interested Parties (Form 1295) prior to award of Notice to Proceed.

END OF INFORMATION FOR OFFERORS

PROPOSAL FORM

PROPOSAL OF:

_____

(Name of Offeror)

TO: Eddie Ashley, Purchasing Director
Boerne Independent School District
235 Johns Road
Boerne, Texas 78006

FOR: *Boerne High School Courtyard Upgrades*

Dear Owner:

The Offeror named herein (hereinafter called "Offeror"), in compliance with the Invitation to Offerors and Instructions to Offerors for the _____ ("Project") for the Boerne Independent School District, Boerne, Texas ("Owner"), having visited the Project site and carefully examined the Project Drawings, Specifications, Addenda Nos. _____, and all other Contract Documents (as such term is defined in the Instructions to Offerors), hereby, offers to enter into a contract to furnish all labor, materials, tools, equipment, transportation, machinery, supplies, insurance, permits, taxes and services necessary to complete the Work in accordance with the Contract Documents, within the time set forth herein, and at the prices stated herein. The Offeror fully understands the intent and purpose of the Contract Documents and the conditions of offer as set forth herein and in the Invitation to Offerors and the Instructions to Offerors. The Offeror hereby covenants and agrees that claims for additional compensation or extensions of time because of Offeror's failure to familiarize itself with the Contract Documents or any condition at the Project site which might affect the Work will not be allowed.

1. **Base Proposal:** The Offeror agrees to execute all of the Work described prices in the Drawings, Specifications and other Contract Documents, including allowances, for the sum of _____ and _____/100 DOLLARS ($_____).
   Base proposal is to include an Owner's Contingency of $75,000.00 and a Graphics Allowance of $5,000.00 for a total sum of $80,000.00.
   In case of a difference in written words and figures in this Proposal Form, the amount stated in written words shall govern.

2. **Additive/Deductive Alternates:** The Offeror agrees that the Base Proposal shall be adjusted by the amounts indicated below for each alternate which is accepted by the Owner. The Owner reserves the right to accept or reject any alternate in the order of the Owner's choosing.

   A. <u>Alternate No. 1:</u>
   Contractor to provide artificial turf section per Landscape details in lieu of solid sodding. Reference Sheet C4.7.
   Add the sum of _____
   and _____*/100 DOLLARS ($*_____*) to the Base Proposal.*

B. <u>Alternate No. 2:</u>

Contractor to provide artificial turf section per Civil details in lieu of solid sodding. Reference Sheet C4.8.

Add the sum of _____

and _____*/100 DOLLARS ($*_____*) to the Base Proposal.*

C. <u>Alternate No. 3:</u>

Contractor to provide triangular shade structures per Civil Grading Keynote 22 and Specification Section 13 31 23.

Add the sum of _____

and _____*/100 DOLLARS ($*_____*) to the Base Proposal.*

3. **<u>Unit Prices:</u>** The Offeror agrees that the Base Proposal shall be adjusted by the amounts indicated below for each unit price indicated below:

A. Unit cost per square yard (SY) to remove existing concrete flatwork section and provide new concrete flatwork per Detail No. 1, Sheet C7.0.

_____*and* ____*/100 DOLLARS ($*_____)

B. Unit cost per square yard (SY) to remove existing asphalt section and provide new asphalt per Detail No. 2, Sheet C7.0.

_____*and* ____*/100 DOLLARS ($*_____)

C. Unit cost per one (1) single sidewalk drain per Detail No. 7, Sheet C7.0. Contractor to assume the sidewalk drain is 8'-0" long.

_____*and* ____*/100 DOLLARS ($*_____)

D. Unit cost per one (1) downspout connection per Detail No. 2, Sheet C7.1.

_____*and* ____*/100 DOLLARS ($*_____)

E. Unit cost per one (1) one-way cleanout per Detail No. 1, Sheet C7.1.

_____*and* ____*/100 DOLLARS ($*_____)

F. Unit cost per five (5) linear feet of handrail per Detail No. 8, Sheet C7.1.

_____*and* ____*/100 DOLLARS ($*_____)

G. Unit cost per ten (10) linear feet of 6" SDR26 PVC storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____)

H. Unit cost per ten (10) linear feet of 18" SDR26 PVC storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

I. Unit cost per ten (10) linear feet of 18" RCP storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

J. Unit cost per ten (10) linear feet of 18" RCP ARCH storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

K. Unit cost per ten (10) linear feet of 18" ALUMINIZED STEEL (ULTRAFLO) ARCH storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

L. Unit cost per ten (10) linear feet of 24" RCP storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

M. Unit cost per ten (10) linear feet of 24" RCP ARCH storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

N. Unit cost per ten (10) linear feet of 30" RCP ARCH storm installation per Detail No. 7, Sheet C7.1. Contractor to assume a 4'-6' installation from finish grade to invert of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

O. Unit cost per ten (10) linear feet of 4" C900 DR 18 per Detail No. 1, Sheet C6.3. Contractor to assume a 4'-0" installation from finish grade to top of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

P. Unit cost per ten (10) linear feet of 8" C900 DR 14 per Detail No. 1, Sheet C6.3. Contractor to assume a 4'-0" installation from finish grade to top of pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

Q. Unit cost per ten (10) linear feet of 2-1/2" Gas pipe.

_____*and* ____*/100 DOLLARS ($*_____*)*

R. Unit cost per one (1) 8" gate valve per Detail No. 3, Sheet C6.3.

_____*and* ____*/100 DOLLARS ($*_____*)*

4. **Time for Completion:** If awarded the Contract, the Offeror agrees to commence the Work within 14 days after notice of top ranking is given by the Owner, and assuming such notice is given on or before **April 25, 2023***,* and to achieve Substantial Completion for the Work on or before **August 4, 2023.**

   Completion Date Alternate: In the event the Offeror elects to provide a completion date/ contract time earlier than the Base Proposal requirement, the Completion Date Alternate below should be completed in full. If no alternate date is provided by the Offeror, the Completion Date Alternate may be left blank. The Owner reserves the right to accept or reject any alternate in the order of the Owner's own choosing.

   The Offeror agrees to achieve Substantial Completion of the Work on or before _____, (_____) consecutive calendar days to Substantially complete the work from a notice to top ranking given no later than_____

5. **Proposal Security:** A certified check or proposal bond in the amount equal to five percent (5%) of the Base Proposal, plus all additive alternatives, if applicable, shall be attached to the Proposal Form.

6. **Contractor's Personnel:** The Offeror agrees to employ the following individuals for the entire duration of the Work at the positions indicated, and agrees not to remove them from the Work nor replace them with others except as otherwise allowed in the Contract Documents or approved in writing by Owner:

   Project Superintendent: _____

   Project Manager: _____

7. **Representations:** By execution and submission of this Proposal, the Offeror hereby represents and warrants to Owner as follows:

   (a) The Offeror has prior experience on construction projects of the same or similar type, nature and class as the Work for the Project.

   (b) The Offeror has read and understands the Proposal Documents and the Contract Documents, and this Proposal is made in accordance with the Proposal Documents.

   (c) The Offeror has inspected the Project site, is familiar with the local conditions under which the Work is to be performed, and has correlated the Offeror's site observations with the requirements of the Contract Documents.

   (d) To the fullest extent permitted by applicable law, the Offeror waives any claim it has or may have against the Owner, the Architect/Engineer, and their respective trustees, officers, shareholders, directors, partners, agents, contractors, consultants and employees arising out of or in connection with the administration, evaluation or recommendation of any proposals; waiver of any requirements under the Proposal Documents or the Contract Documents; acceptance or rejection of any proposals; and the award of the Contract.

8. **Attachments:** The following attachments are incorporated herein:

Attachment 1 - Contractor's Qualification Statement (AIA Form A305)
Attachment 2 - Proposed Subcontractors and Supplies (1 submitted with proposal documents)
Attachment 3 – Contractor's Asbestos Free Affidavit (submitted at project closeout)
Attachment 4 - Felony Conviction Disclosure Statement
Attachment 5 - Hold Harmless Agreement
Attachment 6 – Financial Statements
Attachment 7 – Non-Collusion Affidavit
Attachment 8 – Out of State Certification
Attachment 9 - Certificate to Authority transact business in Texas
Attachment 10 - Authority to do business under an assumed name
Attachment 11 - Federal Tax ID
Attachment 12 - Certificate of Good Standing
Attachment 13 - Certificate of Interested Parties – Form 1295

Exhibit A – Contractor's Relevant Experience
Exhibit B – Contractor's Project Management Ability
Exhibit C – Contractor's Past Performance

OFFEROR:

SIGNATURES OF OWNERS REPRESENTIVE: ***(Note, if different than CEO/ President of the Business Entity Submitting, attach corporate resolution or other instrument indicating person that the authority to bind the business entity and proposal security)***

Name:_____

Title:_____

Date:_____

ATTACHMENT 1
Contractor's Qualification Statement (AIA Form A305)

ATTACHMENT 2

Proposed Subcontractors and Suppliers

Proposed Subcontractors: Subject to by the Owner and Architect, the PROPOSER agrees to employ the following named Subcontractors for the following trades (insert only one name for each item of work, or if the item of work is not to be subcontracted, the PROPOSER shall insert the PROPOSER's own name). Insertion of more than one name will result in a deduction of points during the evaluation process.

ITEM OF WORK	PROPOSED SUBCONTRACTOR	ADDRESS (City & State)
Demolition	_____	_____ _____
Sitework	_____	_____ _____
Concrete	_____	_____ _____
Site Utilities	_____	_____ _____
Electrical	_____	_____ _____
Landscaping	_____	_____ _____
Synthetic Turf Supplier	_____	_____ _____
Synthetic Turf Installer	_____	_____ _____

ATTACHMENT 3
(SUBMITTED WITH CLOSE OUT DOCUMENTS)

CONTRACTOR'S ASBESTOS FREE AFFIDAVIT

I understand that the Boerne Independent School District, in order to protect the students, staff and public in general from any unnecessary exposure to asbestos fibers, and to comply with the Asbestos Hazard Emergency Response Act, prohibits the use of asbestos containing materials in all forms of construction and operation of their facilities.

I certify that I am familiar with the materials used in the construction of, and incorporated into, the construction described below. I further certify that, to the best of my knowledge and belief, no asbestos containing materials, either friable or otherwise, were used in the process of constructing or incorporated into the construction of this project.

DATE: _____

PROJECT: _____

JOB DESCRIPTION: _____

_____

CONTRACTOR: _____

_____

_____

_____
Contractor's Signature Date

Failure to complete this waiver constitutes non-compliance with the job specifications and an unacceptable job.

STATE OF TEXAS δ
δ
COUNTY OF KENDALL δ

This instrument was acknowledged before me on the _____ day of _____, 20_____, by _____

_____
Notary Public, State of Texas

My Commission Expires: _____

ATTACHMENT 4
FELONY CONVICTION DISCLOSURE STATEMENT

State of Texas Legislative Senate Bill No. 1, Section 44.034, Notification of Criminal History, Subsection (1), states "a person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator has been convicted of a felony. A notice must include a general description of the conduct resulting in the conviction of a felony.

Subsection (b) states "a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract.

I, the undersigned agent for the firm named below, certify that the information concerning notification of felony conviction has been reviewed by me and the following information furnished is true to the best of my knowledge.

_____
Vendor's Name

_____
Signature of Authorized Company Official

_____
Authorized Company Official's Name (Please Print)

☐ My firm is a publicly held corporation; therefore, this reporting requirement is not applicable.

☐ My firm is not owned or operated by anyone who has been convicted of a felony.

☐ My firm is owned or operated by the following individual(s) who has/have been convicted of a felony:

_____

_____

ATTACHMENT 5
HOLD HARMLESS AGREEMENT

The Contractor shall defend, indemnify, and hold harmless, Boerne Independent School District and all of its trustees, officers, agents, and employees from and against all suits, actions, or claims of any character brought for or on account of any injuries or damages (including death) received or sustained by any person or property on account of, arising out of, or in connection with, any negligent act or omission of Contractor or any agent, employee, subcontractor or supplier , of Contractor in the execution or performance of the Contract for _____ ("Project") designated as Project No. _____.

The Contractor shall also defend, indemnify and hold harmless, Boerne Independent School District and all of its trustees, officers, agents and employees, from and against claims by any subcontractor supplier, laborer, materialman or mechanic for payment for work or materials provided on behalf of the Contractor in the performance of the Contract and all such claimants shall look solely to Contractor and not Boerne Independent School District for satisfaction of such claims.

This Hold Harmless Agreement shall be binding upon the undersigned, and its successors, legal representatives, heirs and assigns.

DATED this _____ day of _____, 20_____.

CONTRACTOR:
_____

By:_____
Name:_____
Title:_____

STATE OF TEXAS δ
δ
COUNTY OF KENDALL δ

This instrument was acknowledged before me on the _____ day of _____, 20_____, by _____

_____
Notary Public, State of Texas

My Commission Expires: _____

ATTACHMENT 6

Financial Statements

ATTACHMENT 7

NON-COLLUSION AFFIDAVIT

STATE OF TEXAS §
§
COUNTY OF KENDALL §

By the signature below, the signatory for the Offeror certifies that neither he nor the firm, corporation, partnership or institution represented by the signatory or anyone acting for the firm bidding this project has violated the antitrust laws of this State, codified at Section 15.01, *et seq.*, Texas Business and Commerce Code, or the Federal antitrust laws, nor communicated directly or indirectly the bid made to any competitor or any other person engaged in the same line of business, nor has the signatory or anyone acting for the firm, corporation or institution submitting a bid committed any other act of collusion related to the development and submission of this bid proposal.

Signature: _____

Printed Name: _____

Printed Name: _____

Title: _____

Company: _____

Date: _____

SUBSCRIBED and sworn to before me the undersigned authority by _____ the _____ of, _____on behalf of said bidder.

_____
Notary Public in and for the
State of Texas

My commission expires: _____

ATTACHMENT 8
Out of State Certification

As defined by Texas House Bill 602, a "nonresident Proposer" means a Proposer whose principal place of business is not in Texas, but excludes a contractor whose ultimate parent company or majority owner has its principal place of business in Texas.

☐ I certify that my company is a "Resident Proposer":

_____
Company Name (Please Print)

☐ I certify that my company qualifies as a "Nonresident Proposer"
(NOTE: You must furnish the following information:)

Indicate the following information for your "Resident State": (The state your principal place of business is located in)

_____ _____
Company Name Address

_____ _____ _____
City State Zip Code

A. Does your "resident state" require Proposers whose principal place of business is in Texas to give preference to Proposers whose resident state is the same as yours by a prescribed amount or percentage to receive a comparable contract? ("Resident State" means the state in which the principal place of business is located.)

- ❑ Yes
- ❑ No

B. What is the prescribed amount or percentage? $_____ or _____%

Certification: I certify that the information provided above is correct.

_____
Signature of Authorized Representative

_____ _____
Name (Please Print) Title

ATTACHMENT 9
Certificate to Authority to Transact Business in Texas

ATTACHMENT 10
Authority to do business under an Assumed Name

ATTACHMENT 11
Federal Tax ID

(in the case of a person with no business entity, a social security number of the business owner who will perform and be responsible for the work)

ATTACHMENT 12
Certificate of Good Standing

ATTACHMENT 13
Certificate of Interested Parties – Form 1295

Certificate of Interested Parties (Form 1295): Electronically complete and submit using the Texas Ethics Commission's online filing application. Print a copy of Form 1295, sign, have notarized, and, with a copy of the Certificate of Filing, attach to Document 00 12 00 Bid Solicitation.

_____ Independent School District is required to comply with House Bill 1295, which amends the Texas Government Code by adding Section 2252.908, Disclosure of Interested Parties. Section 2252.908 prohibits _____ Independent School District from entering into a contract resulting from a RFP with a business entity unless the business entity submits a Disclosure of Interested Parties (Form 1295) to _____ Independent School District at the time business entity submits the signed contract. The Texas Ethics Commission has adopted rules requiring the business entity to file Form 1295 electronically with the Texas Ethics Commission.

Definitions:

1. Interested Party: A person:
   a) who has a controlling interest in a business entity with whom _____ Independent School District contracts; or
   b) who actively participates in facilitating the contract or negotiating the terms of the contract, including a broker, intermediary, adviser, or attorney for the business entity.
2. Business Entity: An entity recognized by law through which business is conducted, including a sole proprietorship, partnership, or corporation.

As a business entity, each vendors must electronically complete, print, sign, notarize, and submit Form 1295 and the Certification of Filing with their proposals even if no interested parties exist.

File Form 1295 with the Texas Ethics Commission (TEC) using the online filing application, which can be found at https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm. Proposers must use the filing application on the Texas Ethics Commission's website to enter the required information on Form 1295. Proposers must print a copy of the completed form, which includes a certification of filing containing a unique certification number. Form 1295 shall be signed by an authorized agent of the business entity and notarized.

Submit the completed Form 1295 with the certification of filing with _____ Independent School District by attaching the completed form to the vendor's solicitation response.

_____ Independent School District must acknowledge the receipt of the filed Form 1295 by notifying the Texas Ethics Commission of the receipt of the filed Form 1295 no later than the 30th day after the date the contract binds the parties to the contract. After _____ Independent School District acknowledges the Form 1295, the Texas Ethics Commission will post the completed Form 1295 to its website within seven business days after receiving notice from _____ Independent School District.

SAMPLE FORM 1295

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

OFFICE USE ONLY

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the goods or services to be provided under the contract.

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary

5 Check only if there is NO Interested Party. ☐

6 AFFIDAVIT

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

_____
Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said _____, this the _____ day of _____, 20 _____, to certify which, witness my hand and seal of office.

_____
Signature of officer administering oath | Printed name of officer administering oath | Title of officer administering oath

ADD ADDITIONAL PAGES AS NECESSARY

Form provided by Texas Ethics Commission www.ethics.state.tx.us Adopted 10/5/2015

DRAFT

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor
where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

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

«Boerne Independent School District »«, a public school district and political subdivision of the State of Texas»
«235 Johns Road
Boerne, Texas 78006
»
«Telephone Number: 830-357-2000»
«Fax Number: 830-357-2009»

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

« »« »
« »
« »
« »

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

«Boerne HS Courtyard Upgrades»
« »
« »

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

«Moy Tarin Ramirez Engineers, LLC»« »
«12770 Cimarron Path, Suite 100
San Antonio, Texas 78249»
«Telephone Number: 210-698-5051»
«Fax Number: 210-698-5085»

The Owner and Contractor agree as follows.

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

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

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
« »	

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
« »	

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
« »		

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price
« »	

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)
« »		

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- **.1** the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- **.2** a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

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

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

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

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

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

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

« »

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

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

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

« »
« »
« »
« »
« »
« »

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

« »
« »
« »
« »
« »
« »

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

§ 8.5 Insurance and Bonds

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

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

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

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

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

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

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

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

« »

.5 Drawings

Number	Title	Date
« »		

.6 Specifications

Section	Title	Date	Pages
« »			

.7 Addenda, if any:

Number	Date	Pages
« »		

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

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

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

« »

[« »] The Sustainability Plan:

Title	Date	Pages
« »		

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
« »			

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

« »

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

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

SECTION 00 61 00 PERFORMANCE AND PAYMENT BOND FORM

1. Performance and Payment Bonds on all proposals are required in the amount equal to one hundred percent (100%) of the total amount of the Contract Sum.

2. AIA Document A312, 2010 Edition, is hereby referred to and made a part hereof as fully and to the same extent as if reprinted herein.

3. Copies of AIA Document A312 may be obtained from the local offices of the American Institute of Architects.

4. An executed copy of the form shall accompany the executed Agreement. The AIA form shall be endorsed as necessary to make it applicable to public work in Texas.

END OF SECTION 00 61 00

SECTION 00651 RECEIPT AND RELEASE FORMS

CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS
AND CLAIMS (G706) AND
CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS (G706A)

1. The American Institute of Architects Document G706 and Document G706A, 1994 Edition, entitled "Contractor's Affidavit of Payment of Debts and Claims" and "Contractor's Affidavit of Release of Liens" is hereby made a part of these specifications and is hereinafter referred to as the "Receipt and Release Forms". This Document is made part of the Contract Documents by this reference.

2. Copies of this document may be purchased from the local office of the American Institute of Architects.

END OF SECTION 00651

SECTION 00 72 00 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A.I.A. Document A-201, 2007 Edition, "General Conditions of the Contract for Construction," as modified by the Owner's Supplementary Conditions, set forth herein after, is hereby made a part of this Contract. A-201, 2007 Edition is attached to this Specification. Contractor, subcontractors, materials and equipment suppliers shall assume responsibility for knowledge and conformance to the General Conditions.

END OF SECTION 00 72 00

DRAFT

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

«Boerne HS Courtyard Upgrades»
« »

THE OWNER:
(Name, legal status and address)

«Boerne Independent School District, a public school district and political subdivision of the State of Texas»«»
«235 Johns Road
Boerne, Texas 78006»

THE ARCHITECT:
(Name, legal status and address)

«Moy Tarin Ramirez Engineers, LLC»« »
«12770 Cimarron Path, Suite 100
San Antonio, Texas 78246»

TABLE OF ARTICLES

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

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

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

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

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

and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These

obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

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

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for

whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

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

§ 4.2.4 Communications

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

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

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

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

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

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings

against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

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

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

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

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

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

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

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

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

(other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to

provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

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

§ 11.3 Waivers of Subrogation

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

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

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

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for

correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

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

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

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

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

- **.1** damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- **.2** damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

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

and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

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

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

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

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

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

DOCUMENT 00 73 16 INSURANCE AND BOND REQUIREMENTS FOR CONTRACTORS

PART 1 - GENERAL

1.01 GENERAL

A. When the term “school district” or “owner” is used herein, it shall mean **BOERNE INDEPENDENT SCHOOL DISTRICT.**

B. The District shall require that the following insurance requirements be met on public works contracts:

1. No Work will be commenced until all requirements of this Section have been approved by the Owner in writing.

2. The Owner shall be furnished a Certificate of Insurance evidencing all policies and endorsements required by this Section prior to proceeding with any work.

3. The insurance shall contain a provision that at least thirty days prior written notice shall be given to the Owner in the event of cancellation, material change, or non-renewal.

4. Insurance shall be underwritten by a company rated not less than A+ in Best's latest published guide.

5. There shall be a hold harmless agreement in which the Contractor assumes liability on the contract and holds the School District, and Architect/Engineers harmless.

6. The Contractor shall purchase and maintain in force the following kinds of insurance and bonds for operations under construction contracts and as specified in each section.

7. No deletions/exclusions from standard coverage form are allowed without the written consent of the school district.

1.02 INSURANCE

A. Workers' Compensation Insurance Coverage:

1. Definitions:

a) Certificate of Insurance ("Certificate"): A copy of a certificate of insurance showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

b) Duration of the Project: Includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.

c) Persons Providing Services on the Project ("subcontractor" in Texas Labor Code 406.096): includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person has employees. This includes, without limitation,

independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity that furnishes persons to provide services on the project. "Services" shall include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

2. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code 401.011 (44) for all employees of the contractor providing services on the project for the duration of the project.

3. The contractor must provide a certificate of insurance to the governmental entity prior to being awarded the contract. The certificate shall show the school district as the certificate holder. The policy must be endorsed to provide a "waiver of subrogation" in favor of the school district.

4. If the coverage period shown on the contractor's current certificate of insurance ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of insurance with the governmental entity showing the coverage has been extended.

5. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

   a) A certificate of insurance, prior to that person beginning work on the project, so the governmental entity will have on file certificates of insurance showing coverage for all persons providing services on a project; and

   b) o later than seven (7) calendar days after receipt by the contractor, a new certificate of insurance showing extension of coverage, if the coverage period shown on the current certificate of insurance ends during the duration of the project.

6. The contractor shall retain all required certificates of insurance for the duration of the project and two (2) years thereafter.

7. The contractor shall notify the Governmental entity in writing by certified mail or personal delivery, within 10 calendar days after the contractor knew or should have know, of any change that materially affects the provision of coverage of any person providing services on the project.

8. The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

9. The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

a) Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011 (44) for all of its employees providing services on the project, for the duration of the project. The policy must be endorsed to provide a "waiver of subrogation" in favor of the school district.

b) Provide to the contractor, prior to that person beginning work on the project, a certificate of insurance showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project. The certificate shall show the school district as the certificate holder;

c) Provide the contractor, prior to the end of the coverage period, a new certificate of insurance showing extension of coverage, if the coverage period shown on the current certificate of insurance ends during the duration of the project;

d) Obtain from each other person with whom it contracts, and provide to the contractor:

1) A certificate of insurance, prior to the other person beginning work on the project; and

2) A new certificate of insurance showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of insurance ends during the duration of the project.

e) Retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

f) Notify the governmental entity in writing by certified mail or personal delivery, within 10 calendar days after the person knew or should have known, of any change that materially affects the provisions of coverage of any person providing services on the project; and

g) Contractually require each person with whom it contracts to perform as required by paragraphs a – g, with the certificates of coverage to be provided to the person for whom they are providing services.

10. By signing this contract or providing or causing to be provided a certificate of insurance, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and, payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

11. The contractor's failure to comply with any of these provisions is a breach of contract by the contractor which entities the governmental entity to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

12. The Contractor shall post the following language:

REQUIRED WORKERS' COMPENSATION COVERAGE

"The law requires that each person working on this site or providing services related to this construction project must be covered by workers' compensation insurance. This includes persons providing, hauling, or delivering equipment or materials, or providing labor or transportation or other service related to the project, regardless of the identity of their employer or status as an employee."

"Call the Texas Workers' Compensation Commission at (512) 440 – 3789 to receive information on the legal requirements for coverage, to verify whether your employer has provided the required coverage, or to report an employer's failure to provide coverage."

B. Certificate of Minimum insurance Requirements:

1. Type of Coverage:

Commercial General Liability – The coverage is to include: broad form, contractual liability, products and completed operation coverage. Explosion, collapse and underground coverage will also be required if applicable.

For construction contracts up to $1,000,000 the limits of liability required will be: $1,000,000 per occurrence and $2,000,000 aggregate.

For construction contracts between $1,000,001 and up to $5,000,000 the limits of liability required will be:

Primary - $1,000,000 per occurrence and $2,000,000 aggregate
Umbrella - $5,000,000 per occurrence / aggregate and must be project specific.

For construction contracts exceeding $5,000,000 the limits of liability required will be:

Primary - $1,000,000 per occurrence and $2,000,000 aggregate
Umbrella - $10,000,000 per occurrence I aggregate and must be project specific.

Automobile Liability — For construction projects not exceeding $1,000,000 the minimum limit of liability required will be a Combined Single Limit (CSL) of $500,000 per occurrence. For construction projects exceeding $1,000,000 the minimum limit of liability required will be a Combined Single Limit (CSL) of $1,000,000 per occurrence.

2. Workers' Compensation Statutory Limits

Employers' Liability	
Minimum limits required Each Accident	$100,000
Disease (Policy Limit)	$ 500,000
Disease (Each Employee)	$100,000

Pollution Liability — If applicable, the minimum limit of liability required will be $5,000,000 per occurrence/ aggregate if this coverage is required.

Builders Risk —If applicable, the limit will be based on the value of the project.

Professional Liability - If applicable, the limit of liability will be based on construction cost.

Project Size (Based on Construction Cost)	Limit of Liability
$1 - $499,000	$250,000
$500,000-$999,999	$500,000
$1,000,000-$9,999,999	$1,000,000 Project Specific
$10,000,000 plus	$5,000,000 Project Specific

a. School District must be named as an Additional Named Insured and subrogation against the District must be waived.

b. The Architects and Engineers shall be an Additional Named Insured but only will have excess coverage. The full policy limits will protect the School District if needed and only the excess will protect the Architects and Engineers.

c. School district must have 30 calendar days written notice of policy cancellation or change.

d. The insurance carrier must be an "A+" rated carrier.

e. The policy shall be written in the name of the Owner, Contractor, and subcontractors as their interest may appear.

f. The coverage afforded by the carrier will be primary over any other applicable insurance.

g. The policy shall be written on an all risk basis for physical loss or damage and include theft, vandalism, malicious mischief.

h. The amount of coverage shall be for the full insurable value of work.

i. The deductible shall not be over $1,000.00 without the approval of the Owner. (Deductible losses shall be paid by the Contractor.)

j. The policy shall include an endorsement allowing Owner occupancy, and the insurance shall not be cancelled or altered on account of partial occupancy prior to completion.

1.03 BUILDERS RISK INSURANCE

A. The Contractor shall purchase and maintain, for the term of the Agreement, a builder's risk insurance policy, written on an all-risk form, covering the Work to be performed under this Agreement. Such policy shall insure all Work in place, and all materials that are intended to be incorporated into the Work that are stored on or off site.

1.04 BONDS

A. Bonds are required for public works contracts under the following circumstances:

1. Performance bond and Labor and Material Payment Bond, each in a personal sum equal to 100% of contract sum if the formal contract is in excess of $25,000.00.

2. A Proposal Bond or Proposal Security in the amount of 5% of any proposal of $25,000.00 or more must be submitted with formal proposals on public works contracts or as otherwise specified in each contract.

3. Copies of the bonds shall be filed with the country clerk and the owner shall receive a file receipt.

4. Performance and Payment Bonds shall remain in force for one (1) year after completion of the contract.

5. The Work will not be started until the bonds and issuing companies have been accepted as satisfactory by the Owner.
6. The original bonds will be delivered to the Owner with an attached authorized power of attorney.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF DOCUMENT 00 73 16

SECTION 00 73 43 LABOR AND WAGE RATES

PART 1 – GENERAL

COMPLY WITH ALL PREVAILING WAGE LAWS AND STATE LAWS THAT MAY BE IN EFFECT ON THIS PROJECT.

1.1 All contractors and subcontractors shall comply with all laws regarding wage rates including, but not limited to, article 5159a of the revised civil statutes of the State of Texas.

1.2 Pay not less than the general prevailing wage rate as listed herein. Pay prevailing wage rate plus any applicable fringe benefits.

1.3 All contractors and subcontractors shall comply with all state and federal laws regarding, but not limited to:
1. Laws of labor
2. Minimum wage
3. Safety
4. Equal employment opportunity.

1.4 The prevailing wage rates listed are to be considered the minimum to be paid and the listing of prevailing wage rates shall not be construed to prohibit the payment of rates higher than those listed.
1. The contractor and subcontractors shall maintain an adequate work force whether wage rates higher than those listed are required or not.
2. The Owner will not consider claims for additional compensation because of payments of wage rates in excess of the applicable rates listed herein.

1.5 Workers not included in the following trade classifications shall be properly classified and paid not less than the prevailing wages of the locality at the time of construction.

1.6 Apprentice pay: all trades and crafts
1. The minimum rate for apprentices shall be in accordance with the scale determined by an approved apprenticeship program or $1.00 per hour less than journeymen's rates, whichever is lower. An approved apprenticeship program is one approved by the U.S. department of labor, bureau of apprenticeship training, and only apprentices enrolled in an approved program may be paid apprenticeship rates.

1.7 Article 5159a of the revised civil statutes includes the following statement:
1. "The Contractor shall forfeit as a penalty to the state, county, city and county, city, town, district or other political subdivision on whose behalf the contract is made of awarded, Ten Dollars ($10.00) for each laborer, workman or mechanic employed, for each calendar day, or portion thereof, such laborer, workman or mechanic is paid less than the said stipulated rates for any work done under said contract, by him, or by any subcontractor under him, and the said public body awarding the contract shall cause to be inserted in the contract a stipulation to this effect."

1.8 Prevailing wage rates: base per diem rate shall be taken as the hours worked per day times the base hourly rate.

1.9 Overtime rates: over 40 hours per week and holidays at base hourly rate times 1.5.

1.10 Note: Building Construction rates apply up to five feet outside the building line. All rates for work performed beyond this point shall be specified under Highway Construction Rates.

1.11 All published rates are journeyman rates, except where helper classifications have been noted.

1.12 Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(S) 1 (II)

1. Has there been an initial decision in the matter? This can be:
   a. an existing published wage determination
   b. a survey underlying a wage determination
   c. a Wage and Hour Division letter setting forth a position on a wage determination matter
   d. a conformance (additional classification and rate ruling)

1.13 On survey related matters, initial contact, including requests for summaries of surveys, should be with the wage and hour regional office for the area in which the survey was conducted because those regional offices have responsibility for the Davis-Bacon Survey Program. If the response described in b) and c) should be followed.

1.14 With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

If the answer to the question in 1, a. above is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (see 29 CFR Part 1.8 and 20 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

1.15 The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) That the requestor considers relevant to the issue.

1. If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

   Administrative Review Board
   U.S. Department of Labor
   200 Constitution Avenue, N.W.
   Washington, D.C. 20210

2. All decisions by the Administrative Review Board are final.

1.16 Any "laborer" or "workman" or "mechanic" employed and whose position is not listed shall be paid not less than the per diem wage rate established on this project for the "laborer" or "workman" or "mechanic" whose duties are most nearly comparable to those of such employees.

1.17 Overtime work: any work necessary to be performed after regular working hours, on Sundays or legal holidays; shall be performed without additional expense to the Owner.

1.18 Building construction projects (does not include residential construction consisting of single family homes and apartments up to and including 4 stories.)

PART 2 – PRODUCTS

2.1 ADOPTED WAGE RATE (BUILDING CONSTRUCTION)

General Decision Number: TX160308 01/15/2016 TX308
Superseded General Decision Number: TX20150308
State: Texas
Construction Type: Building
County: Kendall County

2.2 ADOPTED WAGE RATE (HEAVY AND HIGHWAY CONSTRUCTION)

General Decision Number: TX160016 01/08/2016 TX308
Superseded General Decision Number: TX20150016
State: Texas
Construction Type: ~~Building~~ *Heavy and Highway*[1]
County: Kendall County

PART 3 – EXECUTION

3.1 WAGE RATE SCHEDULE (BUILDING CONSTRUCTION)

Construction Trade	**Prevailing Wage Rate**
Asbestos Worker/Heat & Frost Insulator	$21.17
Boilermaker	$23.14
Bricklayer	$24.50
Electrician (Communication Technician only)	$21.45
Electrician (Excludes low voltage wiring)	$27.82
Elevator Mechanic	$37.76
Power Equipment Operator	$34.85
Ironworker, Structural	$21.30
Ironworker, Ornamental	$23.02
HVAC Mechanic (HVAC electrical temperature control installation only)	$30.40
HVAC Mechanic (HVAC unit installation only)	$30.40
Pipefitter (Including HVAC pipe installation)	$30.40
Plumber (Excludes HVAC pipe installation)	$30.40
Sprinkler Fitter (Fire sprinklers)	$27.43
Sheet Metal Worker (Excludes HVAC duct installation)	$25.60
Sheet Metal Worker (HVAC duct installation only)	$25.60
Carpenter (Acoustical ceiling installation only)	$18.00
Carpenter (Excludes acoustical ceiling installation, drywall hanging, form work, and metal stud installation)	$14.83
Caulker	$15.00
Cement Mason/ Concrete Finisher	$22.27
Drywall Finisher/ Taper	$13.81
Drywall Hanger and Metal Stud Installer	$15.38
Electrician (Low voltage wiring only)	$20.19
Ironworker, Reinforcing	$12.27
Laborer: Common or general	$10.00
Laborer: Mason Tender – brick	$12.00
Laborer: Mason Tender – Cement/ Concrete	$12.00
Laborer: Pipelayer	$11.00
Laborer: Roof Tearoff	$11.28

Laborer: Landscape and Irrigation	$8.00
Operator: Backhoe/ Excavator/ Trackhoe	$19.43
Operator: Bobcat/ Skid Steer/ Skid Loader	$14.00
Operator: Bulldozer	$14.00
Operator: Drill	$14.50
Operator: Forklift	$13.06
Operator: Grader/ Blade	$19.30
Operator: Loader	$13.90
Operator: Mechanic	$18.75
Operator: Paver (Asphalt, Aggregate, and Concrete)	$16.03
Operator: Roller	$11.25
Painter: Brush, roller, and spray – excludes drywall finishing/ taping	$13.13
Roofer	$12.00
Tiler Finisher	$11.32
Tile Setter	$16.09
Truck Driver: Dump Truck	$12.39
Truck Driver: Flatbed Truck	$19.65
Truck Driver: Semi-Trailer Truck	$12.50
Truck Driver: Water Truck	$12.00
Welders – Receive rate prescribed for craft performing operation to which welding is incidental	

3.2 WAGE RATE SCHEDULE (HEAVY AND HIGHWAY CONSTRUCTION)

Construction Trade	Prevailing Wage Rate
Cement Mason/ Concrete Finisher (paving and structures)	$12.56
Electrician	$26.35
Form Builder/ Form Setter – Paving and Curb	$12.94
Form Builder/ Form Setter – Structures	$12.87
Laborer – Asphalt Raker	$12.12
Laborer – Flagger	$9.45
Laborer – Laborer, common	$10.50
Laborer – Laborer, utility	$12.27
Laborer – Pipelayer	$12.79
Laborer – Work zone barricade servicer	$11.85
Painter – Structures	$18.34
Power Equipment Operator – Agricultural Tractor	$12.69
Power Equipment Operator – Asphalt Distributor	$15.55
Power Equipment Operator – Asphalt Paving Machine	$14.36
Power Equipment Operator – Boom Truck	$18.36
Power Equipment Operator – Broom or Sweeper	$11.04
Power Equipment Operator – Concrete Pavement Finishing Machine	$15.48
Power Equipment Operator – Crane, hydraulic 80 tons or less	$18.36
Power Equipment Operator – Crane, lattice boom 80 tons or less	$15.87
Power Equipment Operator – Crane, lattice boom over 80 tons	$19.38
Power Equipment Operator – Crawler Tractor	$15.67
Power Equipment Operator – Directional Drilling Locator	$11.67
Power Equipment Operator – Directional Drilling Operator	$17.24
Power Equipment Operator – Excavator 50,000 lbs or less	$12.88
Power Equipment Operator – Excavator over 50,000 lbs	$17.71
Power Equipment Operator – Foundation Drill, truck mounted	$16.93

Power Equipment Operator – Front End Loader, 3 CY or less	$13.04
Power Equipment Operator – Front End Loader, over 3 CY	$13.21
Power Equipment Operator – Loader/ Backhoe	$14.12
Power Equipment Operator – Mechanic	$17.10
Power Equipment Operator – Milling Machine	$14.18
Power Equipment Operator – Motor Grader, fine grade	$18.51
Power Equipment Operator – Motor Grader, rough	$14.63
Power Equipment Operator – Pavement Marking Machine	$19.17
Power Equipment Operator – Reclaimer/ Pulverizer	$12.88
Power Equipment Operator – Roller, asphalt	$12.78
Power Equipment Operator – Roller, other	$10.50
Power Equipment Operator – Scraper	$12.27
Power Equipment Operator – Spreader Box	$14.04
Power Equipment Operator – Trenching Machine, heavy	$18.48
Servicer	$14.51
Steel Worker – Reinforcing	$14.00
Steel Worker – Structural	$19.29
Traffic Signal Installer – Traffic signal/ light pole worker	$16.00
Truck Driver: Lowboy-float	$15.66
Truck Driver: Off Road Hauler	$11.88
Truck Driver: Single Axle	$11.79
Truck Driver: Single or tandem axle dump truck	$11.68
Truck Driver: Tandem axle tractor with semi trailer	$12.81
Welder	$15.97

END OF SECTION 00 73 43

SECTION 00 01 10.2 **TABLE OF CONTENTS**

List of Specifications, As Prepared by:

MTR • Engineers • Surveyors • Planners
Moy Tarin Ramirez Engineers, LLC

DIVISION 01 00 00 – GENERAL REQUIREMENTS

STATE OF TEXAS
SEAN S. SMITH
113308
REGISTERED PROFESSIONAL ENGINEER
3/20/2023

DIVISION 02 00 00 – EXISTING CONDITIONS

DIVISION 13 00 00 – SPECIAL CONSTRUCTION

DIVISION 31 00 00 – EARTHWORK

DIVISION 32 00 00 – EXTERIOR IMPROVEMENTS

DIVISION 33 00 00 – UTILITIES

END OF SECTION 00 01 10.2

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DIVISION 26 – ELECTRICAL

DIVISION 27 – COMMUNICATIONS

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PREPARED BY:
COOPER-LOCHTE LANDSCAPE ARCHITECTURE, LLC

DIVISION 32 00 00 – EXTERIOR IMPROVEMENTS

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SECTION 01 10 00 SUMMARY

PART 1 – GENERAL

1.1 PROJECT

A. Project Name: Boerne High School Courtyard Upgrades

B. Owner's Name: Boerne Independent School District

C. Engineer's Name: Moy Tarin Ramirez Engineers, LLC

D. Boerne High School Courtyard Upgrades will consist of the following: Demolition and reconstruction of concrete/flatwork, landscaping, underground drainage system, relocation of existing domestic water, fire and sanitary sewer lines, and all work as indicated on the drawings and specifications to include all general construction, site work, and all other work as indicated on the construction documents.

E. CPS charges and Impact fees, if any, will be paid for by the owner.

F. The site will be open and available for inspection as determined at the Pre-Proposal Conference to be held at 8:00 am on March 30, 2023 at Boerne High School – Library, 1 Greyhound Lane, TX 78006. All persons desiring to submit a proposal are encouraged to attend this conference.

1.2 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00500 - Agreement.

1.3 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied or removed by the owner as noted in the construction plans.

1.4 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

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

C. Schedule the Work to accommodate Owner occupancy.

1.5 CONTRACTOR USE OF SITE AND PREMISES

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

B. Arrange use of site and premises to allow:
   1. Work by Others, if applicable.
   2. Work by Owner, if required by owner.
   3. Use of site and premises by the public, if requested by Owner.

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

D. Time Restrictions:
   1. Limit conduct of especially noisy exterior work to the hours of 8 AM to 5 PM.

2. Construction traffic shall not enter or exit the project site on school days between the hours of 8:30 AM through 9:30 AM and 3:45 PM through 4:45 PM, due to school traffic.
3. Owner reserves the right to suspend work for up to five (5) days due to district testing at no additional cost to the contract.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00 PRICE & PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.2 RELATED SECTIONS

A. Document 00800 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit. Percentage allowances for Contractor's Labor Burden, with an itemized list of all that is included.
   1. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

B. Section 01 22 00 - Unit Prices: Monetary values of unit prices, payment and modification procedures relating to unit prices.

1.3 SCHEDULE OF VALUES

A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet.
   1. Contractor's standard form or electronic media print out may be considered for use.
      a. Submit a sample form to the Engineer for review and approval.
      b. Form shall have all the elements of AIA Form G703 as a minimum.
      c. This consideration will be made only with the understanding that the submitted form has the exact and full force and effect of the AIA Form G703 and does not alter in any way AIA Form G702.
   2. AIA Form G703 must be used unless approved otherwise by the Engineer.

B. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.
   1. Submit Schedule of Values, for review and approval by the Engineer, more than 10 days prior to the first Application for Payment
   2. An approved Schedule of Values must be submitted with the first request for payment and all subsequent requests for payment.
   3. The Schedule of values may only change by Change Order after it has been approved.

C. The Schedule of Values and the Construction Progress Schedule shall directly correlate. The work completed in the current period must be accurately reflected in both documents.
   1. Only items which have been accomplished and shown in the Construction Progress Schedule for the current time period may be claimed in the Application and Certificate for Payment (request for payment).
   2. The Owner/Engineer has the right to ask for and receive additional information or

definition on any or all items, including further breakdown.

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 and bonds and insurance.
   1. Further breakdown may be required for separately identified items, systems, procedures or processes.

E. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

F. Revise schedule to list approved Change Orders, with each Application For Payment.
   1. Each Change Order must be separately listed and its contents itemized.

G. The entire Schedule of Values must be legible. A minimum ten (10) point font size is recommended. Illegible documents will not be accepted. Legibility is determined by the Engineer.

1.4 APPLICATIONS FOR PROGRESS PAYMENTS

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

B. Present required information in typewritten form.

C. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
   1. AIA Form G702 Application and Certificate for Payment is the only form approved for use. Use of any other form is cause for rejection of the application and certificate for payment.

D. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values. Include an itemized Schedule of Values for each Change Order.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
      a. When stored materials are claimed, provide a copy of a paid invoice or receipt from the source of the material. Unpaid stored materials are not allowed to be requested for payment.
      b. Whenever stored materials have not been installed by the time a subsequent Application and Certificate for Payment is due, create a footnote or a new line item identifying the material or materials separately as "previously listed and not installed." Include the accurate amount(s) for each item. Carry this (these) footnote(s) or line item(s) forward until the materials are installed.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

E. Execute certification by signature of authorized officer.

F. 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.

G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
   1. Identify contents of Change Order.
   2. Itemize contents of Change Orders. Reflect in both the Schedule of Values and the Construction Progress Schedule.

H. Submit three copies of each Application for Payment.

I. 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 and Section 01 32 16.
      a. The Construction Progress Schedule must be fully coordinated with the Application and Certificate for Payment Continuation sheet AIA G703 or equivalent approved sheet.
      b. Lack of coordination is cause for rejection of the Application and Certificate for Payment.
   3. Current construction photographs specified in Section 01 30 00.
   4. Partial release of liens from major Subcontractors and vendors.
   5. Provide an itemized list of entries made to the Record Set of documents made since the last Application for Payment. The Owner and Engineer may review the record set at the project site for this information. If no entries were made to the Record Set, the Contractor shall make a written statement to that effect. If entries to the Record Set of documents are due, however, not yet entered, provide a list of items to be entered to this set.
   6. Affidavits attesting to off-site stored products.
      a. Prior approval by the Owner is required before off-site stored products may be submitted. Submittal without prior approval is cause for rejection of payment for these items.
      b. Products must be suitably stored, marked and maintained separately from other contents of the building. Site must be available for Owner or Engineer to verify storage of products.
      c. Proof of an appropriate current bond for the site of the stored materials is required.
      d. Provide an appropriate insurance policy for the stored materials of this project as contents of the site. The policy shall cover the replacement of the stored materials without additional cost to the Owner.
   7. Provide 'Paid' receipts for stored items if requesting payment for these items. Payment by Owner will not be made to Contractor without the 'Paid' receipts.
   8. Provide a separate sheet indicating Time and Dollar expenditure percentages:
      a. Provide ratio of time spent to the total time of the contract expressed as a percentage.
      b. Provide ratio of total dollars (requested to date) to the current contract total expressed as a percentage.
   9. Provide an updated Submittal Schedule.
   10. Provide a current Submittal Log indicating the status of each item.
   11. Provide a current RFI (Request for Information) Log indicating the status of each item.
   12. Provide Certified Payrolls for the Contractor and Subcontractors covering the current payment period.

J. When Engineer 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.

1.5 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.

C. Construction Change Directive: Engineer may issue a document, signed by Owner, instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change in Work.

D. Proposal Request: Engineer may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within ten (10) days.

E. Contractor may propose a change by submitting a request for change to Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 60 00.

F. Computation of Change in Contract Amount:
   1. For change requested by Engineer 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 Engineer.
   3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
   4. For change ordered by Engineer without a quotation from Contractor, the amount will be determined by Engineer based on the Contractor's substantiation of costs as specified
      for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. Provide following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract on AIA G701.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
   1. If a Change Order contains more than one item, separately itemize on the Schedule of Values and the Construction Progress Schedule.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.6 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.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 21 00 ALLOWANCES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cash allowances.

B. Contingency allowance.

C. Payment and modification procedures relating to allowances.

1.2 RELATED SECTIONS

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

1.3 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts delivery to site and applicable taxes.

B. Costs Not Included in Cash Allowances: Product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing.

C. Engineer 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.
3. Prepare Change Order.

D. Contractor Responsibilities:
1. Assist Engineer in selection of products, suppliers, and installers.
2. Obtain proposals from suppliers and installers and offer recommendations.
3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

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

1.4 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.5 INSPECTING AND TESTING ALLOWANCES

A. Inspection and Testing Fees shall be paid for by the General Contractor unless noted

otherwise.

1.6 ALLOWANCES SCHEDULE

A. Contingency Allowance: Include the stipulated sum/price of **$75,000.00** for Owner's Contingency for the **Boerne ISD – Boerne High School Courtyard Upgrades** for use upon Owner's instructions.

B. Graphics Allowance: Include the stipulated sum/price of **$5,000.00** for the **Boerne ISD – Boerne High School Courtyard Upgrades** for use upon Owner's instructions.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 22 00 UNIT PRICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.2 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.3 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.4 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified by Engineer.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Measurement Devices:
1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
3. Metering Devices: Inspected, tested and certified by the applicable State department within the past year.

E. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

F. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

G. Measurement by Area: Measured by square dimension using mean length and width or radius

H. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

I. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.5 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work which is incorporated in or made necessary by the Work and accepted by the Engineer, multiplied by the unit sum/price.

B. Payment will not be made for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.6 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not conforming to specified requirements.

B. If in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct one of the following remedies:
1. The defective Work may remain, but the unit sum/price will be adjusted to a new sum/price at the discretion of Engineer.
2. The defective Work will be partially repaired to the instructions of the Engineer, and the unit sum/price will be adjusted to a new sum/price at the discretion of Engineer.

C. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
1. The defective Work may remain, but the unit sum/price will be adjusted to a new sum/price at the discretion of Owner.
2. The defective Work will be partially repaired to the instructions of the Owner, and the unit sum/price will be adjusted to a new sum/price at the discretion of Owner.

D. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.

E. The authority of Engineer to assess the defect and identify payment adjustment is final.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00 ALTERNATIVES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Alternative submission procedures.

B. Documentation of changes to Contract Sum and Contract Time.

1.2 RELATED SECTIONS

A. Instructions to Offerors: Instructions for preparation of pricing for alternatives.

B. Agreement: Incorporating monetary value of accepted alternatives.

1.3 ACCEPTANCE OF ALTERNATIVES

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

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

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00 ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Construction progress schedule.

D. Submittal Schedule.

E. Progress photographs.

F. Coordination drawings.

G. Request for Information.

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

I. Number of copies of submittals

J. Submittal procedures.
   1. Transmittal Letter.

1.2 RELATED SECTIONS

A. Section 01 10 00 - Summary: Stages of the Work, Work covered by each contract, occupancy, and phase of the work.

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

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

1.3 PROJECT COORDINATION

A. Cooperate with the Owner and Engineer in allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.

B. During construction, coordinate use of site and facilities through the Owner and Engineer.

C. Comply with Contract Documents procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

D. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

E. Coordinate field engineering and layout work.

F. Make the following types of submittals to Engineer:
   1. Requests for Information.

2. Shop drawings, product data, and samples.
3. Test and inspection reports.
4. Manufacturer's instructions and field reports.
5. Applications for payment and change order requests.
6. Progress schedules.
7. Coordination drawings.
8. Closeout submittals.

1.4 SUBSTITUTIONS

A. Request for substitutions prior to Bid.
1. Submit request for substitutions for approval not later than 14 days prior to the bid date. Upon review by the Engineer and if approved, notification will be made by Addendum.
2. No response constitutes no approval. The proposed product may not be used on this project for the proposed use.
3. Rejection of proposed substitute may be made by letter or memo from the Engineer at the Engineers sole discretion.
4. Use the "Substitution Request (Pre-Bid)" form to accompany the back up material for consideration.
a. The form shall be signed by a person authorized to conduct the construction of the proposed project. Signature of the form by secretarial or clerical personnel is cause for rejection.

B. Substitutes shall not be proposed or submitted with the bid. Substitutes will not be considered if submitted with the bid.

C. Request for substitution after the Bidding phase:
1. Substitutions may be considered for use after the Owner-Contractor Agreement has been signed.
2. Submit the request for substitution within 30 days of Contract (Owner-Contractor Agreement) date.
3. Use the "Substitution Request (Post-Bid & After Execution of the Contract)" form to accompany the back up material for consideration.
a. The form shall be signed by a person authorized to conduct the construction of the proposed project. Signature of the form by secretarial or clerical personnel is cause for rejection.
4. Notification of approval for the proposed substitute will be made by Engineers Supplemental Instruction (ASI).
5. No response constitutes no approval. The proposed product may not be used on this project for the proposed use.
6. Notification of rejection may be made by letter or memo from the Engineer at the Engineers sole discretion.

D. Consideration of substitutes:
1. Any product, system or procedure not specifically listed or described in the Contract Documents is subject to rejection.
2. Where a listed manufacturers product is submitted, and this product is not the one described in the Contract Documents, the submitter must provide a point for point comparison of the submitted proposed product to the product described in the Contract Documents.
a. The Engineer will review the data to determine if it will be accepted.
b. Products with incomplete comparison data are subject to rejection.
c. Products determined by the Engineer not to be essentially equivalent, or appropriate, or desired, or better than the described product in the Contract Documents will be rejected.

d. Products with incomplete comparison data are subject to rejection.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

A. Engineer will schedule a meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Engineer.
3. Contractor.
4. Major subcontractors.
5. Contractor's Superintendent.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract, Major Subcontractors, and Engineer.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.
8. Scheduling activities of a Geotechnical Engineer.
9. Hazardous Material (hazmat) permits, scheduling, monitoring.
   a. Contractor shall apply for permit and make arrangements for monitoring the abatement of asbestos, polychlorinated biphenyl (PCB), lead based paint, and any other hazardous material.
   b. Contractor shall indicate these activities on the Construction Progress Schedule.
10. Use of premises by Owner and Contractor.
11. Owner's requirements and partial occupancy prior to completion.
12. Construction facilities and controls provided by Owner.
13. Temporary utilities provided by Owner.
14. Survey and building layout.
15. Security and housekeeping procedures.
16. Schedules.
17. Application for Payment procedure.
18. Procedures for testing.
19. Procedures for maintaining record documents.
20. Requirements for start-up of equipment.
21. Inspection and acceptance of equipment put into service during construction period.

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

3.2 PROGRESS MEETINGS

A. Schedule meetings throughout progress of the Work at monthly intervals.
1. Provide meeting space for 10 to 20 individuals.

B. Engineer will prepare agenda with copies for participants and preside at meetings.

C. Attendance Required: Contractor's Project Manager, Job superintendent, major Subcontractors and suppliers, Owner, Project Manager, Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:
1 Review minutes of previous meeting.
2. Review of Work progress.
3. Field observations, Questions, and decisions.
4. Identification of unforeseen conditions which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Updates to Record Drawings.
14. Other business relating to Work.

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

3.3 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement or the date established in Notice to Proceed, whichever comes first, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.
1. Failure to submit an approved schedule will result in the rejection of the Application and Certificate for Payment.
2. Schedule shall be current and fully coordinated with the Application and Certificate for Payment.
a. Lack of coordination is cause for rejection of Application and Certificate for Payment.

F. Updated Schedules need to clearly identify changes (by cloud) from the previous schedule if changes are other than a reflection of the work accomplished when submitted with the request for payment.

G. Contractor shall provide a remediation plan whenever unapproved changes are made or other event alters the scheduled work.

3.4 SUBMITTAL SCHEDULE

A. The Contractor shall submit a Schedule of Submittals within 30 day of the notice to proceed, unless noted otherwise.

B. Schedule must be approved by Engineer before any submittals are delivered.
   1. Engineer will review and respond to submitted Submittal Schedule within 14 days after receipt in Engineers office.
   2. Revise and Resubmit for approval when required by Engineer.
   3. Schedule cannot be approved in part. Entire schedule must be approved before submittals can begin.

C. Indicate Specification Section number, item description, proposed date of submittal, and list of any other items or submittals with which this item must be coordinated.
   1. Follow numbering procedures identified in paragraph entitled "Submittal Procedures" located below in this Section.

D. Schedule shall contain itemized list of Shop Drawings, Product Data, Samples, and / or similar submittal requested by the Contract Documents.
   1. Also Include and separately identify the following in the schedule (itemize each):
      a. Identify submittals with Professional Engineer Requirements.
      b. Identify Manufacturer Qualification Requirements.
      c. Identify Installer Qualification Requirements.
      d. Mockup Requirements
      e. Pre-installation Meeting Requirements.
      f. Special Warranty Requirements.
      g. Identify products and submittals with Extra Material Requirements.
      h. Identify all Field Testing Requirements. Include anticipated date of testing and expected date of test report delivery to Engineer and Owner.

E. Indicate the time required for delivery of the specified item (product, material, report, activity, document, event or other item) to the site after the approval of the submittal.

F. Submit an updated Submittal Schedule with each Application and Certificate for Payment.

3.5 PROGRESS PHOTOGRAPHS

A. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Engineer.

B. Take photographs on date for each application for a payment and as follows:
   1. Site clearing.
   2. Excavations.
   3. Foundations.
   4. Structural framing.
   5. Enclosure of building.
   6. Final completion.

C. Take photographs as evidence of existing project conditions as follows:
   1. Interior views: Photographs demonstrating construction progress over the previous submittal.
   2. Exterior views: All cardinal views and overall views all around the building and site.

D. Views:

1. Provide non-aerial photographs from four cardinal views at each specified time, until Date of Substantial Completion.
2. Consult with Engineer for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

E. Prints: Full color; three prints of each view. Provide three sets of photos with each Application and Certificate for Payment copy submitted.
1. Glossy: smooth texture; white tint; single weight; contrast grade 4, extra hard.
2. Size: 3-1/2 x 5 inch; mounted for binder and tabs. Mount four to one side of a page.
3. Identify each print on back. Identify name of Project, contract number, phase, orientation of view, date and time of view, name and address of photographer, and photographer's numbered identification of exposure.
4. Provide Key Map of site and floor plan locating photograph point of origin.
5. One set of photos may be submitted with two sets of clear, accurate, color xerox paper copies in lieu of the three photo sets. Black and white photos or copies are not acceptable.

F. Deliver prints with each Application for Payment with transmittal letter specified in this Section.

G. Negatives remain property of photographer. Require that photographer maintain negatives for ten years from Date of Substantial Completion.

3.6 COORDINATION DRAWINGS

A. The General Contractor shall prepare coordination drawings required to facilitate planning and execution of the work of the various subcontractors, trades, and suppliers.

3.7 REQUEST FOR INFORMATION

A. Request For Information (RFI) shall be made for the purpose of clarifying the Contract Documents.

B. Submit issues that cannot be reasonably inferred from the Contract Documents.
1. List only one (1) item per Request For Information.
2. Consecutively number each RFI beginning with the number "1."
3. Issues clearly indicated in the Contract Documents will not be responded to in writing.
   a. An RFI with an issue clearly indicated in the Contract Documents will be voided. The RFI number will not be reused.

C. Requests For Information (RFI's) shall be submitted on the attached form following this section. This form shall not be modified. Use of any other form will not be accepted.
1. RFI's are to be signed by the Contractor's Superintendent, Project Manager or other individual approved by the Engineer.
   a. The Contractor shall submit, for approval of the Engineer, the printed name, signature, hand written initials and resume of the proposed personnel.
   b. Only the signature or hand written initials by the approved individuals will be accepted on the RFI's.
   c. RFI's shall be signed by a person authorized (and recognized by the Engineer) to conduct the construction of the proposed project. Signature or initials of the form by secretarial or clerical personnel is cause for

rejection.

3.8 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. The Contractor must review and approve submittals prior to sending them to the Engineer.
   1. By approving and submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements, and field construction criteria related thereto, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
      a. The Contractor is required to submit, for approval of the Engineer, a copy of the terminology of the Contractors submittal stamp. This stamp must address solely the Contractors review for compliance with the Contract Documents as stated in the above sentence.
         1) Contractor shall have made a rubber stamp bearing the Contractors name, the approved terminology, a line for signature and a line for the date of the signature/initial.
      b. A sample of acceptable terminology and suggested format for the "Contractors Submittal Review Statement" stamp is attached at the end of this Section.
      c. Submittals are to be signed by the Contractor's Superintendent, Project Manager or other individual approved by the Engineer.
         1) The Contractor shall submit, for approval of the Engineer, the printed name, signature, hand written initials and resume of the proposed personnel.
         2) Only the signature or hand written initials by the approved individuals will *be* accepted on the submittals.
         3) Submittals shall be signed by a person authorized (and recognized by the Engineer) to conduct the construction of the proposed project. Signature or initials of the form by secretarial or clerical personnel is cause for rejection.
      d. Contractor shall notify the Engineer immediately of deviations from Engineer/Engineer approved submittals.
   2. Lack of the above certification and signature or initials by the Contractors authorized reviewer will result in the return of the submittal(s) without review by the Engineer/Engineer.
   3. In the unlikely event that it appears that no review or only a cursory submittal review was made, the submittal will be returned for a thorough review by the Contractor.

C. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   1. The approval or other action indicated by the Engineer is based on information given and the design concept expressed in the Contract Documents. Approval does not relieve the Contractors responsibility to comply with every requirement of the Contract Documents unless proposed deviations have been defined in writing and specifically noted as approved on the submittal. The Contractor must verify all dimensions, quantities, and provisions for other work.

D. Samples will be reviewed only for aesthetic, color, or finish selection.
   1. All Color and Finish submittals must be submitted within 60 days of the date of the Agreement or the Notice to Proceed, whichever comes first.

E. 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.

F. Submittals not reviewed and approved by the Contractors authorized personnel

3.9 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.

B. Submit for Engineer's knowledge as contract administrator or for Owner. No action will be taken.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
      a. Provide one reproducible set of the drawings on Mylar.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

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

3.11 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
   1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies which the Contractor requires, plus 1 or 2 (1 for Engineer plus 1 for applicable consultants)) which will be retained by the Engineer. Also provide in digital format (PDF preferred).
   2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions which Contractor requires, plus 1 or 2 (1 for Engineer plus 1 *for applicable* consultant(s)) which will be retained by Engineer. Also provide in digital format (PDF preferred).

B. Contractor is to maintain the Owner's Record set of Submittals.

C. Documents for Information: Submit same number of copies as for Documents For Review above.

D. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

E. Samples: Submit the number specified in individual specification sections; five of which will be retained by Engineer.
   1. Actual samples are required for color. Printed color samples are not acceptable.
   2. After review, produce duplicates.
   3. Retained samples will not be returned to Contractor unless specifically so stated.

3.12 SUBMITTAL PROCEDURES

A. Submit for approval a Schedule of Submittals. Refer to paragraph above entitled "Submittal Schedule."

B. Submit for approval the full names of the General Contractor's Superintendent or Project Manager along with their signature and initials which they will use in confirming the General Contractors review of the submittals 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.
   1. Include each individual's phone number, pager number, mobile phone number and fax phone number.
   2. Submit the same information for personnel which may replace these individuals at the time of replacement.
   3. Only personnel authorized to conduct the construction of the proposed project shall be considered.
   4. Signature of secretarial or other clerical staff is not acceptable.

C. Submittals will begin processing only after approval of Submittal Schedule and approval of signing individual(s).

D. Transmit each submittal with approved form.
   1. Transmittal Form shall be form AIA Doc G810 or other approved form bearing the same information.

E. Sequentially number the transmittal form. Provide Specification section number for item submitted then a Dash (-) and the number 1 for the first product submitted under that section. Examples follow including numbering for revised submittals:
   1. The first item submitted from a section would be "09260-1";
   2. The second item from that section would be "09260-2", the third would be "09260-3", and so forth.
   3. If submittal "09260-2" needed to be revised and resubmitted, the number for the resubmittal would have an alphanumeric suffix added (R#), for example: "09260-2R1"
   4. If another resubmittal was necessary, the number for the resubmittal would be "09260-2R2".

F. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

G. Apply approved Contractor's stamp, signed or initialed by the General Contractor's Superintendent, or Project Manager, or other approved individual. By approving and submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements, and field construction criteria related thereto, or will do so (when the missing limited information becomes available), and has checked and coordinated the information contained within such submittals with *the* requirements of the Work and of the Contract Documents.
   1. Statements, and/or notes, and/or directions to others (including, but not limited to, subcontractors and suppliers) in the stamped statement are cause for

rejection of the submittal.

2. Signature or initial by anyone other than General Contractor's Superintendent or Project Manager or approved individual are cause for rejection.
3. Stamped statements differing from the approved statement will not be recognized and are cause for rejection of the submittal.

H. Partial or incomplete submittals will not be accepted unless previously approved in writing.

I. Deliver submittals to Engineer at business address.

J. Schedule submittals so as to maintain the approved Project schedule, and coordinate submission of related items.

K. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor. The Engineer has the right to notify the Contractor when more time may be necessary.
1. Submittals received on Friday after 10 AM will be logged in on the following workday (Monday, in most cases) and the 15 day for review period begins on the day of the log-in at the Engineers office.

L. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

M. Provide space for Contractor and Engineer review stamps.

N. When revised for resubmission, identify all changes made since previous submission. All changes must be clearly marked. Add a cloud around changes on drawings, schedules and written literature.

O. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

P. Submittals not requested will not be recognized or processed.

Q. Pick-up reviewed submittals at the office of the Engineer when notified by the Engineer. The Contractor is solely responsible, at the Contractors expense, for the delivery and pick-up of the submittals. The Contractor shall make full arrangements for pick-up and delivery of submittals if not able to do so with the Contractor's own forces.

END OF SECTION

SECTION 01 32 16 CONSTRUCTION PROGRESS SCHEDULE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, with network analysis diagrams and reports.

1.2 RELATED SECTIONS

1.3 REFERENCES

1.4 SUBMITTALS

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

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

D. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

E. Within 10 days after joint review, submit complete schedule.

F. Submit updated schedule with each Application for Payment.

G. Submit one reproducible transparency and two opaque reproduction.

H. Submit under transmittal letter form specified in Section 01 30 00.

1.5 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one year minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.6 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Sheet Size: Multiples of 8-1/2 x 11 inches.

C. Scale and Spacing: To allow for notations and revisions.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a preliminary network diagram.

3.2 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Provide sub-schedules to define critical portions of the entire schedule.

E. Include conferences and meetings in schedule.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

G. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, Products identified under Allowances, and dates reviewed submittals will be required from Engineer. Indicate decision dates for selection of finishes.

H. Indicate delivery dates for owner-furnished products.

I. Coordinate content with schedule of values specified in Section 01 20 00.

J. Provide legend for symbols and abbreviations used.

3.3 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
   1. Preceding and following event numbers.
   2. Activity description.
   3. Estimated duration of activity, in maximum 15 day intervals.
   4. Earliest start date.
   5. Earliest finish date.
   6. Actual start date.
   7. Actual finish date.
   8. Latest start date.
   9. Latest finish date.
   10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
   11. Monetary value of activity, keyed to Schedule of Values.
   12. Percentage of activity completed.
   13. Responsibility.

D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and recomputation of all dates and float.

E. Required Reports: List activities in sorts or groups:
   1. By preceding work item or event number from lowest to highest.
   2. By amount of float, then in order of early start.

3.4 REVIEW AND EVALUATION OP SCHEDULE

A. Participate in joint review and evaluation of schedule with Engineer at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.5 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
   1. Correlate activities shown on Construction Progress Schedule with the amounts shown in the request for payment for the current time period.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

3.6 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Engineer, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

3.7 OWNER MODIFICATION TO SCHEDULE

A. The Owner reserves the right to suspend work for up to five (5) days due to District testing at no additional cost to the contract.

END OF SECTION

SECTION 01 33 00 SUBMITTALS

PART 1 – GENERAL

1.1 REQUIREMENTS INCLUDED

Procedures required for submittal items specified in General Conditions of the Contract for Construction, Division 1 and individual Specification Sections to include:

A. Construction Progress Schedules.

B. Schedule of Values.

C. Requirements specified in individual Sections.

D. Shop Drawings.

E. Product Data, manufacturer's specifications, instructions, manuals and certificates.

F. Samples.

1.2 RELATED REQUIREMENTS

A. General Conditions of the Contract for Construction.

B. Section 01 30 00 – Administrative Requirements.

C. Section 01 60 00 – Product Requirements: Manufacturer’s instructions and Contractor’s list of Products.

D. Section 01 70 00 – Execution & Closeout Procedures.

E. Section 01 78 00 – Closeout Submittals.

1.3 PROCEDURES

A. Deliver submittals to Engineer at 12770 Cimarron Path, Suite 100, San Antonio, Texas 78249. Email delivery of submittals will be allowed if prior coordination is taken.

B. Transmit each item under Engineer approved form. Identify Project, Contractor, subcontractor, major supplier. Identity pertinent Drawings sheet and detail number and specification Section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and Architect.

C. Submit initial progress schedules and schedule of values in duplicate within 7 days after award of Contract. After review by Engineer revise and resubmit as required. Submit revised schedule of values reflecting changes since previous submittal.

D. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.

E. After Engineer review submittal, revise and resubmit as required, identifying changes made since previous submittal.

F. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit a horizontal bar chart with separate bar for each major trade or operation identifying first Work day of each week.

1.5 LIST OF MATERIALS

A. List of Materials, within 30 calendar days after issuance of Notice to Proceed:
   1. Tabulated by relevant Specifications Section in triplicate.
   2. Upon review by Owner and Engineer, the Engineer will notify the Contractor if the Owner or Engineer have any objections to any parties on the list. Acceptance of any subcontractor or material supplier will not relieve the Contractor from responsibilities called for in the Contract Documents; nor will acceptance of any subcontractor establish approval of any particular process or material.
   3. Contractor shall submit, in triplicate, a list of the following types of materials proposed for installation:
      a. Materials not specified.
      b. Materials selected from a Section citing more than one manufacturer.
      c. Materials selected to conform to referenced standard.
   4. List shall be tabulated by Specifications Section and include the name and manufacturer of each material. For materials specified by referenced standards, also include the following:
      a. Specifications Section.
      b. Address of manufacturer.
      c. Trade name.
      d. Model and catalog number.
      e. Manufacturer's data: Performance and test data and referenced standards.
   5. Contractor is solely responsible for bidding the items specified in the various Specifications Sections. Any substitutions shall be submitted in accordance with Section 01 60 00.
   6. The Contractor shall not submit any material for approval that cannot be verified as currently in production; no discontinued materials shall be submitted. The Contractor shall provide proof of product availability as requested by Engineer or Owner.

1.6 SCHEDULE OF VALUES

A. Within 3 weeks after Notice to Proceed, submit a Schedule of Values, in triplicate, for approval by Engineer and Owner. This breakdown shall be done by subdividing the schedule values into line items and distributing the total Contract Amount to each separate subcontract for each phase of construction. The more detail included in the Schedule of Values, the easier it is for the Owner and Engineer to review the Contractor's Monthly Estimate for Partial Payment.

B. Include in each line item a directly proportional amount of Contractor's overhead and profit.

C. Include allowances as separate line items.

D. Revise schedule to list change orders, prior to each application for payment.

1.7 SUBMITTAL DELIVERY SCHEDULE

A. Submit Submittal Delivery Schedule within 30 calendar days after notification of Contract Award.
   1. Project Number.
   2. Specification Section number.
   3. Name of Subcontractor.
   4. Description of Work and/or material.
   5. Work Progress activity or event identification.
   6. Dates scheduled for first submittal, re-submittal and final approval.
   7. All submittal written data shall be on 8-1/2” x 11” paper, typed and include a complete standard title/action block.

1.8 SHOP DRAWINGS

A. Submit two copies that will be retained by the Engineer. Reproductions of the Contract Documents will not be acceptable.

1.9 PRODUCT DATA

A. Mark each copy to identify applicable products, options, and other data; supplement manufacturer’s standard to provide information unique to the Work. Include manufacturer’s installation instruction when required by the Specification Section.

B. Submit the number of copies that Contractor requires (including one copy for Record Documents), one copy for Owner plus two copies that will be retained by Engineer.

1.10 SAMPLES

A. Include identification on each sample, giving full information.

B. Submit the number specified in respective Specifications Section; one will be retained by Engineer. Reviewed samples that may be used in the Work are indicated in the Specifications Section.

C. Provide field finishes at Project as required by individual Specification Section. Install sample complete and finished. Acceptable finishes in place may be retained in completed Work.

1.11 ASBESTOS-FREE CERTIFICATION

A. The Contractor shall carefully review each submittal to assure that no asbestos is contained in any material or product used on this project. At the completion of the project and prior to final payment, Contractor shall provide the Owner a notarized warranty stating that no asbestos material or product is contained in this project.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION

SECTION 01 40 00 QUALITY REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

C. Quality Assurance - Shop Drawings.

D. Mock-ups.

E. Control of installation.

F. Tolerances.

G. Testing and inspection and testing services.

H. Manufacturers' field services.

1.2 RELATED SECTIONS

A. Document 00 30 00 - Information Available to Bidders: Soil investigation data.

B. Section 01 21 00 - Allowances: Allowance for payment of testing services.

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

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

1.3 REFERENCES

A. ASTM C 1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 1997.

B. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2000.

C. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Unit Masonry; 1995. D. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 1999c.

E. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction; 2000b.

F. ASTM E 543 - Standard Practice for Agencies Performing Nondestructive Testing; 1999.

G. ASTM E 548 - Standard Guide for General Criteria used for Evaluating Laboratory Competence; 1994.

1.4 SUBMITTALS

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.
   2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Testing Agency must become thoroughly familiar with the Geotechnical Study including recommendations and caveats.

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

C. Test Reports: After each test/inspection, promptly submit one copy to the Owner, two copies of report to Engineer and to Contractor and one copy to each respective Engineer (Structural and Civil).
   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. Conformance with Contract Documents.
      k. When requested by Engineer, provide interpretation of results.
   2. Test reports are submitted for Engineer's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
   3. Failure to submit reports is cause for rejection of Pay Requests.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer, in quantities specified for Product Data.
   1. Indicate material or product conforms to 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 Engineer. Certification must not be older than three years prior the date of testing for this project.

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.

F. Manufacturer's Field Reports: Submit reports for Engineer's benefit as contract administrator or for Owner.
   1. Submit report in duplicate within 30 days of observation to Engineer for information.
   2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

G. Erection Drawings: Submit drawings for Engineer's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.5 QUALITY ASSURANCE - SHOP DRAWINGS

A. Where Specifications or drawings call for the performance of shop drawings to be designed and prepared under direct supervision of a Professional Engineer, the Engineer must be experienced in the discipline/design of the work specified and licensed in the state where the project resides.

B. Shop Drawings prepared under the supervision of a Professional Engineer must bear the Engineers seal and signature.

C. The Engineer's seal and signature is the only evidence acceptable that the shop drawings were designed and prepared under Engineers supervision.

1.6 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. Conform to 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. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

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

1.7 TESTING AND INSPECTION AGENCIES

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. C. Contractor Employed Agency:
   1. Testing agency: Comply with requirements of ASTM E 329, ASTM E 548, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM C 1021.
   2. Laboratory: Authorized to operate in State in which Project is located.
   3. Laboratory Staff: Maintain a full-time registered Engineer on staff to review services.
   4. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 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 Engineer 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.

3.2 MOCK-UPS

N/A

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

A. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Engineer 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 Engineer and Contractor of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by Engineer.
6. Submit reports of all tests/inspections specified.

B. 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.

C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Engineer. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.5 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 30 days in advance of required observations.
1. Observer subject to approval of Engineer.

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

3.6 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telephone and facsimile service.

C. Temporary sanitary facilities.

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

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

I. Field offices.

1.2 TELEPHONE SERVICE

N/A

1.3 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.

1.4 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

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

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

1.5 FENCING

A. Construction: Commercial grade chain link fence.

B. Provide eight-foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.6 EXTERIOR ENCLOSURES

1.7 INTERIOR ENCLOSURES

N/A

1.8 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.

1.9 VEHICULAR ACCESS AND PARKING

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

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

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

D. 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. 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

N/A

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

A. Where specific product selection has not been made, is missing, is undetermined, or is unclear, and a determination from the Engineer is not available, Contractor shall include an amount sufficient to allow selection(s) from the products highest price group.

1.2 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations and procedures.

E. Procedures for Owner-supplied products.

F. Spare parts and maintenance materials.

1.3 RELATED SECTIONS

A. Section 01 30 00 - Administrative Requirements: Submittal Schedule and Submittal Procedures.

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

1.4 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999.

1.5 SUBMITTALS

A. In general, substitutions will not be accepted, unless noted otherwise. Procedures for approving product substitutions occur during the Bidding period.
   1. Refer to the Instructions to Bidders for substitution Procedures.
   2. Refer also to Section 01 30 00 - Administrative Requirements.

B. Procedures for approving product substitutions after the Bidding period:
   1. Refer to Section 01 30 00 - Administrative Requirements, Request for substitutes after the Bidding phase.

C. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

D. 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.

E. Shop Drawing Submittals: Prepared specifically for this Project.

F. 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

2.1 EXISTING PRODUCTS

A. Provide interchangeable components of the same manufacture for components being replaced.

B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

2.2 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 the product specified by the manufacturer specified. Use of a product of one of the other manufacturers named must still receive approval in writing before it is allowed for use on this project. Otherwise, no options or substitutions allowed.
   1. Substitutions are not accepted on or after the date of the Agreement, unless noted otherwise.
   2. Refer also to Section 01 30 00 Administrative Requirements.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
   1. Substitutions are not accepted on or after the date of the Agreement, unless noted otherwise.
   2. Refer also to Section 01 30 00 Administrative Requirements.

2.3 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.

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

PART 3 - EXECUTION

3.1 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period, unless noted otherwise. Comply with requirements specified in this section.
   1. Substitutions must be approved in the time frame described in the Instructions to the Bidders and in Section 01 30 00 - Administrative Requirements. Refer to Section 01 30 00 - Administrative Requirements for Post-Bid consideration. Approval must be in writing from the Engineer or Engineer (consultant) with the approval of the Engineer.
   2. If any approved substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Engineer.

B. Any product, system or procedure not specifically listed or described in the Contract Documents is subject to rejection.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. A request for substitution 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.
      a. The submitter must provide information and certification in writing showing point for point comparison for the proposed substitute with the specified product, including color selections.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner or the Engineer.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without having been previously approved.

3.2 OWNER-SUPPLIED PRODUCTS

A. See Section 01 10 00 - Summary for identification of Owner-supplied products.

B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.3 TRANSPORTATION AND HANDLING

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

B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

3.4 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 weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection. Refer to Section 01 20 00 for requirements concerning off-site storage of materials and equipment.

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

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Transportation of stored products is the responsibility of the Contractor.

J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 70 00 EXECUTION & CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pre-installation meetings.

B. Cutting and patching.

C. Surveying for laying out the work.

D. Starting of systems and equipment.

E. Demonstration and instruction of Owner personnel.

F. Closeout procedures, except payment procedures.

1.2 RELATED SECTIONS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures.

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

C. Section 01 50 00 - Temporary Facilities & Controls: Temporary exterior enclosures.

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

E. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.

1.3 SUBMITTALS

A. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

B. Cutting and Patching: Submit written request in advance of cutting or alteration which affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Effect on work of Owner or separate Contractor.

f. Written permission of affected separate Contractor.
g. Date and time work will be executed.

1.4 QUALIFICATIONS

A. For survey work, employ a land surveyor registered in TEXAS and acceptable to Engineer. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.5 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

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

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

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.

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.
1. Minimize amount of bare soil exposed at one time.
2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

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

G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.6 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, with provisions for accommodating items installed later.

B. 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.

C. Coordinate space requirements, supports, and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown 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.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

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

F. 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

2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that demolition is complete in alterations areas and areas are ready for installation of new work.

C. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

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

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

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Cut, move, or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.

B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.

C. Remove debris and abandoned items from area and from concealed spaces.

D. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ducts and piping to prevent condensation in exposed areas.

E. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.

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

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

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

3.3 PRE-INSTALLATION MEETINGS

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

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Engineer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
1. Review conditions of installation, preparation and installation procedures.
2. Review coordination with related work.

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

3.4 LAYING OUT THE WORK

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

B. Promptly notify Engineer of any discrepancies discovered.

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

D. Control datum for survey is that indicated on Drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

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

H. Utilize recognized engineering survey practices.

I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record

documents.

J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.

K. Periodically verify layouts by same means.

L. Maintain a complete and accurate log of control and survey work as it progresses.

3.5 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 neat transitions between different surfaces, maintaining texture and appearance.

C. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

D. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Engineer review and request instructions.

E. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

F. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.

G. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

3.6 CUTTING AND PATCHING

A. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

I. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.7 PROGRESS CLEANING

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

B. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do no burn or bury.

3.8 PROTECTION OF INSTALLED WORK

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

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

C. Prohibit traffic from landscaped areas.

3.9 STARTING SYSTEMS

N/A

3.10 DEMONSTRATION AND INSTRUCTION

N/A

3.11 ADJUSTING

N/A

3.12 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Clean debris from drainage systems.

C. Clean site; sweep paved areas, rake clean landscaped surfaces.

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

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Engineer and Owner.

B. Accompany Engineer/Engineer on preliminary inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.

C. Notify Engineer when work is considered ready for Substantial Completion.

D. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's review.

E. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

F. Notify Engineer when work is considered finally complete.

G. Complete items of work determined by Engineer's final inspection.

3.14 MAINTENANCE SERVICE

A. Furnish service and maintenance of components indicated in specification sections for one (1) year from date of Substantial Completion.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 78 00 CLOSEOUT SUBMITTALS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

B. Record Submittal Set.

C. Operation and Maintenance Data.

D. Warranties and bonds.

1.2 RELATED SECTIONS

A. Conditions of the Contract: Performance bond and labor and material payment bonds, warranty, and correction of work.

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

C. Section 01 70 00 - Execution Requirements: Contract closeout procedures.

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

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

1.3 SUBMITTALS

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

B. Complete set of approved Submittals. (Owner's Record Submittal Set.)
1. Submit to the Owner 1 copy of the approved submittals, with an index and a log, at the final inspection.

C. Operation and Maintenance Data:
1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
3. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
4. Submit two sets of revised final documents in final form within 10 days after final inspection.

D. Warranties and Bonds:
1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after

acceptance.
2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
2. Addenda.
3. Change Orders and other modifications to the Contract.

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. Record Drawings: Legibly mark each item to record actual construction including:
1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

3.2 RECORD SUBMITTAL SET

A. Reviewed Submittals with Index and Log:
1. Product Data.
2. Shop Drawings.
3. Samples for Selection.
4. Samples for Verification.

B. Submittals for Information with Index and Log:
1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer’s instructions.
6. Manufacturer’s field reports.
7. Other types indicated.

3.3 OPERATION AND MAINTENANCE DATA

A. 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.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.4 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish'
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Additional information as specified in individual product specification sections.

D. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.5 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS
N/A

3.6 OPERATION AND MAINTENANCE MANUALS

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

B. Prepare data in the form of an instructional manual.

C. Binders: Commercial quality, 8-1/2 x 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. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

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

H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

I. Contents: Prepare a Table of Contents for each volume, with each product or system

description identified, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   a. Significant design criteria.
   b. List of equipment.
   c. Parts list for each component.
   d. Operating instructions.
   e. Maintenance instructions for equipment and systems.
   f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
   a. Shop drawings and product data.
   b. Air and water balance reports.
   c. Certificates.
   d. Photocopies of warranties and bonds

J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.7 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 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 the 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. Manual: Bind in commercial quality 8-1/2 x 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 02 41 13 SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General, Supplementary, and Special Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the selective removal and subsequent off-site disposal of, but is not limited to, removal of existing walks, curbs and pavements.

B. Related work specified elsewhere includes relocation of utilities, pipes, conduits, ducts, and other mechanical and electrical work, and is specified in other Sections.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Submit Schedule: Indicating proposed sequence of operations for selective demolition work to Architect for review prior to start of work. Include coordination for shutoff, capping and continuation of utility services as required, together with details for dust and noise control protection.

1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of School operations.
2. Coordination with School District continuing occupation of existing building(s) and with School's partial occupancy of new building(s).

C. Submit Photographs: Of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with School District's representative prior to start of work.

1. Where finish involves normal color and texture variations, include Sample sets composed of two (2) or more units showing the full range of variations expected.
2. Include similar Samples of material for joints and accessories involving color selection.

1.4 JOB CONDITIONS

A. Occupancy: The School will occupy portions of the site adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of school's normal operations. Provide minimum of seventy two (72) hours advance notice to School District of demolition activities that will affect School's normal operations.

B. Condition of Structures: The School District assumes no responsibility for actual condition of items or structures to be demolished.

1. Conditions existing at time of inspection for bidding purposes will be maintained by School District in so far as practicable. However, minor variations within structure may occur by School District's removal and salvage operations prior to start of selective demolition work.

C. Partial Demolition and Removal: Items indicated to be removed and which are of salvable value to Contractor may be removed as work progresses. Transport salvaged items from site as they are removed.

1. Storage or sale of removed items on site will not be permitted.

D. Protections: Provide temporary barricades and other forms of protection to protect School personnel, students, visitors and general public from injury due to selective demolition work, whether or not these are shown in Drawings.

1. Provide protective measures as required to provide free and safe passage of School's personnel, students, visitors and general public to existing building.

2. Erect temporary covered passageways as required by authorities having jurisdiction.
3. Provide shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
4. Protect from damage existing finish work that is to remain in place.
5. Remove protections at completion of work.

E. Damages: Promptly repair damages caused to adjacent surfaces or facilities by demolition work.

F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent facilities. Cooperate and coordinate with School District officials.
1. Do not close, block, or otherwise obstruct streets, walks, or other facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways as required by School District and City of Live Oak.

G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. Notify Local Fire Department before initiating each flame cutting operation.

H. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by the Owner. Provide temporary services during interruptions to existing utilities, as acceptable to School District.
2. Maintain fire protection services during selective demolition operations.

I. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 **-** PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Provide shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
1. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
a) Provide bypass connections as necessary to maintain continuity of service to existing school building. Provide minimum of 72 hours' advanced notice to School District if shutdown of service is necessary during changeover.

3.2 DEMOLITION

A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
2. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction and by environmental regulations.
3. Demolish foundation walls to a depth of not less than 12" below existing ground surface. Demolish and remove below-grade wood or metal construction. Break up below-grade concrete slabs.

4. For exterior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
5. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6" in diameter, roots, or other organic matter.

B. If unanticipated mechanical, electrical, structural, or utility elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to School District's representative in written, accurate detail. Pending receipt of directive from School District's representative, re-arrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3 SALVAGED MATERIALS

A. Salvaged Items: Where items are indicated on Drawings to be salvaged and to remain the property of the School District, carefully remove indicated items, clean, store, and turn over to School district's representative and obtain receipt. Where items are to be re-used, carefully remove indicated items, clean and store until ready to be re-installed at no additional cost to owner.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from project site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off Site.
1. If hazardous materials are encountered on Project Site notify School District.
2. Burning of removed materials is not permitted on Project Site or elsewhere on School property.

3.5 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site and off School property. Remove protections and leave areas free of debris.
1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

SECTION 13 31 23 PRE-ENGINEERED FABRIC SHADE STRUCTURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections apply to this section.

1.02 SUMMARY

A. The Contractor shall be responsible for the design, fabrication, supply, permitting, foundations, and installation of the work specified herein. The intent of this specification is to have only one single contractor be responsible for all the above functions.

1.03 REFERENCES

A. Shade structures must comply with the latest revision of applicable codes and regulations. including IBC 2021 or the latest revision required by the city.

1.04 PERMITTING

A. The awarded Contractor will be fully responsible for submitting, paying all permit fees and processing the permits for each campus. The awarded Contractor will be responsible to obtain a receipt to be reimbursed by Boerne ISD for all permitting fees that are required.

1.05 QUALITY ASSURANCE

A. Design, fabrication and erection are limited to fabric architecture firms with engineering in tensile shade structures and proven experience in design and construction of fabric shade structures and such firms shall meet the following minimum requirements. No Substitutions shall be allowed for the following:
B. The Contractor shall manufacture, permit and erect the fabric shade structures including the foundations.
C. The Contractor shall have at least 10 years of experience in the manufacture and installation of shade structures.
D. All bidders must have an in-house warranty & service department to assist in repairs and service calls within 72 hours.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for shade structures shown on the project drawings in relation to the property survey and existing structures and verify locations by field measurements prior to construction for shade structures. Contractor to field verify existing conditions prior to the design and fabrication of shade structures.
B. Contractor is responsible for site access in their proposal. The contractor will be fully responsible for gaining access to the area, including but not limited to, vertical clearance and gate/fencing access. Contractor is to field verify all access prior to submitting a bid. There will be no additional payment for site access.

1.07 WARRANTY

A. The Contractor shall provide a 12-month warranty on all labor and materials.
B. A warranty from the shade manufacturer and shade installer shall be provided for a period of 10 years (prorated) on fabric and 10 years on the structural integrity of the steel and foundations from the date of substantial completion.
C. The warranty shall not deprive Owner of other rights under the provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by Contractor under requirements of the Contract Documents.

1.08 ITEMS TO BE INCLUDED WITH BID DOCUMENTS

A. To qualify to be a shade manufacturer and/or shade installer for this project, submit the following documentation with the bid documents:

1. 2 physical fabric samples. Samples to be “Electric Purple, Silver, White” color.
2. Detailed material and performance specifications for ALL fabric, steel, hardware, and cables used in shade structure.
3. 2 physical powder coating color metal “chips”. Samples to be “Tele-Gray” color.
4. List of at least 10 reference sites within Texas.
5. List of at least 10 customer references within Texas.
6. Proof of compliance with all quality assurance criteria, as per Section 1.05
7. Full set of signed and sealed (by an engineer in the state of Texas) engineering drawings for standard 20’x20’x20’ triangular shade structure.
8. Proof of installation competency and/or certification for type and size of structure specified.
9. List of any and all deviations from product specifications in Part 2 – Products.

1.09 PRE-APPROVED SHADE MANUFACTUERES/INSTALLERS

A. The following are approved Manufacturers and Installers.

Manufactures:
Tensoshade, LLC
17595 W Blanco Rd. Ste 300
San Antonio, Texas. 78232
210-888-0128

USA Shade
2580 Esters Blvd, Suite 100
DFW Airport, TX 75261
214-587-9397

Installers:
Tensoshade, LLC
17595 W Blanco Rd. Ste 300
San Antonio, Texas. 78232
210-888-0128

USA Shade
2580 Esters Blvd, Suite 100
DFW Airport, TX 75261
214-587-9397

PART 2 – PRODUCTS

2.01 GENERAL

A. Scope of Work: Provide 10’ entry height triangular shade structures per the dimensions shown in the construction documents. The center post shown in the construction plans would need to connect and support all three triangular shade structures.

B. All shade structure manufacturers are required to submit with their bid documents all items per Section 1.08.

C. The shade structure shall conform to the current adopted version of the International Building

Code 2021 and local agency additions and amendments.

D. All shade structures are engineered and designed to meet a minimum of 115 mph wind load, Exposure C and a live load of 5 lbs./sf². All shade structures shall be engineered with a zero wind pass-through factor on the fabric. When ASD Steel Design Method is used based on IBC 2018 Section 1605.3.1 the Dead + 0.75 of Live + 0.75 of Wind Load cases must be combined.

D. Shade fabric to be Flame Retardant Commercial 95 or approved equal.

2.02 FABRIC STRUCTURE

A. Steel:

1. All steel members of the shade structure shall be designed conforming to the current adopted version of the International Building Code 2021 and local agency additions and amendments.
2. All connections shall have a maximum internal sleeves tolerance of .0625 inches using high tensile strength steel sections with a minimum sleeve length of 6 inches.
3. All non-hollow structural steel members shall comply with ASTM A-36. All hollow structural steel members shall be cold formed, high strength steel and comply with ASTM A-500, Grade B or C, or ASTM A-53 Grade C. All steel plates shall comply with ASTM A-572, Grade 50, ASTM A-325, or ASTM A-36. All galvanized steel tubing shall be triple coated for rust protection using an in-line electro plating coat process. All galvanized steel tubing shall be internally coated with zinc and organic coatings to prevent corrosion. Any steel members used in the construction of the shade structures must comply with the International Build Code 2021.
4. All non-cantilevered shade structures are required to utilize only round columns
5. The designer shall utilize bolted connections for the shade structure foundations in their signed and sealed shop drawings.

B. Bolts:

1. All structural framing connections of the shade structure shall be designed and made with high strength bolted connections for field assembly only with no field welding.
2. Fasteners:
   a. Bolts: ASTM A325 Grade B or SAE J429. Grade 8.
   b. Nuts: ASTM A563 high strength nuts.
   c. Stainless Steel Bolts: ASTM F-593, Alloy Group 1 or 2.
   d. Stainless Steel Nuts: ASTM F-594, Alloy Group 1 or 2.
3. Column Anchors: ASTM F1554 Grade 55.

C. Welding:

1. All shop-welded connections of the shade structure shall be designed conforming to the current adopted version of the International Building Code 2018 and local agency additions and amendments. Structural welds shall be made in compliance with the requirements of the “Prequalified” welded joints where applicable and by certified welders. No onsite or field welding shall be permitted.
2. All full penetration welds shall be continuously inspected by an independent inspection agency and shall be design conforming to the current adopted version of the International Building Code 2021 and local agency additions and amendments.

D. Powder coating:

1. Galvanized steel tubing preparation prior to powder coating shall be executed in accordance to solvent cleaning SSPC-SP1. Solvent such as water, mineral spirits, xylol, toluol, which are to be used to remove foreign matter from the surface. A mechanical method prior to solvent cleaning prior to surface preparation shall be executed according to Power Tool Cleaning SSPC-SP3 and utilizing wire brushes abrasive wheels and needle gun, etc.
2. Carbon structural steel tubing preparation prior to powder coating shall be executed in accordance to commercial blast cleaning SSPC-SP6 or NACE #3. A commercial blast

cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, mill scale, rust, coating, oxides, corrosion, products and other foreign material.

3. Powder coating shall be sufficiently applied, with a minimum three mils thickness and cured at the recommended temperature to provide proper adhesion and stability to meet salt spray and adhesion tests as defined by the American Society of Testing Materials.
4. Powder used in the powder coat process shall have the following characteristics:
   a. Specific Gravity: 1.68 +/- 0.15
   b. Theoretical coverage: 114 +/- 5ft^2/lb/mil
   c. Mass loss during cure: <1%
   d. Maximum storage temperature: 80°F
5. The powder coating systems shall be applied in accordance with the manufacturers' specifications. Primer should be fused only and then top coated with the selected powder coat to ensure proper inter-coat adhesion.

E. Tension Cable:
1. Steel cable is determined based on calculated engineering load.
2. For light and medium loads, 1/4" (nominal) galvanized 7x19 strand cable to be used.
3. For heavy loads, 3/8" (nominal) galvanized 7 x 19 cable to be used.

F. Fabric Roof Systems
1. UV Shade Fabric
   a. Shade fabric is to be made of a UV-stabilized, high-density polyethylene (HDPE). HDPE mesh shall be a heatstentered, lockstitch fabric with one monofilament and two tape yarns to ensure that the material will not unravel if cut. Raw fabric rolls shall be a minimum of 9.5 feet wide.
2. Fabric Properties:
   a. Life Expectancy: A minimum of 8 years continuous exposure to the sun
   b. Fading: Minimum fading after 5 years (3 years for red and yellow)
   c. Fabric Mass: 5.31 oz/yd^2 to 23.5 oz/yd^2
   d. Fabric Width: minimum of 9.5 feet
   e. Roll Length: 98.42 feet (30m)
   f. Roll Weight: maximum of 130 lbs
3. Fabric shall meet the following flame spread and fire propagation tests:
   a. ASTM E-84
   b. NFPA 701 Test Method 2

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4. Shade and UV Factors:
   a. Shade protection and UV screen protection factors shall be as follows:

Color	Shade %	UV Block %
Electric Purple	84%	90%
Silver	88%	93%
White	57%	86%

G. Stitching & Thread:
   a. All sewing threads are to be double stitched.
   b. Thread shall be manufactured from 100% expanded PTFE; mildew resistant exterior approved thread. Thread shall meet or exceed the following:
      1) Flexible temperature range
      2) Very low shrinkage factor
      3) Extremely high strength, durable in outdoor climates
      4) Resists flex and abrasion of fabric
      5) Unaffected by cleaning agents; acid rain, mildew, salt water and rot resistant, unaffected by most industrial pollutants

6) Treated for prolonged exposure to the sun
7) Rot resistant

2.03 SHIPPING AND HANDLING

A. All steel surfaces touched by tie down straps are to be padded before final clinching. This can be accomplished by using carpet pads or factory manufactured padding.
B. All dunnage must be padded before painted products are set in place. Smaller and loose pieces must be padded and totally separate from paint padding.
C. Unloading: Lift forks to be covered with properly fitted padding. All dunnage must be padded vertically and horizontally to prevent damage to painted surfaces. When unloading, take care to prevent tools and other hard surface items from making contact with painted items.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Installations of shade structures shall be by the approved manufacturer shown on 2.01.1
B. The contractor installing, if any, the structure shall comply with manufactures instructions for assembly, installation, and erection per approved drawings.
C. The installation shall only commence after the Contractor has submitted for and received all necessary permits from the local Authority Having Jurisdiction.
D. Concrete
1. Unless noted otherwise for footing and piers by the approved manufacturer or General Contractor's Engineer, concrete specification for footings, piers, slabs, curbs and walkways shall meet a minimum 3,000psi at 28-day strength.
2. Concrete work is executed in strict accordance with the latest American Concrete Institute Building Code (ACI 318-99).
3. Slump 4" maximum.
4. Whenever daily ambient temperatures are below 80 degrees Fahrenheit, the contractor may have mix accelerators and hot water added at the batch plant.
a. temperature range between 75-80 degrees, 1% accelerator High Early (non-calcium)
b. temperature range between 70-75 degrees, 2% accelerator High Early (non-calcium)
c. temperature range below 70 degrees, 3% accelerator High Early (non-calcium)
5. The contractor shall not pour any concrete when daily ambient temperature is below 55 degrees Fahrenheit.
6. Concrete will be left to set up a minimum of 24 hours before any load bearing member shall be attached to the structure.
E. Foundations:
1. All Anchor Bolts set in new concrete shall be ASTM A-325.
2. All Anchor Bolts shall be Hot Dipped Galvanized.
3. Footings shall be a minimum as listed below:
a. The minimum footing size for the shade structure is in accordance with and conform to manufactures engineered specifications and drawings
4. All columns must be bolted to anchor plates set in the footings per detail No. 2, Sheet C7.2. Direct set the columns within the concrete footings will not be accepted.

3.02 SAFETY PROCEDURES

A. The Contractor is responsible for the coordination of work with other trades.
B. All staff personnel are to be dressed and conduct themselves in accordance with OSHA standards. All staff must be properly trained for equipment that they might use. Safety is a top priority.
C. All vehicles and machinery are to be properly licensed and insured and must be operated by licensed operators in accordance with OSHA standards. All cranes and lifts must be operated in accordance with manufacturer's guidelines.

D. The handling of steel during installation is critical. Exercise care when lifting items so that it does not come into contact with other surfaces. Clean sand and other deleterious material from structural items before moving or lifting. Before installation, all items are to be washed with soap and water and dried with cloths. All grease, dust, oils, and other latent materials are to be removed during this washing. When pouring concrete pour backs at columns, protect paint by using plastic and tape to prevent concrete from splashing on finish surfaces.
E. All concrete must be cut with a wet diamond blade to ensure that it leaves a clean finish. If at any stage the existing remaining surface lifts, creating a tripping hazard, additional saw cutting will be required so as to leave a neat and uniform joint.
F. Cover all open holes at all times with solid plywood and spoils to prevent access until concrete is poured.
G. All equipment and/or product must be stored inside the fenced area.

END OF SECTION 13 31 23

SECTION 260313
ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

B. The contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing such loss or damage. The contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

C. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The contractor shall allow the Owner 2 weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

D. The contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.

1.02 RELATED SECTIONS

A. Section 01120 - Alteration Project Procedures.

B. Section 02072 - Minor Demolition for Remodeling.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

B. Include in the contract price all rerouting of existing conduits, wiring, outlet boxes, fixtures, etc., and the reconnecting of existing fixtures as necessitated by field conditions to allow the installation of the new systems. Furnish all temporary conduit, wiring, boxes, etc., as required to maintain lighting and power service for the existing areas with a minimum of interruption. Remove wire and conduit back to nearest accessible active junction box and extend to existing homeruns as required.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Coordinate utility service outages with Utility Company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system.

Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Notify Owner and Telephone Utility Company at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

G. Existing Public Address System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from the Owner and at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Section 01120, Section 02072, and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets, which are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

L. Where existing construction is removed to provide working and extension access to existing utilities, contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.

M. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.

N. During the construction and remodeling, portions of the project shall remain in service. Construction equipment, materials, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building.

O. Certain work during the demolition phase of construction may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner`s Representative at least 72 hours in advance.

P. All existing lighting fixtures, switches, outlets, speakers, materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place and shall remain in service.

Q. Electrical equipment, outlets, speakers, circuits to mechanical and building systems equipment, etc., which are to remain but which are served by conduit and/or circuiting that is disturbed by the remodeling work, shall be reconnected in such as manner as to leave it in proper operating condition.

R. Existing branch circuit wiring which is to be removed, shall be pulled from the raceways and the empty conduit shall be removed to a point of permanent concealment.

S. Within the remodeled or alteration areas where existing walls are being removed, all existing lighting fixtures, switches, receptacles, other materials and equipment and their appurtenances shall be removed, where required by the remodel work either shown or specified.

T. New circuiting indicated to be connected to existing panels shall be connected to "spares" and/or "released" breakers as applicable, or new breakers provided where space is available. Contractor shall verify the existing panel load and feeder capacity prior to adding any additional loads.

U. In all the remodeled areas where existing ceilings are being removed and reinstalled, all existing lighting fixtures, other ceiling mounted devices (i.e. smoked detectors, speakers, etc.) and their appurtenances shall be removed and reinstalled, unless otherwise shown or specified. This also applies to new ceiling installations.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.05 INSTALLATION

A. Install relocated materials and equipment under the provisions of Section 01120.

3.06 REMOVAL OF MATERIALS

A. The contractor shall modify, remove, and/or relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean, repair, and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

C. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the contractor`s responsibility and shall be repaired or replaced by the contractor as approved by the Owner, at no additional cost to the Owner.

D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

END OF SECTION

SECTION 260519
WIRE, CABLE AND RELATED MATERIALS

PART 1 - GENERAL

1.01 SCOPE

A. Provide 600 volt building wire, cable and connectors and 300 volt wire, cable and connectors.

B. WORK INCLUDED: Include the following Work in addition to items normally part of this Section.
   1. Wiring for lighting, dimming controls and power.
   2. Automatic Control Wiring.
   3. Connection of equipment shown.
   4. Voice Communications and Sound System.
   5. Mineral Insulated Cable (MI)

C. WORK SPECIFIED ELSEWHERE:
   1. Heating, ventilating, and air conditioning equipment.
   2. Structured cabling system.
   3. Coaxial cables

1.02 REFERENCE STANDARDS

A. UL 83 - Thermoplastic-Insulated Wires and Cables

B. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire

C. NFPA 70 - National Electrical Code

D. All wire cable and connectors shall be UL approved.

E. NEMA

F. NEMA Bulletin 119

1.03 ACCEPTABLE MANUFACTURERS

A. 600 VOLT WIRE AND CABLE
   1. Southwire
   2. Encore
   3. Cerro

B. 300 VOLT WIRE AND CABLE
   1. Westpenn
   2. Beldon
   3. Alpha
   4. Tappan - Southwire

C. FLEXIBLE CABLE SYSTEMS
   1. AFC Modular Cable Systems
   2. Kaf-Tech

D. CONNECTORS
   1. Ilsco
   2. Cooper
   3. AMP - TYCO
   4. Burndy
   5. Ideal
   6. 3M
   7. O.Z. Gedney
   8. Thomas & Betts
   9. Buchanan

1.04 SUBMITTALS

A. Shop drawings shall include, but not limited to:

1. Cutsheets of wire, cable and connectors to indicate the performance, fabrication procedures, product variations, and accessories.

1.05 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electrical Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 WIRING

A. All wire shall be new and continuous without weld, splice, or joints throughout its length. It must be uniform in cross-section, free from flaws, scales and other imperfections.

B. WIRE MATERIAL: Conductors shall be soft drawn, annealed copper. Aluminum wiring is not acceptable unless otherwise noted on drawings.

C. TYPES:
1. Provide type “THHN/THWN-2” insulation for all buried feeders and service entrance conductors.
2. Provide type “THHN/THWN-2” insulation for all branch circuits and above grade feeders.
3. All wire No. 8 and larger shall be stranded. All wire No. 10 and smaller shall be stranded or solid.
4. Provide type "XHHW" or other 90 degrees insulation wiring for branch circuit wiring installed through continuous rows of fixture bodies.
5. All 300-volt cable including but not limited to telephone, fire alarm, data, CATV and security shall be UL listed for use in return air plenums.
6. All dimming conductors shall be 300 volt, 75 C plenum rated. Dimming conductors shall be solid. Stranded conductors are not acceptable.

D. CONDUCTOR SIZES
1. Feeder conductors shall be sized for a maximum of 2% drop in rated voltage at scheduled load.
2. Branch circuit conductors shall be sized for a maximum 3% drop in the rated voltage to the longest outlet on the circuit.
3. Minimum wire shall be 12 AWG, unless otherwise shown on Drawings or required by Code.
4. Minimum wire size for 0-10v dimming controls shall be 18 AWG for conductors not exceeding 300 feet circuit length (one-way) and 16 AWG for those exceeding 300 feet (one-way).

E. COLOR CODING: No. 6 or larger shall use tape for color coding. No. 8 and smaller wire shall be color coded in accordance with the governing authority requirements or as follows:

<u>120/208 Volt</u>
Neutral: White
Phase A: Black
Phase B: Red
Phase C: Blue
Ground: Green

<u>277/480 Volt</u>
Neutral: Gray
Phase A: Brown
Phase B: Purple
Phase C: Yellow
Ground: Green

<u>120/240 Volt</u>
Neutral: White
Phase A: Black
Phase B: Orange
Phase C: Blue

Ground: Green
<u>0-10 Volt dimming conductors</u>
Purple (source)
Pink (common)

2.02 GROUNDING

A. Permanently connect all conduit work, motors, starters, and other electrical equipment to grounding system in accordance with NFPA 70.

PART 3 - EXECUTION

3.01 WIRE

A. Do not pull wire into conduit until Work of an injurious nature is completed. Where two or more circuits run to a single outlet box, each circuit shall be properly tagged. Wyreze or approved equal may be used as a lubricant where necessary.

B. Splices shall be fully made up in outlet boxes with compression crimp-on type splice connectors.

C. Joints and splices will not be permitted in service entrance or in feeders. Joints in branch circuits will be permitted where branch circuits divide, and then shall consist of one through-circuit to which the branch shall be spliced. Joints shall not be left for the fixture hanger to make. Connect joints and splices with Buchanan Series "2000" solderless connectors complete with insulating caps or properly sized twist on wire nuts. “Wago” push-in connectors are not acceptable.

D. All stranded conductors shall be furnished with lugs or connectors.

E. Connectors furnished with circuit breakers or switches shall be suitable for copper wire termination.

F. “Sta-Cons” shall be used to terminate stranded conductors on all switches and receptacles.

G. All stranded #10 and small conductors shall be terminated with an approved solderless terminal if the device or light fixture does not have provisions for clamp type securing of the conductor.

H. The jacket for all travelers used on 3-way and 4-way switches shall be pink.

I. Route conductors for 480Y/277 systems in a separate raceway. Do not combine with 208Y/120 volt or 120/240 volt systems.

J. Emergency circuits shall not be routed with normal conductors.

3.02 BALANCING SYSTEM

A. The load on each distribution and lighting panel shall be balanced to within 10% by proper arrangement of branch circuits on the different phase legs. Provide written documentation showing results. Submit with O & M manuals.

3.03 LOW VOLTAGE WIRING

A. Low voltage wiring, including dimming conductors, shall be plenum rated. All wiring in mechanical rooms, electrical rooms, drywall ceiling, inaccessible areas, underground, plaster ceiling, inside concealed walls areas exposed to occupant view, and other areas subject to physical damage shall be run in conduit.

B. Low voltage wiring shall be routed in separate raceways from power wiring systems.

C. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of wiring. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel.

D. Provide Caddy J-hooks supported independently from other system to support cable at 4-foot on center or closer if required by manufacturer.

E. Provide a junction box to make up all joints and splices.

F. Provide dimming conductors for all lighting circuits located in spaces with dimmer switches and theatrical lighting as indicated on the drawings and as specified.

3.04 CABLE SUPPORTS

A. Provide cable supports in all vertical raceways in accordance with Article 300-19 of NFPA 70.

3.05 DEFECTS

A. Defects shall include, but are not to limited to, the following:
   1. Tripping circuit breakers under normal operation.
   2. Improperly connected equipment.
   3. Damaged, torn, or skinned insulation.

END OF SECTION

SECTION 260526
GROUNDING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.02 SCOPE

A. WORK COMBINED WITH OTHER SECTIONS: Combine the work specified herein with the following Sections to form a single responsibility for the Work:
   1. Electrical.
   2. Basic materials and methods.

B. Provide electrical service, equipment and wiring device grounding as shown, scheduled and as specified.

C. The types of grounding include, but not limited to, the grounding bonding of all equipment devices, building steel piping, and as required by the National Electrical Code, Local Inspection Department and Power Company.

1.03 STANDARDS

A. National Electrical Code (NFPA-70)

B. Local municipal and State codes that have jurisdiction.

C. NECA

1.04 ACCEPTABLE MANUFACTURES

A. Provide grounding products manufactured by Copperweld and Cadweld.

1.05 SUBMITTALS

A. Shop drawings shall include, but not limited to the following:
   1. Cut sheets of ground rods, clamps and connectors.
   2. Grounding system diagram.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide all materials required to construct a complete grounded electrical system.

B. GROUND RODS: Ground rods shall be 3/4" inch diameter by 10 feet long construction with copper jacket and a steel core.

C. CLAMPS: Ground clamps shall be copper except for steel or iron pipes in which the clamps shall be galvanized iron.

D. CONDUCTORS: Conductors shall be connected by means of an approved pressure connector or clamp.

PART 3 - EXECUTION

3.01 INSTALLATION

A. GENERAL: Install grounding system as shown and specified to ensure a properly grounded system.

B. SERVICE ENTRANCE GROUNDING SYSTEM: Provide a main bonding jumper between the neutral and ground bus of each switchboard. Route a separate grounding electrode conductor in conduit from each main gutter to the ground rod grid, incoming cold water piping system, and to the "lightning protection system" (250 - 106 of NEC) under ground bonding loop. Provide a bonding jumper around water meter. The grounding electrode conductor shall be stranded copper, 98% conductivity and shall be run continuous without splices or joints and installed at least 12" below grade.

C. BUILDING STEEL AND PIPING SYSTEM: Install a bonding jumper between building steel and metallic piping systems to bond them to the electrical grounding system.

D. NEUTRAL: The neutral shall be grounded only at the service entrance and other separately derived systems. The neutral shall be kept separate from the grounding system and shall not be used as a ground.

E. GROUNDING SEPARATELY DERIVED ALTERNATING CURRENT SYSTEM
   1. TRANSFORMERS: The center point (neutral) of each wye connected transformer shall be bonded to the case and the grounding electrode conductor shall be connected to the grounded conductor (neutral).
   2. STANDBY EMERGENCY GENERATOR: The generator neutral shall be bonded to the generator when a 4-pole switched neutral automatic transfer switch is specified.

F. GROUNDING CONDUCTOR: A grounding conductor and metallic conduit system shall bond all equipment served by the electrical system. Provide a flexible bonding jumper for isolated metallic piping and ductwork and around expansion fittings and joints.

G. CONDUIT GROUNDING BUSHING: Conduit terminating in equipment that has a ground bus such as switchboards, panelboards, etc., shall have grounding bushings installed. Ground each conduit by means of a grounding bushing and to the ground bus in the equipment.

H. MOTORS: The frame of all motors shall be grounded.

I. SPECIAL GROUNDING: Provide a #6 AWG copper grounding conductor for each telephone board, television system, etc. Terminate the grounding conductor on ground bus and to the building electrical grounding system. Refer to 800-40(d) and 820-40(d) of the NEC.

J. REMOTE PANELBOARDS: Provide a grounding electrode conductor all remote panels as required by the NEC and shown on drawings.

K. LIGHTING FIXTURES: Flexible fixture whips containing a green grounding conductor shall be used to connect light fixtures. Flexible fixture whips shall not exceed ten feet.

L. RECEPTACLES: All receptacles shall be grounded using the branch circuit grounding conductor. Receptacles shall use an approved grounding yoke.

3.02 TESTING

A. Perform a ground resistance test using a biddle analog or digital portable earth/ground resistance tester. The system resistance shall not exceed 5 Ohms. Provide additional electrodes as required (refer to 250-84 and 250-56 of the most current edition NEC). Test shall not be conducted following wet weather. Provide personal instruments to conduct these tests and submit certified test for review. Test shall be verified by Engineer.

END OF SECTION

SECTION 260533
RACEWAYS

PART 1 - GENERAL

1.01 SCOPE

A. Provide electrical raceways and fittings as shown, scheduled and specified.

B. The types of raceways and fittings required are as follows:
   1. Rigid hot-dipped galvanized steel conduit (GRC) (RMC)
   2. Intermediate hot-dipped galvanized steel conduit (IMC)
   3. Electrical metallic tubing (EMT)
   4. PVC (Sch. 40 & 80)
   5. Flexible metal conduit (FMC)
   6. Liquid-tight flexible metal conduit (LFMC)
   7. PVC coated rigid galvanized steel conduit (GRCC)

1.02 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.

E. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.

F. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.

G. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

H. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

I. NEMA FB-1

J. NEMA TC3

1.03 ACCEPTABLE MANUFACTURERS

A. Raceways
   1. Allied
   2. Republic
   3. Prime Conduit (Carlon)
   4. Wheatland Tube
   5. Cantex
   6. Western Tube
   7. Robroy Industries

B. Fittings
   1. Appleton
   2. Crouse Hinds
   3. Steel City
   4. O.Z. Gedney
   5. Carlon
   6. Raco, Inc.
   7. Bridgeport

C. Boxes
   1. RACO
   2. Thomas and Betts
   3. EATON
   4. Crouse-Hinds

5. Appleton

D. Surface
1. Hubbell
2. Wiremold

1.04 SUBMITTALS

A. Product data shall include but not be limited to:
1. Cutsheets for raceways, fitting, solvents, primers, etc.

1.05 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH

A. NFPA 70

B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 CONDUIT AND FITTINGS

A. Rigid Galvanized Steel Conduit (GRC/RMC)
1. Construction, Materials, Codes, Standards:
a. Article 344 - NFPA 70.
b. Hot-dip galvanized rigid steel conduit, galvanized after fabrication. Products shall comply with UL 6 and ANSI C80.1. All threads shall be galvanized after cutting. A uniform zinc coating shall be applied to the inner and outer walls.
c. Fittings shall be threaded and shipped with thread protectors. Set Screw are not acceptable. Die Cast Fittings are not acceptable.
2. Permitted for use in the following locations:
a. Outdoor or Exterior (Exposed)
b. Indoors, Conditioned Spaces
c. Unconditioned Spaces
d. Underslab (Void Form Slab): where not in contact with earth – only permitted where indicated on plan.
e. Underslab (Suspended Slab): Permitted – only where indicated on plan.
3. Prohibited Locations: Underground, Corrosive environments, Underslab (Slab on Grade), Foundation penetrations.
4. Specific Uses: Exposed Exterior installations, where within or attached to masonry or concrete, where subject to damage.

B. Intermediate Metal Conduit (IMC)
1. Construction, Materials, Codes, Standards:
a. Article 342 - NFPA 70.
b. Conduit shall be similar to rigid steel conduit except thinner wall.
c. Fittings shall be threaded hot-dipped galvanized and shipped with thread protectors. Set Screw or Die Cast Fittings are not acceptable
d. Products shall comply with UL 1242.
2. Permitted for use in the following locations:
a. Outdoor or Exterior (Exposed)
b. Indoors, Conditioned Spaces
c. Unconditioned Spaces
d. Underslab (Void Form Slab): not in contact with earth only as indicated on plan.
e. Underslab (Suspended Slab): only where indicated on plan.
3. Prohibited Locations: Corrosive Environment, Underground, Underslab (Slab on Grade), Foundation Penetrations
4. Specific Uses: Exposed exterior locations, Rooftops exposed to sunlight

C. Electrical Metallic Tubing (EMT)
1. Construction, Materials, Codes, Standards:
a. Article 358 - NFPA 70.

b. EMT shall be made of hot-dip galvanized strip steel. The interior shall be coated with a corrosion-resistant lubricant for ease of wiring pulling.
c. Shall utilize steel insulated throat, set-screw connectors and steel set-screw couplings in all indoor conditioned spaces.
d. Shall utilize steel insulated throat, threadless, watertight compression type connectors and steel threadless watertight compression type coupling in all non-conditioned spaces and in grout filled CMU walls.
e. Products shall comply with UL 797 and ANSI C80.3.

2. Permitted for use in the following locations:
   a. Indoors, Conditioned Spaces
   b. Unconditioned Spaces
3. Prohibited Locations: Corrosive Environment, Underground, Underslab (all types), Wet or Damp Locations, Exteriors, Within Concrete, foundation penetrations.
4. Specific Uses: Primary use conduit for indoor spaces, where conditioned. Unconditioned locations shall require use of insulated throat water tight fittings.

D. Rigid Nonmetallic Conduit (PVC Schedule 40 & 80)
1. Construction, Materials, Codes, Standards:
   a. Article 352 and 300.6 - NFPA 70.
   b. Conduit shall be schedule 40 or 80 polyvinyl chloride (PVC), UV stabilized, rated for 90°C conductors.
   c. Fittings shall be solvent weld socket type.
   d. Products shall comply with UL 651.
2. Permitted for use in the following locations:
   a. Underground (Earth, outside foundation perimeter)
   b. Underslab (Slab on Grade): only where indicated on plan.
   c. Under Driveways, roadways, or vehicular crossings, and where required by Utility Company: PVC Schedule 80
      1) PVC Schedule 40 allowed where concrete encased.
3. Prohibited Locations: return air Plenums, interstitial spaces, Outdoor or Exterior (Exposed), Unconditioned spaces, corrosive environments, underslab (suspended or void form), foundation penetrations.
4. Specific Uses: For use underground or underslab (Slab on grade). Underground use is approved for all locations where transiting a project site, not underneath any foundation. For locations under the footprint of building/foundation, use only authorized where indicated on drawings.

E. Flexible Metal Conduit (FMC/Greenfield)
1. Construction, Materials, Codes, Standards:
   a. Article 348 - NFPA 70.
   b. Spirally wound continuously interlocked zinc coated strip steel.
   c. Fittings shall be one screw for smaller than 1-1/2-inch, two screw for 1-1/2-inch and larger, double clamp steel or malleable iron, either cadmium plated or hot-dip galvanized.
   d. Products shall comply with UL 360.
2. Permitted for use in the following locations:
   a. Indoors, Conditioned Spaces.
3. Prohibited Locations: outdoors/Exterior, unconditioned spaces, Corrosive, Wet, Concrete, underslab(all types), underground, foundation penetrations.
4. Specific Uses and Applications: For use in connection to rotating equipment within conditioned spaces, including plenums. Also permitted for use with empty raceways in walls for use with Low Voltage, AV, telecom cabling.

F. Liquid-Tight Flexible Steel Conduit (LFMC/Seal Tite)
1. Construction, Materials, Codes, Standards
   a. Article 350 - NFPA 70.

b. Spirally wound continuously interlocked zinc coated strip steel with a UV stabilized polyvinyl chloride (PVC) outer jacket bonded to the conduit.
c. Fittings shall be compression type, malleable iron, with insulated throat, either cadmium plated or hot-dip galvanized. Plastic is not acceptable.

2. Permitted for use in the following locations:
   a. Outdoor or Exterior (Exposed)
   b. Indoors, Conditioned Spaces
   c. Unconditioned Spaces
3. Prohibited Locations: Concrete, corrosive, underground, underslab (all types), foundation penetrations.
4. Specific Uses and Applications: Primary use is connection to rotating equipment at unconditioned spaces. Transformer Primaries and Secondaries (excluding service transformer).

G. PVC Coated Rigid Galvanized Steel Conduit (GRCC/Plastibond)
1. Construction, Materials, Codes, Standards:
   a. Article 344 and 300.6 - NFPA 70.
   b. Conduit shall be same as rigid metal conduit with a factory-applied 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal, coated inside and outside.
2. Permitted for use in the following locations:
   a. Outdoor or Exterior (Exposed): except for stub-ups and penetrations.
   b. Corrosive Environment: required throughout
      1) Where corrosive environments exist, such as pools, pool pump room, corrosive chemical storage, GRCC shall be provided throughout, up to the point of sealed penetration into a non-corrosive environment.
   c. Underground (Earth, outside foundation perimeter): Required at bends of 15° or greater, Penetrations through concrete, Stub-ups through foundation or grade at concrete.
   d. Foundation Penetrations
3. Prohibited Locations: extended runs exposed to sunlight, Plenums, Underslab except for penetrations (all foundation types).
4. Specific Uses: For use at Cooling Towers, Pools, Pool Decks, Pool pump rooms, chemical storage, corrosive environments.

2.02 PULL BOXES

A. Exterior in-ground pull boxes shall be concrete or polymer as manufactured by Brooks, Dalworth, Hubbell Quazite, or approved equivalent. Covers shall include identification of systems contained.

B. Where located in Roadways, Parking Lots, or Traffic zones, Pullboxes shall be rated to accept a minimum 25,000 lb. load.

C. All Pullboxes shall be sized based on NEC wire-bending requirements at each individual location.

D. Covers shall include identification of systems contained, such as:
1. Electrical
2. Telecom
3. Communications
4. Others, as required.

E. Pull boxes in pole bases shall be as manufactured by Carlon.

F. Pullboxes shall be provided in all raceway systems upon exceeding the following conditions:
1. The equivalent of 270° in conduit bends, or after (3) 90° bends.
2. Any 400ft of linear conduit or duct bank continuous segments.
3. Where required to make transitions to prevent the damaging of conductor insulation.

2.03 WIREWAYS

A. Wireways shall be made of not less than 16-gauge sheet steel for 4 inch and 6 inch square sizes and 14 gauge steel for 8 inch and 12 inch square sizes. Couplings end plates, and knockouts shall be furnished as required. Each section of wireways shall be rigidly supported.

B. The finish shall be ANSI-49 gray epoxy paint applied by a cathodic electrode position paint process over a corrosion resistant phosphate preparation for NEMA 1 wireways. Provide galvanized steel for NEMA 3R wireways. NEMA 3R wireways and auxiliary gutters are for horizontal mounting only.

2.04 BUSHINGS

A. Provide nylon bushing on end of all low voltage cabling system conduits (sleeves, rough-ins, etc.).

B. Provide Grounding Bushing as required in 260526 - Grounding.

PART 3 - EXECUTION

3.01 PROVIDE CONDUIT AS FOLLOWS:

A. GENERAL: The Drawings are diagrammatic and are intended to show the general location of outlets, devices, fixtures, and arrangement and control of circuits. The Contractor shall determine exact locations by actual measurement of the building or by reference to the Architectural Drawings.

B. Raceways shall not be routed below or within slab-on-grade, foundations, or below grade of suspended slab structures, unless specifically noted or indicated otherwise on plan.

C. EMT in sizes up to 4 inches when concealed or not exposed to damage and located indoors only. (EMT is not acceptable in wet and damp location.)

D. MINIMUM SIZE: 3/4 inch.

E. Flexible conduit of any type shall not be used except for connections to rotating or vibrating equipment, or where use for low voltage raceways. All conduit shall be provided as a rigid type conduit for homeruns, runs between termination boxes, outlets, etc.

F. Fixture whips: Refer to 265119 for additional information.

G. Of such size, and so installed that conductors may be drawn in without injury or excessive strain.

H. Where entering panels, pull boxes, junction boxes, or outlet boxes, shall be secured in place with lock nuts inside and outside, and insulated bushings inside.

I. Have Red seal type VCC or approved equal cable supports in risers, as required by N.E.C.

J. Have ends reamed after cutting and application of die.

K. Keep conduit corked and dry during construction and swab out before conductors are pulled.

L. Have bends and offsets made with approved tools. Bends or offsets in which the pipe is crushed or deformed shall not be installed.

M. Have O.Z. Gedney or approved equal expansion fittings where crossing building expansion joints.

N. Fixtures in finished areas having suspended acoustical ceilings shall be connected to outlet boxes of lighting grid by flexible metal conduit; length not to exceed ten feet (six feet if using 3/8” manufactured fixture “whips”).

O. Outlet boxes in partitions shall never be set back-to-back. They shall be offset to prevent undue noise transmission from room to room.

P. Each entire conduit system shall be installed complete before any conductors are drawn in. Every run of conduit shall be finished before covering up to guard against obstructions and omissions.

Q. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of conduits. Sleeves should be set in place a sufficient time ahead of

the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel with a minimum thickness of 1.07MM and set to extend 4” above slab.

R. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty. All fire rating material shall be installed in accordance with manufacturer`s printed instructions.

S. All conduit shall be cleaned and swabbed to remove all foreign matter and moisture prior to pulling wire and cable. All boxes in which conduits terminate shall be cleaned of all concrete mortar and other foreign matter.

T. Provide #30 nylon pulling line in all conduits in which permanent wiring is not installed.

U. All conduit shall be securely fastened and supported using hot galvanized malleable iron one-hole pipe straps, clamps, hanger or other means approved by the engineer. Supports shall be as required per NEC. Tie wire shall not be used as support or securing means. Support conduit independently of ceiling hanger wire. Use all thread rods to support outlet boxes, junction boxes and conduit.

V. Contact the Architect and Engineer for an installation review before covering any below grade or above grade conduit.

W. All new outlets shall be flush mounted. In remodeled areas where wall construction prohibits flush mounting, provide Hubbell 2400 series, unless noted otherwise. Verify exact location and routing with architect before installation.

X. Contractor shall not penetrate waterproof barriers without using proper fitting to maintain barriers. This shall include exterior walls and slabs. Coordinate with Architect for proper methods.

3.02 CONDUIT ROUTING

A. Conduit shall be concealed and by using the shortest practicable route between outlets, including where located on CMU walls.

B. Conduit may be exposed in electrical and mechanical rooms, and central plants, or other industrial type facilities such as warehouses or production plants.

C. Install risers, drops, offsets to avoid ductwork and structural components. Ductwork and structural systems shall take precedence to conduit.

D. Any exposed and visible conduit shall be parallel and perpendicular based on the lines of the building (such as ceiling lines, wall blocking lines, or architectural feature lines) using structural systems to conceal conduit visibility at all opportunities.

E. Concealed conduit shall be run in as direct manner as possible, using long bends. All bend radii shall be 12x conduit diameter. Condulets in lieu of elbows where ease of installation and appearance warrant their use – confirmation with architect is required for this use.

F. Conduit shall be continuous, with no more than (4) quarter bends between terminals, cabinets, boxes, or pullboxes is acceptable. Contractor is expected to provide wireway or boxes at appropriate intervals, in accordance with NFPA 70 for wire bending space. All conduit shall be electrically continuous throughout, including across boxes and cabinets. Terminals of all conduit shall be provided with double lock nuts and bushing, or terminated on conduit hubs. Use of Running Threads prohibited.

3.03 CONDUIT CORROSION PROTECTION

A. Branch circuit conduits installed in concrete slabs on fill or grade shall be positioned in a manner to ensure complete concrete cover. In no case shall such conduits be exposed below or above the slab surfaces, or penetrate the waterproof membrane.

B. At locations where metallic conduits pass through slabs on grade or transitions below grade, PVC coated rigid galvanized conduit shall be used.

C. Conduit installed in the air gap between the water-resistant barrier and finish brick shall not exceed 2-ft. in length.

3.04 EXPANSION JOINTS

A. Install approved expansion fitting in all conduit runs in excess of 150 feet or when crossing building expansion joints.

3.05 OUTLET AND JUNCTION BOXES

A. Provide an approved galvanized outlet box with adequate volume for number of conductors installed.

B. Provide standard galvanized switch boxes of the required number of gangs. Switch boxes where conduit is exposed shall be handy boxes or approved equal.

C. Outlet boxes for receptacles shall be similar to Universal 52151 with suitable raised cover. Receptacle boxes where conduit is exposed shall be handy boxes or approved equal.

D. Weatherproof boxes shall be FS or FD. Provide these boxes in all non-conditioned areas, exterior areas and natatoriums.

E. Outdoor boxes shall be NEMA 3R, with conduit connections made by Myers Hubs.

F. See notes and details on Drawings for special box requirements.

G. Provide junction boxes required to facilitate installation of the various conduit systems. Provide support boxes required for risers, each complete with approved cable supports as described elsewhere in this Division.

H. Outlet boxes for drywall shall be standard galvanized 4" square boxes with the appropriate device cover. Secure all outlet boxes with a backing brace connected to two adjacent studs. Mounting brackets with a single ear to rest against the backing sheet rock are not acceptable.

I. Provide floor outlet fittings for telephone to match fittings for duplex floor receptacles.

J. Provide 3-1/2” deep gangable masonry boxes in all masonry wall (CMU). Steel City GW-135-G or approved equal.

K. Provide shallow 4”x4” boxes in all demountable partitions.

L. Metallic boxes located in fire rated walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between metallic boxes may be reduced when “ Wall Opening Protective Materials” (CLIV) are installed according to the requirements of their Classification. Metallic boxes shall not be installed on opposite side of walls or partitions of staggered stud construction unless “Wall Opening Protective Materials” are installed with the metallic boxes in accordance with Classification requirements for the protective materials.

M. Junction, pull boxes, condulets, gutters, disconnects, contactors, etc., above 2-foot x 2-foot grid ceilings shall be mounted within 18-inches of ceiling grid. Above 2-foot x 4 – foot grid ceiling they shall be mounted within 30-inches of ceiling grid. All junction box, pull box, gutter openings shall be side or bottom accessible.

N. Junction boxes are prohibited above drywall or plaster ceilings except for lighting; and those must be mounted directly over light fixture opening. Route power, PA, fire alarm conduits to nearest lay-in ceiling.

3.06 THRU-WALL SEALS

A. Provide O.Z. Gedney “Thru-wall” seals for all conduits passing through concrete structure below grade, above grade, and floor penetrations below grade. These prevent moisture from entering the building.

B. Straight sleeves are not acceptable.

3.07 PULL BOXES

A. Interior Pull boxes shall be provided for conduit systems as required and shall be constructed of galvanized steel of not less than gauge and size specified by National Electrical Code. Size pull boxes per Article 314.28 - NFPA 70.

B. Where two or more feeders pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number, and panel designation.

C. Exterior in-ground pull boxes shall have open bottoms with sand and rock beds below box for drainage of water. Provide closed bottom boxes where specified. Closed bottom boxes shall be provided with sumps for portable pump to allow for extracting water. Refer to details on the drawings.

D. Pull boxes mounted in pole bases shall be coordinated with the pour of the pole base and shall be flush with finished footing.

3.08 WIREWAYS

A. Wireways shall be installed as indicated or required and locations shall be coordinated with architect.

B. Wiring in wireways shall be neatly bundled, tied and suitably tagged.

3.09 UNDERGROUND DUCTBANK SYSTEM

A. DUCT SYSTEM

1. The duct system shall consist of Schedule 40 PVC or type 1-EB PVC conduits encased in red concrete as detailed on the drawings. Use rigid conduit for stub-ups and the last ten feet at the end of each ductbank. Duct lines shall be laid to a minimum grade of 4 inches per 100 feet and shall be free from either horizontal or vertical waves. Duct lines shall be straight unless otherwise noted on the drawings. Duct lines shall be installed so that the top of concrete in encased duct lines is not less than 24 inches below finished grade or finished paving at any point. Changes in direction or runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 5 feet. The long sweep bends may be made up of one or more curved or straight sections and/or combinations thereof using five degree angle couplings. Conduit shall be thoroughly cleaned before using or laying. During construction and after the duct line is completed, the ends of the conduit shall be plugged to prevent water washing mud into the conduits. Particular care shall be taken to keep the conduits clean of concrete, dirt, and any other substance during the course of construction.
2. Each single conduit of the duct bank shall be completely encased in steel reinforced concrete as indicated. The thickness of concrete encasement indicated is the minimum thickness, and may be increased to fit the actual shape of trench.
3. Concrete for duct bank envelopes shall be standard 2000 psi concrete mix as described in Division 03, and be colored deep red for permanent marking of underground electrical work. The concrete red pigment shall be pure inorganic natural metallic base pigment, approved by the Engineer before use. Organic pigments will not be permitted. The approved pigments shall be mixed four pounds per yard of cement.
   a. Envelopes may be poured directly against sides of trenches if the "cut" is clean, even and free of loose material. All loose dirt and extraneous material shall be removed from the trenches before and during the pouring of concrete to ensure sound envelopes. Concrete shall be carefully spaded during pouring to eliminate all voids under and between the conduit and honeycombing of the exterior surfaces. Power driven tampers of agitators shall not be used, unless specifically designed for the application, in order to ensure that the water-tightness of the conduits is not destroyed.
   b. Generally, each run of envelopes shall be poured in one continuous operation. Where more than one pour is necessary, each pour shall terminate in a vertical plane. Partial pours shall not terminate in horizontal or angular planes.

B. For normal underground installation see Section 260200, paragraph 3.1 for Excavating and Backfilling.

END OF SECTION

SECTION 260634
LOW VOLTAGE RACEWAY SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.02 WORK INCLUDED

A. Furnish and install a complete raceway system for telephone system, consisting of cabinets, conduit, junction boxes, etc. This shall include but not limited to fire alarm, access control, structured cabling, audio-video, intercommunications, sound reinforcing, intrusion detection, telephone.

1.03 WORK SPECIFIED ELSEWHERE

A. Section 260200 - Basic Materials and Methods for Electrical

B. Section 260533 - Raceways

C. Section 260519 - Wire, Cable and Related Materials

1.04 WORK NOT INCLUDED

A. Cabling

B. Equipment

C. Division 27

D. Division 28

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Conduit - Refer to Section 260533.

B. Backboards - 3/4" X 4' X 8' fire rated plywood painted white.

C. Outlet Boxes - Refer to Section 260533.

D. Pull and junction boxes - Refer to Section 260533.

E. Floor Boxes - Refer to Section 260533.

F. Cabinets - Consult low voltage system installer/supplier.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Refer to Section 260533 for underground service entrance.

B. Provide pull boxes in telephone conduit runs spaced not greater than 100 ft. apart, and on backboard side of runs with more than two right angle bends.

C. Place telephone label on pull and junction boxes.

D. Provide pull wire in each telephone run.

E. Provide plywood backboards and duplex receptacle in the telephone equipment room. Confirm location on jobsite prior to installation.

F. All terminal cabinets/backboards and conduit shall be sized per the recommendations of the telephone system installer.

END OF SECTION

SECTION 260800
COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.02 RELATED SECTIONS

A. Section 019100 - General Commissioning Requirements

B. Section 230963 - Energy Management and Control System (EMCS)

1.03 SUMMARY

A. The commissioning of the lighting system and associated controls shall be performed by an impartial technical firm hired by the owner or shall be performed by the installing contractor if the owner has not hired a commissioning firm. The commissioning provider shall be certified under one or more of the following certifications:
   1. CxA - Certified Commissioning Authority - ACG
   2. CBCP - Certified Building Commissioning Professional - AEE
   3. CCP - Certified Commissioning Professional - BCA
   4. CPMP - Certified Process Management Professional - ASHRAE
   5. BSC - Building System Commissioning Certification - NEBB

B. The commissioning provider (Commissioning authority) shall be responsible for leading the entire construction team through the commissioning process including, but not limited to, conducting the commissioning kick-off meeting, preparing the commissioning plan, preparing pre-functional checklists, preparing functional test scripts, participation in functional testing and preparation of required documentation and reports.

1.04 RESPONSIBILITIES

A. Contractor: Responsibilities of the Contractor as relate to Commissioning Process include, but are not limited to the following:
   1. Facilitate coordination of Commissioning work by Commissioning authority.
   2. Attend Commissioning meetings or other meetings called by Commissioning authority to facilitate the Commissioning Process.
   3. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide Commissioning authority with written comment on same.
   4. Provide all documentation relating to manufacturer's recommended performance testing of equipment and systems.
   5. Provide Operations & Maintenance data to Commissioning authority for preparation of checklists and training manuals.
   6. Provide As-built drawings and documentation to facilitate Testing.
   7. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
   8. Certify to Commissioning authority that installation work listed in Pre-Functional Checklists has been completed.
   9. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
   10. Provide data concerning performance, installation, and start-up of systems.
   11. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
   12. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with Commissioning authority. Prepare and submit to Commissioning authority **written** certification that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.

a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by Commissioning authority.

13. Coordinate with Commissioning authority to determine mutually acceptable date of Functional Performance Tests.
14. Provide qualified personnel to assist and participate in Commissioning.
15. Provide test instruments and communications devices, as prescribed by Commissioning authority, required for carrying out Testing of systems.
16. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
17. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
18. Provide Commissioning authority with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
19. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.
20. Prepare and submit to Commissioning authority proposed Training Program outline for each system.
21. Coordinate and provide training of Owner's personnel.
22. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to Commissioning authority in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and Commissioning authority's comments.
23. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.

B. Subcontractors and vendors shall prepare and submit to Commissioning Agent proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by Commissioning authority.

C. Electrical contractor shall provide a letter certifying the installed lighting controls meet documented performance criteria specified in the commissioning plan within 90 days of substantial completion.

1.05 COMMISSIONING PLAN

A. Commissioning Process tasks and activities:
1. Commissioning kick-off meeting: Conducted by commissioning authority and attended by construction team and design team.
2. Pre-functional checklists: Prepared by the commissioning authority and filled out by subcontractors performing the work that is applicable.
3. Site visits to review installation of applicable systems and progress of checklist documentation performed and reported by commissioning authority.
4. Functional testing: Commissioning authority shall conduct functional testing with assistance of applicable subcontractors and document successful results as well as deficiencies (issues). Functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing in accordance with plans and specifications.
5. Preliminary commissioning report: Commissioning authority shall issue a preliminary commissioning report to the owner that has results of the first round of functional testing

including deficiencies discovered.

6. Systems manual: Commissioning authority shall compile the systems manual using submittal data provided by the general contractor and applicable subcontractors.
7. Final commissioning report: Commissioning authority shall issue final commissioning report documenting the entire process and final results of functional testing. Report shall include final testing and balancing report.

B. Electrical System Equipment to be tested
1. Occupancy sensors.
2. Time switch controls
3. Daylighting controls.
4. Electrical Service and Distribution System.

C. Testing functions and conditions
1. Daylighting control devices
   a. Verify the devices have been calibrated, properly located and adjusted.
   b. Loads adjust to light level set points in response to daylight.
   c. Location of calibration equipment is accessible to authorized personnel only.
2. Time switches
   a. Verify schedule, time, date and programming is accurate.
   b. Verify override time limit is set, battery is installed and switch operates the lights that are specified in the design documents.
   c. All specified lights can be turned on and off by area control switch.
   d. Manual override switch allows only the lights in the space where the switch is located turn on or remain on until next scheduled shut off.
3. Occupant sensors:
   a. Certify the sensor has been located and aimed in accordance with manufacturer recommendations.
   b. For projects with fewer than seven sensors, each sensor shall be tested.
   c. Fore projects with more than seven occupant sensors, testing shall be done for each unique combination of sensor type and space geometry. Where multiples of each combination are provided not less than 10 percent shall be tested.
   d. Verify correct operation of status indicators.
   e. Controlled lights turn off or down to the permitted level with in the required time.
   f. For auto-on sensor, the lights turn-on to the permitted level when an occupant enters space.
   g. Verify the lights are not incorrectly turned-on by movement in adjacent areas or by HVAC operation.

D. Performance criteria
1. Daylighting controls shall maintain specified light levels within 5% of design.
2. All time switches shall be accurate to time on cellular network devices.

PART 2 - PRODUCTS

2.01 NO PRODUCTS SUPPLIED

PART 3 - EXECUTION

3.01 GENERAL

A. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.

B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.

C. Commissioning authority will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect

as deemed appropriate.

3.02 WORK PRIOR TO COMMISSIONING

A. Complete all phases of the work so the systems can be started, adjusted, balanced and otherwise tested.

B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.

C. Assist Commissioning Agent with all information pertaining to actual equipment and installation as required complete the full commissioning scope.

D. Contractor shall prepare startup procedures to demonstrate compliance with pre-functional checklists, and coordinate scheduling for completion of these checklists.

E. A minimum of seven (7) days prior to date of system startup, submit to Commissioning Agent for review, detailed description of equipment start-up procedures which contractor proposes to perform to demonstrate conformance of systems to specifications and Checklists.

3.03 PARTICIPATION IN COMMISSIONING

A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.

B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.

C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist Commissioning authority in commissioning process.

3.04 WORK TO RESOLVE DEFICIENCIES

A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs thus incurred will be Contractor's responsibility.

3.05 PRE-FUNCTIONAL CHECKLISTS (PFC)

A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.

B. Refer to commissioning plan for detailed list of equipment to be commissioned.

3.06 FUNCTIONAL PERFORMANCE TESTING (FPT)

A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.

B. Refer to commissioning plan for detailed list of equipment to be commissioned.

C. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.

D. Assist Commissioning authority in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

E. Sampling
   1. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy.
   2. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Subs is allowed in pre-functional checklist execution.
   3. A common sampling strategy is the "xx% Sampling - yy% Failure Rule", defined by the following example.
      a. xx = the percent of the group of identical equipment to be included in each sample.

b. yy = the percent of the sample that if failing, will require another sample to be tested.
c. The example below describes a 20% Sampling - 10% Failure Rule.
d. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”
e. If 10% (yy) of the units in the first sample fail the functional tests, test another 20% of the group (the second sample).
f. If 10% of the units in the second sample fail, test all remaining units in the whole group.
g. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

F. Re-Testing And Failure To Remedy Deficiencies
1. Despite Contractor’s best efforts to ensure systems are problem-free, it is expected that some deficiencies will be found during initial inspection of Pre-functional Checklist, and during initial Functional Testing; such deficiencies are expected to be minimal.
2. It is Contractor’s responsibility to remedy identified deficiencies, both in Pre-functional Checklist and in Functional Testing phases of work, in a timely and thorough manner.
3. It is Contractor’s responsibility to ensure that all deficiencies are corrected prior to requesting a re-inspection or re-test of systems and equipment. Do not request re-inspection or re-test until deficiencies are corrected.
   a. At his discretion, CxA may agree to re-testing systems or equipment where deficiencies remain which are beyond Contractor’s control to resolve expeditiously.
   b. Typically such re-testing of incomplete systems and equipment will take place only if remaining deficiencies are minor in scope and nature, and are of such nature that they cannot be resolved in a timely manner (such as those due to difficulties in obtaining parts, or where Owner has requested a change that has delayed work, etc.)
4. CxA will carry out a second re-inspection or re-test of systems and equipment subsequent to receiving Contractor’s request.
   a. If CxA finds deficiencies identified in initial inspection or test have not been remedied (with exception of un-resolvable deficiencies in 3.b. above), and such remaining deficiencies are significant enough to require additional inspection or re-testing, Contractor will be back-charged for CxA’s expenses, and time at a rate of $150.00 per hour and $100.00 expenses, for a third and any subsequent re-inspections and re-tests.

G. Deferred Testing
1. "Seasonal Commissioning” pertains to testing during peak heating or cooling seasons when HVAC equipment is operating at full-load or heavy-load conditions. Initial commissioning will be done as soon as contract work is completed, regardless of season. Seasonal Commissioning under full- or heavy-load conditions other than the current season will be handled at later time by GC and CxA.
2. If adequate load may be artificially placed upon heating or cooling equipment, CxA, at his discretion, may perform functional testing during non-peak load periods.
3. GC is to provide services of personnel and participate in seasonal testing process in the same manner as he would in non-seasonal testing.
4. Until off-season commissioning can be accomplished, Owner may retain an amount from GC’s payment sufficient to cover the cost of off-season testing.
5. Unforeseen Deferred Tests: If any check or test cannot be completed due to building structure, required occupancy condition, or other reason, execution of checklists and functional testing may be delayed upon approval of Owner. Tests shall be conducted in same manner as seasonal tests, as soon as possible. Services of required parties will be negotiated. Make final adjustments to Operation and Maintenance Manuals and record drawings due to unforeseen deferred tests.
6. GC is to provide services of personnel and participate in deferred testing in the same manner as he would for normal commissioning.

3.07 TRAINING

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.

C. The training agenda (plan) shall include, at a minimum, the following elements:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions.
   5. Most likely failure modes, causes and corrections.
   6. On site demonstration.

D. Commissioning Agent shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Provide Commissioning Agent with training plan two weeks before planned training.

3.08 OPERATIONS & MAINTENANCE MANUALS

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.

C. Provide Commissioning authority with a single, electronic copy of Operation & Maintenance Manuals for review. Commissioning authority's copy of O&M manuals shall be submitted through Architect.

D. Operation and maintenance manuals shall include, service agency contact information, maintenance requirements, controls system settings and a narrative of how each system is intended to operate, including set points.

3.09 DOCUMENTATION

A. Commissioning authority shall provide documentation of process as follows:
   1. Preliminary commissioning report including test procedures, results of testing, itemization of deficiencies, deferred tests and climatic conditions required for performance of deferred tests. Preliminary commissioning report shall be issued to owner to demonstrate the first pass of testing has occurred and to demonstrate compliance with applicable codes.
   2. Final commissioning report shall include the final test and balance report, final results of functional testing, disposition of deficiencies discovered during testing, including the details of corrective measures used and functional testing procedures used for repeatability of testing in the future.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1 - GENERAL

1.01 SCOPE

A. Provide wiring devices as shown; scheduled, required and as specified.

B. The types of wiring devices required include:
   1. Receptacles
   2. Switches
   3. Coverplates

1.02 STANDARDS

A. NEMAWD-1

B. NEMA WD-5

C. UL

D. Federal Spec WC-596-F and WS-896

1.03 ACCEPTABLE MANUFACTURERS

A. Hubbell

B. Leviton

C. Pass & Seymour

1.04 SUBMITTALS

A. Shop drawings shall include but not be limited to:
   1. Cut sheets of all devices indicating NEMA configuration, rating, materials, color, and all accessories.
   2. Cut sheets of all coverplates indicating materials, color and any engraving specified on drawing or in the specifications.

1.05 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electric Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. GENERAL
   1. Provide factory assemble wiring devices with the rating type and color as required and specified for the service indicated.
   2. Provide matching one-piece multiple gang plates where switches are ganged.
   3. Provide wall plates for each receptacle furnished.
   4. Architect reserves the right to select wiring device styles and colors to match wall finish.
   5. Wall plates shall be of same manufacturer as devices.

2.02 SWITCHES

A. Provide specification grade White toggle switches where indicated on the Drawings. Provide "Red" switches for switching emergency lighting circuits where switching is indicated. Coordinate exact locations with architect.
   1. Wall switches shall be 20 amp, 120-277 volt and shall be Hubbell, Leviton or P&S as follows:
      a. SINGLE POLE SWITCHES: Hubbell HBL1221, Leviton 1221-2, P&S PS20AC1
      b. DOUBLE POLE SWITCHES: Hubbell HBL1222, Leviton 1222-2, P&S PS20AC2
      c. THREE WAY SWITCHES: Hubbell HBL1223, Leviton 1223-2, P&S PS20AC3
      d. FOUR WAY SWITCHES: Hubbell HBL1224, Leviton 1224-2, P&S PS20AC4
      e. MOMENTARY CONTACT SWITCHES: Hubbell HBL1557, Leviton 1257, P&S 1251

f. THREE POSITION, TWO CIRCUIT MAINTAINED CONTACT SWITCHES: Leviton 1285, Hubbell HBL1385, P&S 1225
g. KEY TYPE LOCKABLE BARREL KEY OR CORBIN STYLE: Leviton 1221-2KL with 2KL key or P&S PS20AC1-KL with 4609 key for each switch, Hubbell #HBL 1221-RKL.
h. Dwelling units shall use Hubbell CS115I, CS120I, P&SCS15AC1, and CS20AC1.

2. Dimmers: Provide Lutron DIVA or as shown on drawings. Wall box dimmers shall be sized to handle the load. Where fluorescent dimming ballasts are to be used, coordinate wall box dimmer with ballast manufacturer.
3. Light Handle Switches: Provide Leviton 1221-LHC, Hubbell HBl1221-ll, P&S PS20AC1-ISl lighted handles to switch emergency lights were noted on the drawings.

B. Provide specification grade White decora style rocker switches where indicated on the Drawings. Provide "Red" switches for switching emergency lighting circuits where switching is indicated. Coordinate exact locations with architect.
1. Wall switches shall be 20 amp, 120-277 volt and shall be Hubbell Decorator Series, Leviton, Decora or Pass & Seymor Decorator, as follows:
a. SINGLE POLE SWITCHES: Leviton 5621-2, P&S 2621, Hubbell DS120
b. DOUBLE POLE SWITCHES: Leviton 5622-2, P&S 2622, Hubbell DS220
c. THREE WAY SWITCHES: Leviton 5623-2, P&S 2623, Hubbell DS320
d. FOUR WAY SWITCHES: Leviton 5624-2, P&S 2624, Hubbell DS420
e. MOMENTARY CONTACT SWITCHES: Hubbell HBL1557, Leviton 1257, P&S 1251
f. THREE POSITION, TWO CIRCUIT MAINTAINED CONTACT SWITCHES: Leviton 1285, Hubbell HBL1385, P&S 1225
2. Dimmers: Provide Lutron DIVA wall box dimmers sized to handle the load or as shown on drawings. Where fluorescent dimming ballasts are to be used, coordinate wall box dimmer with ballast manufacturer.
3. Light Handle Switches: Provide Leviton 5649-2 or P&S 2625 lighted handles to switch emergency lights where noted on the drawings.

2.03 RECEPTACLES

A. Provide specification grade White receptacles where indicated on the drawings. Provide “Red” receptacles for receptacles on emergency power. Coordinate exact location with architect.
1. Receptacles shall be Hubbell, Leviton or Pass & Seymour as follows:
a. Duplex 20A-125V-self grounding with Brass mounting yoke (NEMA configuration 5-20R): Hubbell HBL5352, Leviton 5362, P&S 5362A
b. Simplex 20A-125V-Self Grounding with Brass mounting yoke (NEMA configuration 5-20R): Hubbell HBL5361, Leviton 5361, P&S 5361 with Brass mounting yoke.
c. Isolated ground duplex, 20A-125V: (Orange, NEMA configuration 5-20R) Hubbell IG5352, Leviton 5362IG , P&S IG5362.
d. Clock hanger receptacle 15A-125V: (Brown with stainless steel plate with hanger, NEMA configuration 5-15R): Leviton 5361-CH, Hubbell 5235, P&S S3733-SS
e. Ground fault circuit interrupter (GFCI) receptacle 20A-125V; (NEMA Configuration 5-20R, shall incorporate self-test, auto monitoring technology and features which will lock-out or render the device incapable of being reset if ground fault protection is compromised, with "Feed through" connectors capable of protecting connected downstream receptacles on a single circuit, and of being installed in a 2-3/4" deep outlet box without adapter, Hubbell GFRST20, Leviton GFNT2 or P & S 2097.
1) Install Hubbell GFTRST20, Leviton GFTR2 or P&S 2097TR Tamper Resistant type for locations requiring Tamper Resistant installations
2) Install Hubbell GFTWRST20, Leviton GFWR2 or P&S 2097TRWR Weather Resistant type for installations in damp or wet locations
f. Tamper resistant receptacles 20A-125V (NEMA configuration 5-20R): Hubbell HBL8300SGA, Leviton 8300-SG, P&S TR63-H.
g. Surge Protection Duplex Receptacles 20A-125V, (NEMA 5-20R) Hospital grade to include LED light and audible alarm: Hubbell HBL8362SA, Leviton 8380, P&S 8300BLSP

h. Equipment receptacles shall be coordinated with owner/manufacturer requirements and the correct and appropriate receptacle and coverplate shall be installed.
i. Receptacles for dwelling units shall be Hubbell CR15TR and CR20TR tamper resistant receptacles. P&S TR15 and TR20 are an approved equal.
j. USB Charger type receptacles shall be Hubbell, 20A, 125V AC Hospital Grade, Tamper Resistant, with two USB Type 2.0 Ports 5.0 Amp, 5V DC, Decorator Type duplex receptacle. Hubbell USB8300A5 or P&S TR20HUSBAC6.
k. Plug load controlled receptacles shall be Hubbell DR20C2WHI or P&S 26352CDW white and two controlled faces.
l. ARC Fault circuit interrupter receptacles shall be Hubbell AFR20TR or P&S AF202TR.
m. Ground fault circuit interrupter/ARC Fault dual function receptacles shall be Hubbell AFGF20TR or P&S AFGF202TR.

B. Provide specification grade, Decora type White receptacles where indicated on the drawings. Provide “Red” receptacles for receptacles on emergency power. Coordinate exact location with architect.
1. Receptacles shall be Hubbell StyleLine Decorators Series, Leviton, Decora or Pass & Seymour Decorator as follows:
a. Duplex 20A-125V-self grounding: (NEMA configuration 5-20R): Hubbell DR20, Leviton 16362, or P&S 26342.
b. Simplex 20A-125V-Self Grounding: (NEMA configuration 5-20R): Leviton 1635 or P&S 26361.
c. Isolated ground duplex, 20A-125V: (Orange, NEMA configuration 5-20R) Hubbell IG20DRX, Leviton 16362-IG or P&S IG26362 (where X denotes color).
d. Clock hanger receptacle 20A-125V: (Brown with stain finish stainless steel plate with hanger, NEMA configuration 5-20R): Hubbell 5235, Leviton 5361-CH P&S S3733-SS
e. Ground fault circuit interrupter (GFCI) receptacle 20A-125V; GF-5352. (NEMA Configuration 5-20R, shall incorporate self-test, auto monitoring technology and features which will lock-out or render the device incapable of being reset if ground fault protection is compromised, with "Feed through" connectors capable of protecting connected downstream receptacles on a single circuit, and of being installed in a 2-3/4" deep outlet box without adapter,Hubbell GFRST20, Leviton GFNT2 or P&S 2097
1) Install Hubbell GFTRST20, Leviton GFTR2 or P&S 2095TR Tamper Resistant type for locations requiring Tamper Resistant installations
2) Install Hubbell GFTWRST20, Leviton GFWR2 or P&S 2097TRWR Weather Resistant type for installations in damp and wet locations.
f. Tamper resistant receptacles 20A-125V: (NEMA configuration 5-20R): Hubbell DR20TR, Leviton 16262-SG, P&S TR26362 - HIGH LTG.
g. Surge Protection Duplex Receptacles 20A-125V, (NEMA 5-20R) Hospital grade to include LED light and audible alarm. Hubbell HBL8362SA, Leviton 8380, or P&S 8300SP
h. Special equipment receptacles shall be coordinated with owner/manufacturer requirements and the correct and appropriate receptacle and coverplate shall be installed.
i. USB Charger types receptacles shall be Hubbell, 20A, 125V AC Hospital Grade, Tamper Resistant, with two USB Type 2.0 Ports 5.0 Amp, 5V DC, Decorator Type duplex receptacle. Hubbell USB8300A5, P&S TR20HUSBAC6 or equal by other approved wiring device manufacturers.
j. Plug load controlled receptacles to be Hubbell DR20C2WHI or P&S 26352CD white, two controlled faces or equal by Leviton.
k. ARC Fault circuit interrupter receptacles shall be Hubbell AFR20TR
l. Ground fault circuit interrupter/ARC Fault dual function receptacles shall be Hubbell AFGF20TR or P&S AFGF202TR.

2.04 OCCUPANCY SENSORS

A. Provide White dual technology wall mounted sensors, provide one of the following:
   1. Single Pole:
      a. Wattstopper #DSW301
   2. Double Pole:
      a. Wattstopper # DSW302
   3. Dimmer:
      a. Wattstopper #DW311

B. Provide dual technology ceiling sensor with low voltage controlling switch and power pack.
   1. Single Button:
      a. Wattstopper # DT300 Sensor, BZ150 Power Pack and LVSW101 Digital Switch

C. Provide Ultra Sonic Ceiling sensor for restrooms.
   1. Wattstopper #UT3000, BZ150 Power Pack

2.05 DIGITAL TIMER SWITCHES

A. Provide Wattstopper TS-400-G digital timer. Locate in mechanical, electrical, MDF, and IDF rooms.

B. The time switch shall provide audible notification and visual notification (blink the room lights) prior to turning lights off.

C. The time switch shall have a 12-hour manual override setting.

2.06 PLATES

A. Furnish and install plates on all outlet boxes. Oversize (Jumbo) plates are not acceptable.

B. Plates shall be smooth nylon and 302/304 smooth stainless steel in kitchen and coffee bar areas.

C. Provide Hubbell WP Series, Bell, Carlon or Leviton NEMA 3R weatherproof coverplates on all exterior wiring devices. Enclosure shall be suitable for wet locations when in use.

D. Plates shall be Hubbell SS Series, Leviton, Pass & Seymour 302/304 smooth stainless steel on all receptacles 30 amps and larger.

E. Stainless steel device plates shall be provided at locations with tile or stone walls.

2.07 FLOOR BOXES

A. Floor boxes with surface activation shall be cast iron as manufactured by Hubbell or equal by Wiremold 880CS/CM series and as indicated below:
   1. Slab at grade (dual level, fully adjustable type 1).
      a. Single gang: #B-2436 w/#SB-3083 carpet flange.
      b. Two gang: #B-4233 w/#SB-3084 carpet flange.
      c. Three gang: #B-4333 w/#SB-3085 carpet flange.
   2. Slab above grade (shallow, fully-adjustable, type II)
      a. Single gang: #B-2421 w/#SB-3083 carpet flange.
      b. Two gang: #B-2422 w/#SB-3084 carpet flange.
      c. Three gang: #B-2423 w/#SB-3085 carpet flange.
   3. Cover plates shall have brass finish as follows:
      a. #S-3825 for duplex flap for duplex receptacles.
      b. #S-3826 for data/communications.

B. PVC floor boxes manufactured by Hubbell or equal shall be as follows:
   1. Provide CFBS1R4CFB dual service cast iron body floor box with PVC riser. Provide CFBS1R4CUP adjustable mounting cup, S1R4SP2X2DUPLEX sub-plate for (1) Duplex and (2) RJ-45 Keystone jacks OR S1R4SP2X2STYLE for (1) GFCI duplex, USB or Surge Device & (2) Keystone jacks, OR S1R4SPQUAD sub-plate with (4) 20A simplex receptacles, single and dual circuit wiring capability. Provide with CFBS1R4CVR cover, Color to be chosen by Architect.

a. Maximum finished floor thickness (above top of box collar) with maximum adjustability is 1-1/2-inches at 5-inch, at 6-inches maximum adjustability is 1/2".

C. Floor boxes, recessed activation type, meet UL 514A scrub water requirements, shall be stamped steel with corrosion resistant finish, UL Listed for slab-on-grade installations, or stamped steel for above-grade installations as manufactured by Hubbell or equal by Wiremold RFB2-11 series and as indicated below:

1. Recessed Activation Slab at grade:
   a. Two gang: #CFB2G30CR or CFB2G30RCR (provisions for round cover), capable of up to 2” entry per gang. Flush flange, Surface flange and Furniture Feed cover availability. Surface Type Covers shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past 0.15” rise
   b. Four Gang: #CFB4G30CR or CFB4G30RCR (provisions for round cover), capable of up to 2” entry per gang. Flush flange, Surface flange availability. Cover shall not exceed 0.15” rise. Surface Type Covers shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15” rise.
   c. Six Gang: #CFB6G30CR or CFB6G30RCR (provisions for round cover), capable of up to 2” entry per gang. Flush flange, Surface flange availability. Surface Type Covers shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall maintain the 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15” rise.
   d. Ten Gang AV: #CFB10G55CR or CFB10G55RCR (provisions for round cover), with minimum (2) 2” KO’s, multiple front and back ¾” to 1-1/2” concentric KO’s.. Flush flange, Surface flange availability. Cover shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15” rise.
2. Recessed Activation Slab above grade
   a. Two Gang: #CFB2G30 or CFB2G30R (provisions for round cover), capable of up to 2” entry per gang. Flush flange, Surface flange and Furniture Feed cover availability. Surface Type Covers shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15” rise.
   b. Four Gang: #CFB4G30 or CFB4G30R (provisions for round cover), capable of up to 2” entry per gang. Flush flange, Surface flange availability. Cover shall not exceed 0.15” rise. Surface Type Covers shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past 0.15” rise.
   c. Six Gang: #CFB6G30 or CFB6G30R (provisions for round cover), capable of up to 2” entry per gang. Flush flange, Surface flange availability. Surface Type Covers shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall maintain the 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15” rise
   d. Ten Gang AV: #CFB10G55 or CFB10G55R (provisions for round cover), with minimum (2) 2” KO’s, multiple front and back ¾” to 1-1/2” concentric KO’s.. Flush flange, Surface flange availability. Cover shall not exceed 0.15” rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15” rise.
3. Service Fittings
   a. Surface Style Rectangular for use with carpet, tile, VCT and other engineered floors, available with or without carpet insert and offer system’s furniture feed type cover providing (1) 1-inch and (1) 2-inch threaded openings
   b. Flush Style Rectangular for use with tile, finished concrete or Terrazzo floors, available with or without carpet insert and offer system’s furniture feed type cover providing (1) 1-inch and (1) 2-inch threaded openings
   c. Rectangular covers shall be powder coated in variety of common finishes, Aluminum, Black, Brass, Bronze and Satin Nickel.
   d. Round Covers for use with all floor types Shall provide cable egress doors and systems furniture feed type cover providing (1) ¾-inch and (1) 2-inch threaded openings Round covers shall be plated metal in variety of finishes except Black (powder coated) Brushed Aluminum, Brass Plated, Bronze Plated, Satin Nickel Plated.

2.08 FIRE RATED POKE THROUGH DEVICES

A. Installations requiring 4-inch cored openings, poke thru devices shall be manufactured by Hubbell or approved equal, Hubbell S1R4PTFIT Recessed Activation poke thru with either S1R4SP2X2STYLE or S1R4SP2X2DUPLEX sub-plate for (1) 20A Duplex, GFCI OR USB 2 Port Duplex with (2) openings for (2) RJ-45 Jacks with S1R4CVR - color to be chosen by Architect.

B. Installations requiring 6-inch cored openings, with duplex power, shall be manufactured by Hubbell or Wiremold 6AT, Hubbell S1R6PTWZ-XXX Recessed Activation poke thru which includes S1R6SPW and S1RSSPZ sub plates and S1R6CVR cover, where XXX is finish. Color to be chosen by Architect. This includes (1) pre-wired 20A, 125 V duplex receptacle and (2) NEMA configured rectangular Decorator openings for telephone, signal or up to (12) Category 5e/Cat 6 RJ-45 Jacks.

C. Installations requiring 6-inch cored openings, with quad power, shall be manufactured by Hubbell or Wiremold 6AT, Hubbell S1R6PTDEH-XXX Recessed Activation poke thru which includes S1R6SPH and S1R6SPE sub-plates and S1R6CVR cover where XXX is finish. Color to be chosen by Architect. This includes (2) pre-wired 20A, 125 V duplex receptacles (quad) single, dual circuit capable and (1) NEMA configured rectangular Decorator opening for telephone, signal or up to (6) Category 5e/Cat 6 RJ-45 Jacks plus (2) additional Keystone openings for a total of (8) Category 5e/Cat 6 RJ-45 Jacks for this sub-plate

D. Installations requiring 8-inch cored openings, shall be manufactured by Hubbell or Wiremold 8AT, Hubbell S1R8PTFIT3 Recessed Activation poke thru offering (2) perimeter (outer) sub-plate locations and (3) standard NEMA configured openings in center sub-plate location allowing multiple combinations for power, data and A/V connectivity devices including acceptance for third party AV devices such as Crestron, FSR, Extron.

E. Poke thru devices with above floor service fittings shall be Hubbell PT7XC Series or Wiremold RC9 approved equal for 3-inch cored openings with FR280BKA Pedestal Service Fitting for (1) 20A, 125V duplex receptacle and (1) NEMA configured Decorator opening for telephone, signal or Cat 5e/Cat 6 data cables with RJ-45 jacks.

F. Poke Thru devices for furniture feed applications shall be Hubbell S1R6PTFF-XXX or Wiremold 6AFTT where XXX is finish, to be chosen by Architect. Provides (1) ¾” threaded entry for Power feed and (1) 2-0” threaded opening for Data/AV Cables. Installed in 6-inch cored openings.

G. Poke Thru devices for furniture feed applications shall be Hubbell S1PTFF-XX or Wiremold 4FF or approved equal where XX is finish, to be chosen by Architect. Provides (1) ¾” threaded entry for Power feed and (1) 1-1/2” threaded opening for Data/AV Cables. Installed in 4-inch cored openings.

PART 3 - EXECUTION

3.01 WIRING DEVICE MOUNTING HEIGHTS

A. Unless noted to the contrary on plans, or directed otherwise during the progress of the Work, wiring devices shall be set as follows:
   1. Switches 42" above finished floor.
   2. Wall mounted receptacles shall be installed vertically at 15 inches to the bottom outlet above finished floor unless otherwise noted or as required by local codes.
   3. Wall telephone outlets shall be mounted 15 inches to the bottom above finished floor unless otherwise noted. Mount even with wall mounted receptacles.
   4. At locations above counters, set devices at 6 inches above to the centerline counter tops, verify exact mounting height with the architect.

3.02 INSTALLATION (REFER TO 26 05 33 FOR OUTLET BOX SPECIFICATIONS).

A. Wall switches shall be set in a suitable steel box and shall be installed on the strike side of the door as finally hung, whether so indicated on the Drawings or not.

B. Receptacles shall be installed in a suitable steel box.

C. The Architect reserves the right to relocate wiring device up to a distance of 5 feet from the location shown, before rough-in, without additional cost.

D. Provide multi-gang device covers at locations where devices gang together.

E. Device locations are indicated schematically on the drawings along with the type and mounting height. Final locations and mounting heights shall be coordinated with the Architect on the jobsite, and with shop drawings of equipment; including equipment to be furnished and installed by the Owner. Devices installed in walls covered with vinyl, fabric wallpaper or other special finishes shall be coordinated and verified with the Architect on the job-site.

F. Stranded wire termination to switches, receptacles, devices and miscellaneous control devices shall be with an approved solderless terminal if clamp type securing is not possible (i.e. Sta-Con crimp on fork tongue connectors; Burndy Type TP-F).

G. Provide keyed switches in all common areas not monitored by the faculty (i.e. gym, corridors, cafeteria, commons natatoriums).

H. Tamper-resistant type receptacles shall be installed in all classrooms, cafeterias, corridors, special education, ALE, computer labs, special use classroom and all spaces where children 7 years and younger may occupy. In Child-Care facilities, tamper resistant receptacles shall be provided for all spaces with exception to back-of-house spaces, such as kitchens, custodial closets, electrical and mechanical rooms.

I. All 20A, 120V receptacles in food service areas shall be GFCI.

J. Provide GFCI circuit breakers for all drinking fountain branch circuits where GFCI receptacles are not indicated on plan.

K. Provide ARC Fault circuit interrupters (AFCI) as required to comply with 210.12 of the N.E.C. This shall include but not be limited to dwelling units and dormitories. AFCI breakers may be used.

L. Provide ground fault circuit interrupter (GFCI)/ARC Fault circuit interrupter (AFCI) dual function receptacles to comply with 210.8, 210.12 and 406.4 of the N.E.C.

M. Contractor shall indicate the circuit serving each wiring device. Provide a type written label located on the inside face of the coverplate for all recessed mounted devices and on the outside of the coverplate on all surface mounted devices.

END OF SECTION

SECTION 262926
MISCELLANEOUS ELECTRICAL CONTROLS AND WIRING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.02 SCOPE

A. Provide the various miscellaneous control devices, wiring and additional branch circuits as required, shown and specified.

B. The types of miscellaneous control devices and wiring include but not limited to the following.
   1. Contactors
   2. Relays
   3. Photocells
   4. Time switches
   5. Additional control wiring and safety devices as shown and specified.
   6. Connect power from fire alarm relays to starters to shut down air handling units.

C. WORK SPECIFIED ELSEWHERE:
   1. Various control devices, of an electrical nature, for the safe operation and temperature control of the heating, ventilating, air conditioning and plumbing systems provided under Division 22 and Division 23.
   2. All control wiring and conduit shall be furnished under Division 23. All power wiring 120 volt or larger shall be provided by Division 26.
   3. Refer to building controls specification, Division 23 for scope of work required to be performed by Division 26 (electrical contractor).

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:
   1. National Electrical Code.
   2. Local municipal or state codes that have jurisdiction.

1.04 ACCEPTABLE MANUFACTURERS

A. Provide one of the following manufacturers:
   1. LIGHTING CONTACTORS AND RELAYS
      a. General Electric Comapny/ABB
      b. Square D Company
      c. Automatic Switch Company
   2. PHOTOCELLS AND TIME SWITCHES
      a. Tork, Inc.
      b. Intermatic time controls
      c. AMF Paragon

PART 2 - PRODUCTS

2.01 MATERIAL

A. GENERAL: This Section shall outline the basic installation of electric devices, conduit, boxes, fittings, and wiring required for complete interconnection of several systems, this may not reflect every required appurtenance. It does not cover integral parts of mechanical equipment.

B. CONTACTORS AND RELAYS: Provide control wiring, contactors, and relays with the ampere-rating and number of poles as shown, specified, and required for a complete and functioning system:
   1. Rated at 600 volts, 60 hertz.
   2. Continuously rated contacts for all types of ballast and tungsten lighting, resistance and motor loads. Contacts shall be sized as scheduled or noted.

3. Shall have totally enclosed, double-break silver-cadmium-oxide power contacts. Auxiliary arcing contacts are not acceptable. Contact inspection and replacement shall be possible without disturbing line or load wiring.
4. The contactor shall have straight-through wiring with all terminals clearly marked.
5. The contactor shall be approved per UL508 and/or CSA, and be designed in accordance with NEMA ICS2-21 1B.
6. They shall be industrial-duty rated for applications to 600 volts maximum.
7. The contactor shall have provisions for factory or field addition of:
   a. Four (4) N.O. or N.C. auxiliary contacts rated 6 amperes continuous at 600 volts.
   b. Single or double circuit, N.O. or N.C., 30 or 60 ampere 600 volt power-pole adder.
8. The contactor shall have a NEMA type 1 enclosure unless otherwise noted.
9. Control power to the contactor 120V control circuit shall be provided from the nearest panelboard 120V circuit. If the 120V control power circuit is not shown, provide a control power transformer for 120 volt control power and a 120 volt coil when required for control. Provide primary and secondary fuses on the control power transformer.
10. Electrically Held Lighting - Contactor coils shall be continuously rated and encapsulated. Electrically held contactors are not to be used unless specifically shown on the plans.
11. Mechanically Held Lighting Contactors - Coil-clearing contacts shall be supplied so that the contactor coils shall be energized only during the instance of operation. Both latch and unlatch coils shall be encapsulated. All contactors shall be mechanically held unless noted otherwise on the plans.
12. Provide 2-wire or 3-wire control modules as required to operate lighting contactors.
13. Provide hand-off-automatic controls (H-O-A) for each lighting contactor.
14. Provide relays and contactors to shut down air handling units.

C. Photocells: Provide a specification grade self-contained, weatherproof, photoelectric control that shall be mounted on an FS type weatherproof junction box. The photocell shall:
   1. Switch "ON" at dusk and "OFF" at dawn.
   2. Adjustable from 2 to 50 foot-candles.
   3. Rated at 2000 watts.
   4. Use 1" diameter cadmium sulphide cell.
   5. Have a 2-minute delay to prevent false switching.

D. TIME SWITCHES: Provide a 7-day digital time clock with battery back-up feature installed in a NEMA 3R enclosure.

E. Control wiring shall be not less than #14 AWG type TW and shall be color coded and labeled with Brady markers throughout. Bundle multiple conductors with Ty-Raps.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install miscellaneous electrical controls and wiring to provide a functioning system.

B. Install contactor and relays in electrical/mechanical rooms unless otherwise noted.

C. Install photocells on the roof unless otherwise directed by the architect. Coordinate any roof penetrations with all other trades and shield from other light sources.

D. Provide miscellaneous connections for signs and other furnished equipment as shown on the Drawings.

3.02 DIVISION 22, 23, 27 AND 28 MISCELLANEOUS POWER AND CONTROLS

A. Install electrical devices not an integral part of system equipment providing conduit, boxes, fittings, wiring, circuit breakers, disconnecting means and other devices.

B. Contractor is responsible for providing all line voltage power to devices that require electrical power to operate. Contractor shall terminate line voltage power to termination points. Contractor shall coordinate between all trades to determine sizing and quantities of line voltage circuits to adequately power and control devices. Provide circuits from nearest low voltage panel using spare circuits provided, if device requires power not already available or indicated.

C. Provide GFCI receptacle with weather proof cover within 25 feet of all heating, air conditioning and refrigeration equipment.

3.03 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions.
   5. Most likely failure modes, causes and corrections.
   6. On site demonstration.

END OF SECTION

SECTION 265119
LIGHTING FIXTURES - LIGHT EMITTING DIODE (LED)

PART 1 - GENERAL

1.01 SCOPE

A. Provide general and emergency lighting fixtures as noted on the drawings. Fixtures shall be completely wired with lamps installed and shall be in perfect operating condition at the time of substantial completion.

B. The types of lighting fixtures required for this project include:
   1. LED

1.02 STANDARDS

A. All fixtures shall conform to all applicable UL standards and shall be UL label including damp and wet location ratings. “ETL listed” is an acceptable listing.

B. NFPA 101

C. ANSI C82.1

D. NEMA-LE

E. All LED drivers shall be UL recognized Class 2 per UL1310 or non-Class 2 per UL 1012 as applicable.

F. All LED drivers shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, for Non-Consumer Equipment.

G. All LED drivers shall be RoHS compliant.

H. TM-21

I. LM-80

J. LM-79

K. L70

L. DLC

M. UL 1008

1.03 ACCEPTABLE MANUFACTURERS

A. Provide lighting fixtures produced by manufacturers as shown and scheduled.

B. LED DRIVER:
   1. Provide one of the following manufacturers
      a. Eldo
      b. Lutron
      c. Osram
      d. Philips

C. LAMPS:
   1. Provide one of the following LED Chip manufacturers
      a. Cree
      b. Nichia
      c. North American Philips
      d. Seoul
      e. Lumileds

1.04 SUBMITTALS

A. Shop drawings shall include a brochure with a separate cut sheet for each fixture type arranged in alphabetical order with fixture and all accessories/options clearly labeled. Provide performance data for each fixture. Provide an independent test lab report for each fixture if requested by the Architect/Engineer.

B. Provide driver and LED module data brochures for each fixture type.

C. Provide air handling and heat removal data for light fixtures specified with these requirements.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:
1. National Electrical Code.
2. Local, municipal, or state codes that have jurisdiction.
3. UL fire resistance directory.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. General:
1. Provide the size, type and rating of each light fixture shown and scheduled. All light fixtures shall complete with reflectors, lens, trim rings, flanges, LED modules, lamp holders, drivers, fuses, wiring, earthquake clips, etc. to provide a complete functioning light fixture.

B. Lighting Fixture Types:
1. LED Fixtures
   a. Fixtures shall be pre-wired with frame-in kit and integral thermal management system for fixtures. Driver shall be encased in metal-can construction for optimal thermal performance.
   b. Total fixture lumen output is dependent on the chip, thermal management, driver current and optical system. LED fixtures shall be tested as a complete unit or system. Only DOE recognized CALiPER testing laboratory results shall be utilized.
   c. Interior LED fixtures shall have integral common mode and differential mode surge protection of 3kV(1.2/50µs, 2 ohm combination wave).
   d. Exterior LED fixtures shall have integral common mode and differential mode surge protection of 10kV/10kA(1.2/50µs, 2 ohm combination wave).
2. Exit signs
   a. Exit signs shall meet all federal, state and local codes.
   b. Provide fire alarm interface relay when required to flash exit signs.
   c. Provide battery packs for emergency operation when not connected to emergency generator power.

2.02 LED MODULES AND DRIVERS - COORDINATE WITH LIGHT FIXTURE SCHEDULE

A. LED
1. Driver manufacturer shall have a 10-year history producing electronic drivers for the North American market.
2. Driver shall carry a five year limited warranty from date of manufacture against defects in material or workmanship (including replacement) for operation at a maximum case temperature of 80 degrees Celsius.
3. Drivers shall not contain any Polychlorinated Biphenyl (PCB).
4. Provide driver with integral color-coded leads.
5. Driver shall operate from 50/60 Hz input source of 120 Volt through 277 Volt or 347 Volt through 480 Volt with sustained variations of +/- 10% (voltage) with no damage to the driver.
6. Driver output shall be regulated to +/- 5% across published load range. And shall have a power factor greater than .90 for primary application to 50% of full load rating with an input current Total Harmonic Distortion (THD) of less than 20% to 50% of full load rating.
7. Provide drivers with a Class A sound rating.
8. Provide LED drivers for outdoor fixtures with a minimum operating temperature of -40 degrees Celsius (-40 F). Provide LED drivers for indoor fixtures with a minimum operating temperature of -20 degrees Celsius (-2F).
9. Drivers shall tolerate sustained open circuit and short circuit output conditions without fail and auto-resetting without need for external fuses or trip devices.

10. Driver output ripple current shall be less than 15% measured peak-to-average, with ripple frequency being greater than 100Hz.
11. Driver performance requirements shall be met when operated to 50% of full load rating.
12. Driver shall have integral thermal foldback to reduce driver power above rated case temperature to protect the driver if temperatures reach unacceptable levels.
13. Drivers shall comply with NEMA 410 for in-rush current limits.
14. Dimmable drivers shall be controlled by a Class 2 low voltage 0-10VDC controller with dimming range controlled between 1 and 8VDC with source current 150µA.

2.03 LAMPS – COORDINATE WITH LIGHT FIXTURE SCHEDULE

A. LED Lamps shall be appropriately matched to the driver with junction-down design for improved thermal management. Maximum DC Forward Current.

2.04 EMERGENCY LED BATTERY BACKUP

A. Provide Bodine #BSL310M for emergency light fixtures in 9 or 10-foot ceiling.

B. Provide Bodine #BSL20 for emergency LED driver for emergency light fixtures in ceiling heights greater than 12 feet.

C. Provide Bodine #BSL17-C2 for emergency LED driver for LED downlights.

D. Provide unswitched hot leg. Hot leg shall originate from the same branch circuit as required in NEC article 700.12 (F).

2.05 POLES

A. Provide poles for area lighting fixtures as specified. Poles shall be one piece, anchor base, with 2-piece steel bolt cover and vibration dampers. Poles shall be round straight steel as specified on the Lighting Fixture Schedule.

B. Provide all poles with appropriate mounting accessories including arms, tenons, or bullhorns as required. Anchor bolts shall be hot dipped galvanized, sized as required by the manufacturer of the pole.

C. All poles shall have a normal 3” x 5” hand hole at 18” above the base flange and grounding provision.

D. Poles shall be prime painted interior and exterior. The exterior shall be finished with polyester powder coating and architectural finish as specified by the Architect. The interior with 3 mil thermoplastic hydrocarbon resin, or equivalent to meet 1000-hour salt spray exposure (ASTM B-117).

2.06 BRANCH CIRCUIT EMERGENCY TRANSFER SWITCH (BCELTS)

A. Provide 20 amp, 120-277 Volt, UL1008 listed Branch Circuit Emergency Transfer Switch to control emergency light fixtures transferring from normal to emergency branch circuits Provide Bodine GTD 20A or ETC SC 1008 UL 924 Devices are not acceptable

2.07 AUTOMATIC LOAD CONTROL RELAY (ALCR)

A. Provide 3 amp, 120-277 volt UL 924 listed. Relay to bypass switching controlling emergency branch circuit light fixtures Provide Bodine GTD or Wattstopper ELCU.

PART 3 - EXECUTION

3.01 INSTALLATIONS

A. General
1. Install the type of lighting fixture where shown and indicated in accordance with manufacturer's written instructions.
2. Provide earthquake clips on all recessed lay-in lighting fixtures as required by building code.
3. Adjust all adjustable lighting fixtures, as directed by the Architect.
4. Provide safety chains and wire guards for lighting fixtures located in gymnasium, multi-purpose rooms, play areas, etc.

B. Coordination

1. The contractor shall verify the type of fixtures with the ceiling types as indicated on the drawings. Any discrepancies shall immediately be brought to the architect's attention before the contractor places his order and accepts delivery. Fixtures shall fit exact in the type of ceiling scheduled. Provide plaster frames, trim rings and other accessories required for a correct fit.
2. Provide supports attached to structural member to support fixtures when the ceiling system cannot maintain support. Provide separate supports for all recessed ceiling mounted HID fixtures.
3. Refer to architectural reflected ceiling plan for the exact location of all lighting fixtures. Notify the architect for any discrepancies or conflicts with structural, architectural, mechanical piping or ductwork before installation.

C. Mounting
1. Provide support channels to support outlet boxes used support surface mounted lighting fixtures such as exit signs or downlights.
2. Pendant or surface mounted fixture shall be provided with required mounting devices and accessories, including hickeys and stud-extensions, ball-aligners, canopies and stems. Locations of fixtures in mechanical areas shall be coordinated with mechanical contractor. Mounting stems of pendant fixtures shall be of the correct length to uniformly maintain the fixture heights shown on the drawings or established in the field. The allowable variation tolerance in mounting individual fixtures shall not exceed 1/4 inch and shall not vary more than 1/2 inch from the floor mounting height shown on the Drawings. Fixtures hung in continuous runs shall be installed absolutely level and in line with each other. Hanging devices shall comply with Code requirements. Fixtures shall employ single - not twin - stem hangers unless otherwise noted.
3. All structure mounted fixtures (i.e. bracket mounted, pipe mounted and surface mounted) shall be provided with cables of suitable size and weight to support the weight of the fixture. Cables shall be fastened around or fastened to the housing of the fixture. On pendant fixtures, one safety cable of suitable size and weight to support the weight of the fixture assembly shall connect the top of the pendant to the supporting structure by means of welding or bolting, and one safety cable shall connect the housing of the fixture to the bottom of the pendant. Where more than one pendant per fixture occurs, only one pendant must be cabled. Track fixtures for pendant mounted track shall also be supplied with clip-on safety cables of suitable size and weight to support the weight of the fixture.
4. Provide secondary support wires from all four (4) corners of the lay-in fixtures to the structure above. Do not support fixtures from ceiling grid wire supports, piping, conduit, side walls, or mechanical equipment. Ceiling specifications do not supersede this requirement.
5. Where pole mounted luminaries are provided, provide appropriate anchor base pole as specified with manufacturer’s recommended anchor bolts. Verify exact location on site for poles with Architect, Civil, and Landscape documents. Poles shall be installed on proper footing. Refer to details on the drawings. Provide grounding connection to a separately driven ground rod, outside of the footing. Where indicated provide pole with identification plate indicating pole number.

D. Electrical Connection
1. All light fixtures shall be connected from a branch circuit junction box using 1/2" flexible metal conduit or MC cable fixture pigtails not exceeding 8'- 0". Provide #12 AWG conductors. All fixtures must be grounded by using a grounding conductor. Fixture to fixture wiring of fixtures installed in an accessible ceiling is not permitted. Fixture whips shall not lay-on ceiling tile or grid. Provide caddy clips to provide additional support.

E. Fire Rated Ceiling
1. Provide fire rated canopy or enclosure for all fixtures recessed in a fire rated ceiling. The fire rated canopy or enclosure shall be as required by the UL design number listed in the UL fire resistance directory. Refer to architectural drawing for the UL design number. Coordinate with ceiling installer and manufacturer. Provide proper rated drivers for lighting fixtures installed within these rated enclosures.

F. Air Handling Fixtures
   1. Install all air handling light fixtures with return air slot in the open position, if it is to be as an air handling fixture. Coordinate with mechanical contractor.

3.02 FINAL INSPECTION

A. Remove all plastic and protective coating from all fixtures. Fixtures shall be thoroughly cleaned. Replace any damaged fixture or fixture parts including reflectors, louvers, lens and metal parts that show signs of corrosion.

B. Replace all other defective fixtures showing signs of excessive usage.

C. Demonstrate proper operation of all fixtures and controls. Refer to other sections and details on the drawings for lighting controls.

END OF SECTION

SECTION 270200
BASIC MATERIALS AND METHODS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect and Engineer for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect and Engineer.

1.02 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all labor, material, tools, equipment and services necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.

B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Communications items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies within the Contract Documents discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least seven (7) working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning Communications system shall be considered a part of the overall "Scope".

H. Coordinate with other contractors on items required for the proper functioning of communications system and indicated as provided by others, such as power, backboxes, conduits, sleeves, air conditioning, structural support, etc..

I. Contractor shall participate in the commissioning process; including but not limited to meeting attendance, completion of checklists and participation in functional testing.

1.03 RELATED SECTIONS

A. Div 1 and conditions of the contract

B. Div 26 Electrical

C. Div 28 Electronic Safety and Security

1.04 COOPERATION WITH TRADES:

A. Cooperation with trades of adjacent, related, or affected materials or operations shall be considered a part of this work in order to affect timely and accurate placing of work and bring together in proper and correct sequence, the work of such trades.

1.05 REFERENCES

A. National Electrical Code (NEC)

B. American Society for Testing and Materials (ASTM)

C. Underwriter's Laboratories, Inc. (UL)

D. Insulated Cable Engineer's Association (ICEA).

E. National Electrical Manufacturer's Association (NEMA).

F. Institute of Electrical and Electronics Engineers (IEEE).

G. American National Standards Institute (ANSI).

H. National Fire Protection Association (NFPA).

I. International Energy Conservation Code (IECC).

J. BICSI (Building Industry Consulting Services International)

K. Owner’s Design Guidelines and Construction Standards

L. Local, county, state and federal regulations and codes in effect as of date of installation.

1.06 COMPLETE FUNCTIONING OF WORK

A. All work fairly implied as essential to the complete functioning of the electrical systems shown on the Drawings and Specifications shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specifications to establish the types of the systems, but not set forth each item essential to the functioning of the system. In case of doubt as to the work intended, or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for supplementary instructions, Drawings, etc.

B. Contractor shall review all pertinent Drawings and adjust his work to all conditions shown there on. Discrepancies between Plans, Specifications, and actual field conditions shall be brought to the prompt attention of the Architect.

1. Approximate location of communications outlets, devices, equipment cabinets, cable trays, conduits and sleeves, etc., are indicated on the Drawings. However, the Drawings, do not give complete and accurate detailed locations of such items and exact locations must be determined by actual field measurement. Such locations will, at all times, be subject to the approval of the Architect.
2. Communicate with the Architect and secure his approval of any location about which there may be the least question. Outlets obviously placed in a location not suitable to the finished room or without specific approval, shall be removed and relocated when so directed by the Architect. Location of ceiling devices shall be coordinated with reflected ceiling plans.

C. Additional coordination with mechanical, electrical, plumbing contractor may be required to allow adequate clearances for all building components. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.07 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

1.08 QUALITY ASSURANCE

A. Contractor shall have a complete working knowledge of the communications system being installed.

B. Contractor shall have installed similar-sized systems in at least ten (10) other projects in the last five (5) years prior to this bid and be regularly engaged in the business of installation of the types of systems specified in this document.

C. Contractor and individual installation crew members shall be experienced and qualified to perform the work specified herein at time of bid submission. All onsite supervision personnel that will be assigned to this project shall be listed in the Pre-Installation Submittal.
   1. 80% shall have a minimum of three (3) years of experience in the installation of the types of systems, equipment, and cables specified in this document prior to this bid.
   2. All installation team members must demonstrate knowledge and compliance with all applicable methods, standards, and codes.
   3. All members of the Structured Cabling System installation team shall be certified by the Structured Cabling System Assurance Warranty provider as having completed the necessary training to complete their part of the installation and capable of an installation that falls under manufacturer's guidelines necessary to obtain the Manufacturer's System Assurance Warranty.
   4. Any personnel substitutions shall be noted in writing to the Owner.

D. A BICSI RCDD shall supervise and approve all on-site structured cabling work as a recognized member of the Contractor's installation team.

E. Contractor shall obtain Communications system product manufacturer's certification if applicable.

F. Refer to General Conditions for other requirements.

1.09 CONTRACTOR REQUIREMENTS

A. In order to accomplish the conditions of this agreement, the Contractor shall perform the specific duties listed herein.

B. Contractor shall provide and pay for all labor, supervision, tools, equipment, test equipment, tests and services to provide and install a complete communications cabling infrastructure system. Pay all required sales, gross receipts, and other taxes.

C. Insurance
   1. The Contractor shall procure, submit for review, and maintain for the duration of this agreement, insurance against claims for injuries to persons or damages to property which may arise from, or in connection with, the performance of work hereunder by the Contractor, his agents, representatives, employees or subcontractor. The Contractor shall pay the cost of such insurance.
   2. The Owner, its directors, officers, representatives, agents and employees, respectively, shall have no responsibility to the Contractor with respect to any insurance in accordance with the provisions set forth herein.

D. Regulatory Requirements
   1. Communications Contractor shall supply all city, county, and state telecommunication cabling permits required by Authority Having Jurisdiction (AHJ).
   2. Communications Contractor shall be licensed and/or bonded as required for telecommunications/low voltage cabling systems.

E. Privacy and Confidentiality
   1. The Contractor will respect and protect the privacy and confidentiality of Owner, its employees, processes, products, and intellectual property to extent necessary, consistent

with the legal responsibilities of the Owner policies.

2. Contractors shall sign a non-disclosure agreement and abide by the requirements to keep confidential all information concerning bid documents and this project.

F. Use of Subcontractors
   1. Successful bidder shall inform the Owner's contact and General Contractor in writing about the intention to use Subcontractors and the scope of work for which they are being hired.
   2. The Owner or Owner's designated contact must approve the use of Subcontractors in writing prior to the Subcontractor's hiring and start of any work.

G. The Contractor's designated Project Manager will be recognized as the single point of contact. The Project manager shall oversee all work performed to ensure compliance with specifications as outlined in bid documents (which includes all specifications, references, and drawings) to ensure a quality installation and attend project meetings with the telecommunication consultant, the Owner and others.

H. Coordination
   1. Coordinate installation work with other trades (examples include ceiling grid contractors, HVAC and sheet metal contractors, etc.) to resolve procedures and installation placement for cable trays and cable bundle pathways.
   2. The goal of this coordination will be to establish priority pathways for critical data/voice network cable infrastructure, materials, associated hardware, as well as mitigate delays to the project and to allow service access for communications components.
   3. Exchange information and agree on details of equipment arrangements and installation interfaces.
   4. Coordinate with electrical contractors and plan for the pathway routes used communications cabling to minimize cable lengths. Report any potential over distance cable runs for approval before pulling the cables.
   5. Record agreements with other trades and distribute record to other participants, Owner and telecommunication consultant.

1.10 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

1.11 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of

construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances) or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.

C. Damaged equipment shall be promptly removed from the site and new, undamaged equipment shall be installed in its place promptly with no additional charge to the Owner.

1.13 SUBMITTALS

A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete product data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty-day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty-day (30) time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF format and bookmarked for individual specification sections. Individual electronic files of submittals for individual products shall not be permitted. Each submittal shall include the following items:
   1. A cover sheet with the names and addresses of the Project, Architect, Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
   2. An index page with a listing of all data or drawings ncluded in the Submittal.
   3. Product Data and Shop Drawings shall be submitted in separate submittals, to avoid rejection of one due to errors in the other.

B. Shop Drawings
   1. Communications Contractor shall submit, for approval, floor plans that identify all device locations, device ID, cable routes and quantities, cable types, riser locations, and references to installation details and diagrams.
      a. Communication Contractor shall notify A&E team of any cable routes that will exceed the permanent link distance limit and get approval before work to start. Without advance notice and approval from A&E team, the contractor shall be fully responsible for make corrections as needed to bring all installed cables within the distance limit.
   2. Communications Contractor shall submit, for approval, diagrams that show communications room layouts, rack layouts (including wall and rack elevations), cabling riser and interconnection diagrams, etc.
   3. Communications Contractor shall submit, for approval, labelling scheme for all communications devices and cabling components (faceplates, horizontal cables, riser cables, inter-building cables, racks, patch panels, etc.) installed.
   4. The Contractor shall make any corrections as required by the Engineer and submit revised shop drawings to the team for approval.
   5. Approval by the Engineer of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from the drawings or specifications, nor shall it relieve the Contractor from responsibility for errors of any sort in shop drawings or schedules. Requests to deviate shall be submitted in writing to the Architect.
   6. Drawings shall show the proposed firestop systems and locations, (stamped/embossed by the PE) to restore/maintain the designed fire rating of the building structure (walls, ceilings, floors, etc).
   7. Shop Drawings shall be newly prepared and not reproduced from the Contract Documents. Drawings shall be prepared by a draftsman skilled in this type of work. Submitting copy of the engineering drawings or engineering drawings with contractor's markup as shop drawings is NOT ACCEPTABLE.
   8. Shop drawings shall be developed in coordination with other trades (MEP, Architecture, Structural, etc.) to avoid any collision or conflict and to meet all industry standards best practices, codes and regulation requirements. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that

the systems, products and equipment submitted can be installed in the building and will operate as specified

9. Additional coordination with other trade contractors may be required to allow adequate clearances and meet code requirements. All transitions, offsets and relocations as required by actual field conditions shall be performed by the contractor at no additional cost to the owner

C. Product Data Submittals
1. Communications Contractor shall submit catalogue cutsheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten and/or highlighted to indicate exact selection.
2. Communications Contractor shall identify applicable specification section reference for each product performance for each component specified for approval prior to purchase and installation.
3. Product information sheets for the proposed system test equipment to include certification of test equipment calibration. Installer is to use test equipment with a calibration date within one year of test date. Installer is to recalibrate and resubmit if necessary.
4. All data sheets shall be organized by specification sections and provided with table of contents. All products required in the spec section shall be included in one submittal.
5. Provide specification variations pages with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this specification page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor, and this page shall be signed by the submitting Contractor.
6. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
7. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
8. Identification of each item of material or equipment matching that indicated on the Drawings.
9. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
10. All product substitutions shall be submitted in advance for review and approval before being included in product submittal package.
11. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in longhand.

D. Structured Cabling System Warranty
1. The Communications Contractor shall submit appropriate documentation from the certifying manufacturer showing the project is registered and qualified for the System Assurance Warranty.
2. All subsequent work shall be in accordance with approved submittals. The Communications Contractor shall not perform any portion of the work requiring approval of the System Assurance Warranty manufacturer’s warranty registration qualification procedures that would disqualify any part or all of the wiring system from that warranty qualification.

E. Qualifications
1. Communications Contractor shall submit a list of the Contractor’s previous projects that demonstrate qualification for this project. This list shall include, but not be limited to:
   a. At least ten (10) other projects in the last five (5) years

b. Name and location of project
c. Project contacts, email addresses, and phone numbers
d. Total square footage
e. Total number of cables/drops
f. Types of media

2. Communications Contractor shall submit an up-to-date and valid statement of qualifications for those assigned to perform the work specified herein at time of bid submission.
   a. Communications Contractor Employees
   b. Subcontractors
3. Manufacturer certifications for Contractor and installers.

F. Cable Testing Plan
1. The Contractor shall provide a complete and detailed test plan for approval of the cabling system specified herein, including a complete list of test equipment for copper and fiber components and accessories prior to beginning cable testing.
2. The following minimal items shall be submitted for review:
   a. A testing plan that clearly describes procedures and methods.
   b. Product data for test equipment.
   c. Certifications and qualifications of all persons conducting the testing.
   d. Calibration certificates indicating that equipment calibration meets National Institute of Standards and Technology (NIST) standards and has been calibrated at least once in the previous year of the testing date.
   e. Examples of test reports, including all graphs, tables, and charts necessary for display of testing results.

G. Samples
1. For workstation outlet connectors, jack assemblies, housings and faceplates for color selection and evaluation of technical specifications and requirements. Confirm with Architect, interior designer, and Owner representative for color before purchasing materials.

H. Refer to Division 1 for additional information on shop drawings and submittals.

I. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

J. Submittals shall be reviewed and returned to the Contractor with one of the following categories indicated:
1. REVIEWED: Contractor does not need to take further submittal action, shall include this submittal in the O&M manual, and verify with Architects and other parties (Owner, etc) reviewing the submittals that no other correction is required before placing orders and starting installations.
2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted, and verifed with Architects and other parties (Owner, etc) reviewing the submittals that no other correction is required before placing orders and starting installations.
3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and

resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.

5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

K. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

L. Refer to each specification section for additional requirements.

1.14 COORDINATION DRAWINGS

A. Before submit shop drawings, Contractor shall prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of communications conduits/sleeves, cable trays, equipment, cabinet and other materials. Include the following:
   a. Wall and type locations.
   b. Clearances from other building structure and MEP equipment.
   c. Clearances for servicing and maintaining equipment and cabling, and space for equipment disassembly required for periodic maintenance.
   d. Equipment connections and support details.
   e. Exterior wall and foundation penetrations.
   f. Fire-rated wall and floor penetrations.
   g. Sizes and location of required concrete pads and bases.
   h. Structural floor, wall and roof opening sizes and details.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: cable routing, equipment location, clearance, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can

be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 OPERATION AND MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing instructions and lubrication charts and schedules.
   5. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 27, include the following information for equipment items:
      a. Identifying names, name tags designations and locations for all equipment.
      b. Fault Current calculations and Coordination Study.
      c. Reviewed shop drawing submittals with exceptions noted compliance letter.
      d. Fabrication drawings.
      e. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
      f. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
      g. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
      h. Equipment name plate data.
      i. Wiring diagrams.
      j. Exploded parts views and parts lists for all equipment and devices.
      k. Color coding charts for all painted equipment and conduit.
      l. Location and listing of all spare parts and special keys and tools furnished to the Owner.
      m. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.
   6. The Communications Contractor shall deliver the Installer's Extended Product Warranty and Manufacturer's signed System Assurance Warranty of installed cabling system to include all components that comprise the complete cabling system.
      a. Delivery shall be completed within two (2) weeks of the time of final punch list review.
   7. Product Certificates shall be signed by manufacturers of cables, connectors, and terminal equipment certifying that products furnished comply with requirements.
   8. Cable Testing Report Requirements
      a. Submit certified test reports of Contractor-performed tests. Contractor shall submit the required Test Reports in the format and media specified, upon completion of testing the installed system.
   9. The tests shall clearly demonstrate that the media and its components fully comply with the requirements specified herein.
   10. Three (3) sets of electronic and hardcopy versions of test reports shall be submitted together and clearly identified with cable designations.

11. Cable inventory data shall be submitted for all fiber, copper, and coaxial cabling and termination components. Include products furnished:
    a. Manufacturer's name
    b. Manufacturer's part numbers
    c. Cable designations
    d. Location and riser assignments
    e. Product Data
12. The Contractor's BICSI Registered Communications Distribution Designer (RCDD) supervisor shall review, approve and stamp all documents prior to submitting. The Contractor's RCDD shall warrant in writing that 100% of the installation meets the requirements specified herein upon completion of all work.
13. Supply Owner with training manuals with instructions on methods of adding or removing cabling to/from firestopped sleeves and chases.

1.16 RECORD DRAWINGS

A. Maintain a continuous record during the course of construction of all changes and deviations in the work from the contract drawings. Upon completion of the work, purchase a set of "Auto Positive Tracings" on vellum and make corrections as required to reflect the electrical systems as installed. Location and size of all conduit shall be accurately shown to dimension. Submit three prints of the tracings for approval. Make corrections to tracings as directed and deliver "Auto Positive Tracings" to the Architect. Record drawings shall be furnished in addition to shop drawings. Symbols on the Record drawings shall correspond to the identification symbols on the contract drawings and equipment identification plates and tags.

B. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

C. Refer to Division 1 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of final acceptance.

D. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed device and cabling, and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.

E. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.

F. For all cables and devices served from a wall mounted equipemnt enclosure, provide printed as-built wiring diagram showing all the cable route and type, device IDs and locations, and brand and models of all system components inside the enclosure, and attach the wiring diagram to the interior face of the enclosure's front door.

G. When the option described in paragraph E., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

    CERTIFIED RECORD DRAWINGS
    DATE:
    (NAME OF GENERAL CONTRACTOR)
    BY:_____

(SIGNATURE)
(NAME OF SUBCONTRACTOR)
BY:_____
(SIGNATURE)

1.17 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 27.

1.18 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of onsite training in three 4-hour shifts.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 27 Sections for additional Operator Training requirements.

1.19 SITE VISITATION

A. Visit the site of the proposed construction in order to fully understand the facilities, difficulties and restriction attending the execution of the work.

B. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

C. Understand the existing utilities from which services will be supplied; verify locations of utility services and determine requirements for connections.

D. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.20 WARRANTY

A. The undertaking of the work described in this Division shall be considered equivalent to the issuance, as part of this work, of a specific guarantee extending one year beyond the date of completion of work and acceptance by Owner, against defects in materials and workmanship. Materials, appliances and labor necessary to effect repairs and replacement so as to maintain said work in good functioning order shall be provided as required. Replacements necessitated by normal wear in use or by Owner's abuse are not included under this guarantee.

B. All normal and extended warranties shall include parts, labor, miscellaneous materials, travel time, incidental expenses, freight/shipping, refrigerant, oils, lubricants, belts, filters and any

expenses related to service call required to diagnose warranty problems.

C. Structured System Warranty
   1. The Contractor shall be a certified Manufacturer's Value Added Reseller (VAR) and/or Authorized Installer and provide an end-to-end product warranty, adhere to the industry standard engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this project.
   2. Contractor shall coordinate with manufacturer for warranty paperwork and procedures prior to the start of the project.
   3. Contractor shall provide a minimum one (1) year warranty on installation and workmanship PLUS an Extended Product Warranty and System Assurance Warranty for this wiring system and shall commit to make available local support for the product and system during the Warranty period.
      a. The Extended Product Warranty shall apply to all passive structured cabling system components and shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products for a minimum of one (1) year.
      b. The System Assurance Warranty provides a complete system and product warranty that will be extended to the end-user, ensuring the structured cabling system will be free of defects in materials and workmanship, will meet or exceed applicable performance requirements defined in the contract documents, and support all current and future network applications for a minimum of twenty (20) years.
   4. System Certification: Upon successful completion of the installation and subsequent inspection, the customer shall be provided with a numbered certificate, from the manufacturer, registering the installation.

1.21 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.

B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.
   1. It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
   2. If the client, Architect or Owner of the project requires electronic media for "record purposes", then AutoCAD/ Revit documents will be prepared by Engineer on electronic

media such as removable memory devices, flash drives or CD's. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.

3. At the Architect/Owner's request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a ".rvt" or ".dwg" format to permit the end user to revise the drawings.

1.22 PRE-INSTALLATION MEETINGS

A. Communications Contractor shall attend and/or arrange a scheduled pre-installation conference prior to beginning any work of this section. This venue is to ask and clarify questions in writing with consultant and/or project manager/Owner representative.

B. Agenda
   1. Safety
   2. Work to be performed
   3. Scheduling
   4. Coordination
   5. Other topics as necessary

C. Attendance
   1. Communications project manager/supervisor shall attend meetings arranged by General Contractor, Owner's representatives, and other parties affected by work of this document.
   2. All individuals who will serve in an on-site supervisory capacity, including project managers, site supervisors, and lead installers, shall be required to attend the pre-installation conference. Individuals who do not attend the conference will not be permitted to supervise the installation and testing of communications cables on the project.

1.23 CONTRACT ADMINISTRATION

A. The Engineer may perform site visits and provide job field reports upon inspection of Contractor's installation, materials, supporting hardware, coordination with other trades and progress to schedule to the client.

B. Job Field Report outline:
   1. General: The general installation progress in relation to scheduled work made by the Contractor up to that date.
   2. Deficiencies and/or Items of Note: Documents observations of the cable installation that may require corrective action by the Contractor.

1.24 POST INSTALLATION MEETINGS

A. At the time of substantial completion the contractor shall call and arrange for a post installation meeting to present and review all submittal documents to include but not be limited to As-Built Drawings, Test reports, Warranty paperwork, etc.

B. Attendees shall include
   1. Communications Contractor
   2. Project Manager/Owner Representative
   3. General Contractor
   4. Communications Engineer.
   5. Other trades that the GC deems appropriate.

C. At this meeting the Communications Contractor shall present and explain all documentation.

D. Any discrepancies or deviations noted by and agreed to by participants shall be remedied by the Communications Contractor and resubmitted within one (1) week of the meeting.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. The names and manufacturers and model numbers have been used in the Contract documents to establish types of equipment and standards of quality. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer for consideration, provided the following conditions are met:
   1. Submit alternate equipment with complete descriptive data in shop drawing form. Provide sample of equipment upon request for review by Architect. Samples will be returned if requested in writing.
   2. Alternate equipment must be equal from the standpoint of materials, construction and performance.
   3. Alternate submittal must be presented to the Engineer/Architect ten (10) days prior to bid date for approval.

B. Where only one manufacturer is mentioned without the phrase "or approved equal". No substitution is allowed. If the product specified is discontinued,. Contractor shall submit an alternate product of equal or better performance at no additionla cost for review and approval.

C. The Architect and Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.

2.02 GENERAL REQUIREMENTS

A. All materials and products used on this project shall be listed by Underwriters' Laboratories.

B. Equipment and materials shall be standard products of a manufacturer regularly engaged in the manufacture of telecommunications cabling products and shall be the manufacturer’s latest standard design in satisfactory use for at least one year prior to bid opening.

C. All material and equipment, as provided, should be the standard Commercial-Off-The-Shelf (COTS) products of a manufacturer engaged in the manufacturing of such products.
   1. All shall be typical commercial designs that comply with the requirements specified.
   2. All material and equipment shall be readily available through manufacturers and/or distributors.

D. Installer is to comply in every way with the requirements of local laws, ordinances, and rules, , the National Board of Fire Underwriters, and the National Electrical Code.

E. In the event of any conflicts between documents referenced herein and the contents of this specification, the Installer is to notify in writing to the Architect/Engineer of any such occurrences before the purchasing of any equipment, materials and/or installation by the Installer. The Architect/Engineer will notify the Installer of any actions required to resolve these conflicts.

F. No change in the plans or in the specifications is to be made without written instruction to do so from the Owner or Architect/Engineer.

G. Materials are to be installed in accordance with manufacturer’s recommendations and best industry practices.

H. The Installer is to promptly correct all discrepancies and/or defects for which the Installer is responsible.
   1. The Installer is to maintain a set of working specifications and drawings on site at all times and to make this set available for inspection during site visits.

I. All materials are to be new and of the highest quality.

J. All products installed in the above ceiling space are to meet or exceed the Underwriters Laboratories (UL) fire rated cable insulation requirements and are to be Plenum rated.

K. The Installer is to seal ALL penetrations, conduits, sleeves, cable trays, etc., where cabling has been installed through rated walls/floors with Wiremold Flamestopper intumescent fire- stop

system (or approved equivalent) where they pass through rated walls. The Installer is responsible for returning any and all penetrations through rated walls or floors made for communications cable to their pre-penetration rating.

L. All material used to dress cable bundles shall be applied loosely to allow the dressing material to slide around the bundle. Tension of dressing materials shall not deform the cable sheath. Dressing materials should be limited to the telecommunications rooms only. Cabling shall be placed unbundled in cable tray and/or j hooks in the above ceiling spaces. No bundling materials are to be used above ceiling. All j hooks installed shall include the corresponding clip provided by the hook manufacturer. Plastic cable ties will not be permitted.

M. Any discrepancy in the contract documents is to be remedied by the Installer providing and installing the newer, greater quality or quantity of the item or items in question.

N. Horizontal cabling is to have minimum ten (10) feet of service loop coiled and stored above the ladder rack in the telecommunication room.

O. Horizontal cabling is to have no less than twelve (12) and no more than eighteen (18) inches of maintenance loop coiled and stored as close to the entrance to the workstation outlet as possible.

P. Horizontal cabling is to have no less than six (6) and no more than twelve (12) inches of maintenance loop coiled and stored inside the back box at the workstation outlet.

Q. Horizontal cable lengths for individual links shall not exceed 90 m (295 ft) from the point of termination at the connector to the point of termination at the patch panel.

R. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

S. Provide nylon bushings for all conduit openings.

T. All horizontal cables not in a cable tray or conduit shall be supported at a maximum of 48 to 60 inch intervals. Cable support system is to be independent of supports for other trades. At no point shall cable(s) make contact with acoustic ceiling supports, grids, panels, electrical conduits, water pipes or HVAC ductwork or supports.

U. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the installer prior to final acceptance at no cost to the Owner.

V. Pair untwist at the termination shall not exceed 3.18mm.

W. Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.

X. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

2.03 ACCESS DOORS

A. Wherever access is required in walls or ceilings to concealed junction boxes, pull boxes, equipment, etc., installed under this Division, furnish a hinged access door and frame with flush latch handle to another Division for installation. Doors shall be as follows:
   1. Plaster Surfaces: Milcor Style K.
   2. Ceramic Tile Surfaces: Milcor Style M.
   3. Drywall Surfaces: Milcor Style DW.
   4. Install panels only in locations approved by the Architect.

2.04 FIRE STOPPING

A. Contractor shall restore the fire rating of penetrations to rated walls, ceiling, flooring after cable pulling. Fire stopping products shall be as follows:
   1. Hilti
   2. SpecSeal
   3. 3M
   4. Owner approved alternate

2.05 IDENTIFICATION (LABELING) SYSTEM

A. Contractor shall label al communications system components installed. Labeling products shall be as follows:
   1. Brady (LAT-19-361-4)
   2. Dymo
   3. Hellerman-Tyton
   4. Owner approved alternate

2.06 ESCUTCHEONS

A. Provide heavy chrome or nickel plated plates, of approved pattern, on conduit passing through walls, floors and ceilings in finished areas. Where conduit passes through a sleeve, no point of the conduit shall touch the building construction. Caulk around such conduit with sufficient layers of two hour rated firesafing by Thermafiber 4.0 P.C.F. density, U.S.G. fire test 4/11/78 and seal off openings between conduit and sleeves with non-hardening mastic prior to application of escutcheon plate. Escutcheons shall be Gravler Sure-Lock, or approved equal.

2.07 SPACE LIMITATIONS

A. Equipment shall be chosen which shall properly fit into the physical space provided and shown on the drawings, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearances in accordance with Code requirements. Physical dimensions and arrangement of equipment shall be subject to the approval of the Architect.

2.08 PAINTING

A. All factory assembled equipment shall be delivered with a hard surface factory applied finish such as baked-on machinery enamel which will not require additional field painting. The finish shall consist of not less than 2 coats of medium gray color paint USA No. 61 Munsell Notation 8-3G, 6. 10/0.54 enamel. This Contractor shall protect this finish from damage due to construction operations until acceptance of the building. He shall be responsible for satisfactorily restoring any such finishes or replacing equipment that becomes stained or damaged.

PART 3 - EXECUTION

3.01 PREPARATION

A. Field Measurements
   1. Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

B. Established Dimensions
   1. Where field measurements cannot be made without delaying the work, coordinate with the General Contractor to establish dimensions.
   2. When approved in writing, proceed with fabricating units without field measurements.
   3. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

C. Pre-installation inspection
   1. The Contractor shall visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport.
   2. Visibly damaged goods are not acceptable and shall be replaced by the contractor at no additional cost to the Owner.

3.02 DEMOLITION AND REMODELING

A. Where only portions of the existing Communications system are to be modified as part of the renovation and addition project, devices related to or part of this system outside of the renovation area shall be kept in operations.

B. The Drawings do not show all demolition work required. The Contractor shall make himself familiar with the required scope of work to accomplish the work required by these documents. All demolition work implied or required shall be included in the scope of this contract.

C. Utility service outages required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner two (2) weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

D. The contractor shall perform a preconstruction walk thru of the site to observe and test the existing systems for operation. The owner assumes that the system is 100% operational and functioning prior to the commencement of construction. If any portion of the system observed or tested to be non-functional or inoperable at the commencement of the project will be noted by the contractor. A written report will be generated by the contractor noting their findings and submitted to the project team for review and handling. The owner will determine if the items found to be non-functional are to be repaired by contractor or repaired by the owner. If this repair of the equipment found to be non-functional is to be added to the contractor's scope of work the contract amount for the Work shall be adjusted accordingly.

E. Work Sequence and Timing. The Owner will cooperate with the Contractor; however, the following provisions must be observed:
   1. During the construction of this project, normal facility activities will continue in existing buildings until new buildings or renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems shall be maintained in service within the occupied spaces of the existing building.
   2. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Subcontractors and Sub-subcontractors, and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.

F. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing Local Area Network (LAN) and Wide Area Network (WAN) infrastructure and workstation outlets. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by the contractor, who shall produce drawings which shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.

G. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

H. All equipment and/or systems noted on the Drawings "To Be Removed" should be removed including, associated pipe and duct, pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

I. During construction and remodeling, portions of the Project shall remain in service. Construction equipment, material, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility; or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment,

materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

J. Certain work during the demolition and construction phases may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.

K. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

L. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.

M. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage which occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.

N. When applicable, Include in the contract price all rerouting of existing backbone cabling, , etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing telecommunications rooms in areas scheduled to remain operational with a minimum of interruption.

O. All existing cabling, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

P. Cabling and equipment s serving technology and communications, etc., which is to remain but which is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

Q. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

R. Refer to Architectural Demolition and/or Alteration plans for actual location of walls, ceilings, etc., being removed and/or remodeled.

S. Field verify measurements, and cabling arrangements are as shown on Drawings.

T. Verify that scheduled cabling and equipment serving only those abandoned devices to be demolished and removed in its entirety.

U. Demolition Drawings are based on casual field observation and existing Record Documents. Report discrepancies to Architect and Engineer before disturbing existing installation.

V. Beginning of demolition means that the contractor accepts existing conditions.

W. Demolish and extend existing communications work under provisions of Division 02 and this Section.

X. Remove, relocate, and extend existing systems to accommodate new construction.

Y. Remove abandoned cabling to source of origination point. Remove racks and other equipment as scheduled on the drawings.

Z. Remove exposed / abandoned cabling systems, including abandoned systems above accessible ceiling finishes. Cut systems flush with walls and floors, and patch surfaces.

AA. Repair adjacent construction and finishes damaged during demolition and extension work.

BB. Maintain access to existing systems which remain active. Modify installation or provide access doors as appropriate.

CC. Extend existing systems using materials and methods compatible with existing systems, or as specified.

DD. Clean and repair existing materials and equipment which remain or are to be reused. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operating condition. The Contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

EE. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

FF. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.

GG. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

HH. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen and shall be responsible for repairing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

II. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.

JJ. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.

3.03 INSTALLATION

A. General
   1. Contractor shall install work in accordance with specifications, drawings, manufacturer’s instructions and approved submittal data.

B. Allowable cable bend radius and pull tension:
   1. In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation.
   2. Refer to cable manufacturer's bend radius recommendations for the maximum allowable limits.

3. After installation, exposed cable and other surfaces must be cleaned free of lubricant residue. Use only lubricants specifically designed for cable installation.

C. Pull Strings
1. Provide pull strings in all new conduits, including all conduits with cable installed (trailer strings) as part of this contract.
2. Data and video cables can be pulled in tandem with pull strings.
3. The pull strings must move freely to prevent cable jacket/cable damage during pulls.

3.04 EXCAVATING AND BACKFILLING

A. Trenching and backfilling and other earthwork operations required to install the facilities specified herein shall conform to the applicable requirements of Division 2 (95% of maximum standard density). Where trenching or excavation is required in improved areas, the backfill shall be compacted to a condition equal to that of adjacent undisturbed earth and the surface of the area restored to the condition existing prior to trenching or excavating operations. Provide a minimum of 3” of sand underneath all conduits. The plans indicate information pertaining to surface and sub-surface obstructions; however, this information is not guaranteed. Should obstructions be encountered whether or not shown, the Contractor shall alter routing of new work, reroute existing lines, remove obstructions where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of new work and leave existing surfaces and structures in a satisfactory and serviceable condition. All work shall comply with OSHA Standards.

3.05 WORKMANSHIP AND CONCEALMENT

A. The work of this Section shall be performed by workman skilled in their trade. Installation shall be consistent in completeness whether concealed or exposed. Each item of Communications work shall be concealed in walls, chases, under floors and above ceilings except:
1. Where shown to be exposed.
2. Where exposure is necessary to the proper function.

3.06 SLEEVES, CUTTING AND PATCHING

A. This section shall be responsible for placing sleeves for all conduit passing through walls, partitions, sound walls, beams, floors, roof, etc. Sleeves through below-grade walls shall use water-tight fitting manufactured by O-Z/Gedney.

B. All cutting and patching will be done under another Division, but this Section will be responsible for timely performance of this work and layout of holes and setting sleeves.

C. All un-used sleeves shall be sealed with 2 hour UL approved fire sealant manufactured by “3M” or approved equal.

3.07 LABELING

A. All communications system field devices, faceplates, cables, termination devices, equipment enclosures (racks, cabinets, wall mounted boxes, etc) shall be clearly labelled with printed labels showing the device/cable ID, type, and the origination and destination location for cables.

B. All labelling shall conform to Owner's labelling standard and industry standards. Submit labelling scheme as part of the shop drawing for review and approval before work to start.

C. Cable labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

D. Flat-surface labels: Self-adhesive vinyl or vinyl-cloth labels, machine printed with alphanumeric cable designations.

E. Provide transparent plastic label holders, and 4-pair marked colored labels.

F. In accordance with ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure":
1. Install colored labels according to the type of field as per color code designations.
2. Use “designation strip color-code guidelines for voice, data, cross-connect, riser, and backbone fields”.

G. Pathway Labels and Labeling System
   1. Labeling system shall consist of a hand-held portable printer
   2. Conduits: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive. Label size shall be appropriate for the conduit size. Font size shall be legible from the finished floor.
   3. Inner duct: Polyethylene general-purpose tagging material attached using tie wraps.
   4. Junction boxes: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive, trade name. Font size shall be easily visible from the finished floor.
   5. All labels shall be permanent, i.e. will not fade, peel, or deteriorate due to environment or time.
   6. Identification
      a. All conduits, junction boxes, gutters, and pull boxes shall have machine-generated labels easily visible from the finished floor.
      b. Conduits shall be labeled with the word “communications” and the conduit’s origination room number and destination room number.
      c. The Contractor shall label conduit at each wall and floor penetration and at each conduit termination, such as outlet boxes, pull boxes, and junction boxes, or as otherwise specified in other sections.
      d. Junction boxes, gutters and pull boxes shall be labeled with identification name or number as determined by contractor and submitted for approval.
      e. The Contractor shall label conduit sleeves at each wall and floor penetration.

3.08 FIRESTOPPING

A. Provide approved fire-resistant materials to restore originally-designed fire-ratings to all wall, floor, and ceiling penetrations used in the distribution and installation for communications cabling system.

B. Install and seal penetrations (conduit, sleeves, slots, chases) in fire-rated barriers created for communications infrastructure to prevent the passage of smoke, fire, toxic gas, or water through the penetrations.

C. The firestopping material shall maintain/establish the fire-rated integrity of the wall/barrier that has been penetrated.

D. All through penetrations in a fire rated surface require a sleeve, regardless of penetration diameter or penetrating cable count.

E. Using a “ring and string” method of installing cabling for membrane penetrations in a wall cavity is acceptable, provided the solution was accepted by the Owner in writing. Code-compliant firestopping rules still apply.

F. Coordinate firestopping procedures and materials with General Contractor.

G. Sharing the pathway of other trades/utilities through compliant and non-compliant penetrations does not remove the requirement to maintain code-compliant firestopping.

H. Provide and install removable, intumescent mechanical systems in floor chases for all openings greater than 0’-4”.

I. Provide and install removable, intumescent, firestop bricks for all openings greater than 0’-4” where there are penetrations through walls.

J. Bricks shall be listed for insertion in fire-rated openings and require restraining materials or apparatus as needed per manufacturers’ specifications.

K. Provide manufacturer recommended material for rated protection for any given barrier.

L. Laminate and permanently affix adjacent to chases the following information:
   1. Manufacturer of firestop system.
   2. Date of installation/repair.
   3. Part and model numbers of system and all components.
   4. Name and phone numbers of local distributor and manufacturer’s corporate headquarters.

M. Solutions and shop drawings/submittals for firestop materials and systems shall be presented to the General Contractor for written approval of materials/systems prior to purchase and installation.

N. Materials shall be installed per manufacturer instructions, be UL-listed for intended use, and meet NEC and locals codes for fire stopping measures.

O. The material chosen shall be distinctively colored to be clearly distinguishable from other materials, adhere to itself, and maintain the characteristics for which it is designed to allow for the removal and/or addition of communication cables without the necessity of drilling holes in the material.

P. Develop training manuals with instructions on methods of adding or removing cabling to/from firestopped sleeves and chases.

Q. Within the normal environment, the installed systems shall not generate nor be susceptible to any harmful electromagnetic emission, radiation, or induction that degrades, or obstructs any equipment.

R. Expansion Capability: Unless otherwise indicated, provide spare conductor pairs in cables, positions in patch panels, cross connects, and terminal strips, and space in cable pathways and backboard layouts to accommodate 20% future increase in structure cable system capacity.

S. In the event of a breach of the representations and warranties contained herein, the Contractor, at their own expense, shall take all measures necessary to make the cabling system work and comply with the applicable manufacturer written technical recommendations and standards.

3.09 TESTING CABLING SYSTEM

A. Upon completion of the installation of the communications infrastructure systems, including all pathways and grounding, the Contractor shall test the system.
   1. Cables and termination modules shall be affixed, mounted or installed to the designed/specified permanent location prior to testing.
   2. Any removal and reinstallation of any component in a circuit, including faceplates, shall require retesting of that circuit and any other disturbed or affected circuits.
   3. Approved instruments, apparatus, services, and qualified personnel shall be utilized.
   4. The Contractor must verify that the requirements of the specifications are fully met through testing with an approved tester (rated for testing parameters listed elsewhere), and documentation as specified below.
   5. This includes confirmation of requirements by demonstration, testing and inspection. Demonstration shall be provided at final walk-through in soft copy and printed test data.

B. Non-Compliant Cabling
   1. Testing that shows some or all pairs of a cable do not comply with specifications, without written approval by the Owner, shall be replaced at Contractor's expense (including respective connectors).
   2. With the Owner's written approval, the over-length cable(s) shall be excluded from requirements to pass standardized tests and shall be explicitly identified.
      a. Testing is still required for non-compliant cabling.
      b. The tests shall be for wire-mapping, opens, cable-pair shorts, and shorts-to-ground.
      c. The test results must be within acceptable tolerances and shall be submitted with the Owner's acceptance document.

C. Failed Tests
   1. If tests fail, Contractor shall correct as required to produce a legitimate passing test.
   2. Manipulation of tester parameters on a failing test in order to achieve a passing test is unacceptable.
   3. If the Contractor is found to have manipulated or falsified any failing test result to show a "PASS" for any reason (without written notice and prior approval of the Owner), the Contractor shall be required to employ a Third-Party Testing Agent selected by the Owner to retest the complete cable plant and shall be required to pay all costs associated with this retesting.

D. Owner reserves the right to be present during any or all testing.

3.10 WALL MOUNTED EQUIPMENT

A. Install all wall mounted equipment in accordance with the National Electrical Code, industry standards and as shown on the drawings.

B. Unless noted otherwise, all wall mounted equipment that need to be accessed for operation or maintenance shall be mounted at a working height not requiring a ladder when wall space is available. Installation of these devices at greater elevations shall be approved by the Engineer. Contractor shall provide a coordination sketch of each mechanical/electrical room noting locations and mounting heights of all electrical devices(note bottom and top elevations) shown to be installed. Sketches shall be provided to the Engineer for review and the general contractor for coordination with other trades working in these rooms.

3.11 CLEANING

A. The Contractor will clean all surfaces of equipment and devices prior to final acceptance by Owner.

3.12 CORROSIVE AREAS

A. In areas of a corrosive nature, which include but are not limited to the following: pool equipment rooms, cooling towers and areas subject to salt air, etc., provide NEMA 4X stainless steel or fiberglass reinforced enclosures for contactors, panel boards, controllers, starters, disconnects and materials used as supporting means (i.e. plastibond unistrut, pipe, fittings). The use of spray on coating may be acceptable in some applications.

3.13 TESTS AND INSPECTIONS

A. Tests and inspection requirements shall be coordinated with Division I.

B. Date for final acceptance test shall be sufficiently in advance of completion date of contract to permit alterations or adjustments necessary to achieve proper functioning of equipment prior to contract completion date.

C. Conduct re-tests as directed by Architect on portions of work or equipment altered or adjusted as determined to be necessary by final acceptance test. No resultant delay or consumption of time as a result of such necessary re-test beyond contract completion date shall relieve Contractor of his responsibility under contract.

D. Put circuits and equipment into service under normal conditions, collectively and separately, as may be required to determine satisfactory operation. Demonstrate equipment to operate in accordance with requirements of these specifications. Perform tests in the presence of Architect. Furnish instruments and personnel required for tests.

E. Final Inspection:
   1. At the time designated by the Architect, the entire system shall be inspected by the Architect and Engineer. The contractor or his representative shall be present at this inspection.
   2. All devices, equipment, equipment cabinets and enclosure shall be cleaned and in operating condition.
   3. Certificates and documents required hereinbefore shall be in order and presented to the Architect prior to inspection.
   4. Panel covers, junction box covers, etc., shall be removed for visual inspection of the wire, bus bars, etc.
   5. After the inspection, any items which are noted as needing to be changed or corrected in order to comply with these specifications and the drawings shall be accomplished without delay.

3.14 ACCEPTANCE

A. Once all work has been completed, test documentation has been submitted, and Owner is satisfied that all work is in accordance with contract documents, the Owner shall notify Contractor in writing of formal acceptance of the system.

B. Contractor must warrant in writing that 100% of the installation meets the requirements specified herein (Standards Compliance & Test Requirements).

C. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100% PASS rating, and receipt of full documentation soft and hard copies as described herein.

END OF SECTION

SECTION 270543
UNDERGROUND DUCTS AND RACEWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes underground communications duct banks, hand-holes and maintenance holes

B. Related Sections
   1. Section 260200 - Electrical (including related sub-sections)
   2. Section 270200 - Basic Materials and Methods for Communications Systems
   3. Section 270526 - Grounding and Bonding for Communications Systems
   4. Section 270528 - Pathways for Communications Systems
   5. Section 271100 - Communications Room Fittings
   6. Section 271300 - Communications Backbone Cabling

1.02 REFERENCES

A. Refer to section 270200.

B. Conflicts
   1. Refer to section 270200.

C. Codes and Standards (Most recent editions or as required in contract)
   1. National Electrical Manufacturers Association (NEMA)
      a. RN1 Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Electrical metallic Tubing
      b. TC2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
      c. TC3 PVC Fittings for Use with Rigid PVC conduit and tubing
   2. Underwriters Laboratories (UL)
      a. UL 651 - Schedule 40 and 80 Rigid PVC conduit
      b. UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit
   3. ANSI/TIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces
   4. ANSI/TIA-758-A Customer-owned Outside Plant Telecommunications Standard.
   5. BICSI Telecommunications Distribution Methods Manual (TDMM)
   6. Standard for Riser Application for Optical Fiber Raceway
   7. BICSI Customer Owned Outside Plant (CO-OSP) Design Manual
   8. Local, county, state and federal regulations and codes in effect as of date of installation
   9. Equipment of foreign manufacture must meet U.S. codes and standards.
      a. It shall be indicated in the proposal the components that may be of foreign manufacture, if any, and the country of origin.
   10. IEEE C2, National Electrical Safety Code (NESC).

D. Related Documents
   1. Refer to section 270200.

1.03 SUBMITTALS

A. Refer to section 270200.

1.04 QUALITY ASSURANCE

A. Refer to section 270200, and IEEE C2.

B. Follow Annex B of National Electrical Code (NEC)

C. Items of the same classification shall be identical. This requirement includes equipment, assemblies, parts, and components.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver ducts to Project site with ends capped.
   1. Store nonmetallic ducts with supports to prevent bending, warping, and deforming

B. The contractor shall endeavor to make the site ready for installation of manholes when delivered so that they can be placed off of the truck into final position.
   1. When this is not possible, store precast concrete and other factory-fabricate underground utility structures as Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

C. Lift and support precast concrete units only at designated lifting or supporting points.

D. Clearly mark containers "For Communications Duct Banks Only".

E. Refer also to section 270200.

1.06 WARRANTY

A. Refer to IEEE C2.

B. Refer also to section 270200.

1.07 MAINTENANCE

A. Refer to IEEE C2.

B. Refer also to section 270200.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Ducts
   1. Use owner approved solution

B. Hand Holes
   1. Christy Concrete Products
   2. Cretex Concrete Products West, Inc.; Riverton Division
   3. Oldcastle Precast Group
   4. Oldcastle Precast Inc/; Utility Vault Division
   5. Utility Concrete Products, LLC
   6. Owner Approved equivalent

C. Maintenance (Man) Holes
   1. Christy Concrete Products
   2. Cretex Concrete Products West, Inc.; Riverton Division
   3. Oldcastle Precast Group
   4. Oldcastle Precast Inc/; Utility Vault Division
   5. Utility Concrete Products, LLC
   6. Owner Approved equivalent

2.02 MATERIALS

A. Continuous Tape for Underground Conduit
   1. The Contractor shall use orange warning ribbon, PVC tape (detectable, i.e., containing metallic tracings), three inches wide, permanently imprinted with "CAUTION--BURIED COMMUNICATIONS LINE BELOW" in black letters, minimum 0’-1” high.

B. Labeling
   1. Refer to section 270200.

C. Firestopping
   1. Refer to section 270200.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Where necessary, Contractor shall provide all excavation, boring, trenching, backfill and restoration of grounds for all OSP pathways.
   1. In addition, Contractor shall include all labor, materials, and equipment.

B. The owner of the property has the option to obtain a testing laboratory to ensure proper soil compaction.

C. All work shall comply with all city, county and State Codes, NEC, EIA/TIA, OSHA, and BICSI TDMM requirements, codes and standards.

D. The above referenced codes and standards are to be considered as a minimum requirement.
   1. If the plans or specifications call for material and/or methods of construction higher than the standard, the plans or specification shall govern.

E. All holes, trenches and/or any other excavation shall be covered, fenced, and/or taped off to make the area safe at all times.
   1. Conform to general Contractor requirements.

F. The Contractor will visit the job site prior to submitting a proposal to determine existing conditions.
   1. Contractor shall evaluate the site for materials, and any other information that may affect the work to be performed.

G. The Contractor shall locate and protect all existing conduits.
   1. Should damage occur notify the appropriate utility.
   2. Damage costs are the responsibility of the Contractor.

H. The Contractor shall CALL BEFORE YOU DIG, One Call Directory Telephone Numbers (Texas: 1-800-245-4545, 1-800-344-8377) to locate any existing conduits (Power, Gas, Telephone, and other utilities) prior to start of work.

I. Any proposed re-routing of all trenches/pole lines shall be reviewed and approved by the owner/consultant.

3.02 PREPARATION

A. Refer to Section 270200.

B. The Contractor shall verify materials are on-site in proper condition and of sufficient quantity.

C. The Contractor shall verify proper excavation depth (minimum 4’-0” below finished grade), width, route and support of work.
   1. Verify proper location of hand-holes and maintenance holes (minimum every 350’-0”).
   2. Communications facilities must be placed in separate hand-holes and maintenance holes from electrical facilities.

D. Trenches greater than or equal to 5’-0” deep shall:
   1. Be shored to prevent cave-in.
   2. Have 2’-0” clearance from the dirt pile.

E. Directional boring is a suitable option when trenching is impractical or impossible.
   1. Locating existing underground utilities is crucial when directional boring is planned because of the potential for the drilling unit to encounter high voltages.
   2. Although directional boring machines are manufactured with electrical strike sensing capabilities, which can warn the operator of any contact with a high voltage source, accidents may still occur.
   3. Operators of directional boring machines require special protection due to the potential for exposure to high voltage.
      a. Therefore, operators must always have a ground mat grid underfoot as insulation protection.
      b. In addition, operators must wear insulating boots and gloves, along with hard hats and safety glasses.

F. Minimum separation between electrical and communications underground cable (measured from conduit sidewall:
   1. Concrete: 0’-3”
   2. Masonry: 0’-4”
   3. Well-tamped earth: 1’-0”

G. Before encasement, the Contractor shall:
   1. Prove and verify all ducts are free of debris and properly installed in support and spacer system.
   2. Verify the system is properly fitted together and hold-down hardware is properly installed.
   3. Verify ducts are capped at both ends

3.03 INSTALLATION

A. Refer to section 270200.

B. Hand Holes
   1. Unless otherwise shown, Hand-holes shall be at least 4'-0" X 4'-0" and shall be constructed of 0'-2" thick cement covered with 0'-3/8" steel plate.
   2. The hand-hole or maintenance hole shall rest on a 0'-4" blanket of sand, and 0'-4" around the sidewalls shall be filled with sand.
   3. Each hand-hole or maintenance hole which contains a pedestal shall have four bollards installed 1'-6" (18") diagonally from each corner, with a cross member welded at 2'-6" (30") connecting the four corners.
      a. These barriers will be constructed of 0'-4" ridged conduit filled with concrete, driven 4'-0" in the ground and extending 3'-0" above the protective cover.
   4. All Hand-holes shall have a hasp and locking plate installed so they can be locked with padlock.

C. Maintenance (Man) Holes
   1. Precast concrete maintenance hole components shall be in accordance with ASTM C478/C478M.
   2. Maintenance hole components shall be designed for H-20 highway wheel loading and specific site conditions.
   3. Maintenance hole bases may be either precast or cast-in-place, as appropriate for the application, with a formed recess shaped to match the first precast shaft section.
      a. The maintenance hole base shall extend 0'-10" below the bottom of the lowest pipe and 0'-6" above the top of the largest pipe.
   4. Maintenance hole shafts shall be fabricated only from precast shaft sections, eccentric cone sections and grade rings.
   5. Precast maintenance holes shall utilize either an integrally cast embedded pipe connector, or a boot-type connector installed in a circular block out opening in accordance with ASTM C923/C923M.
      a. Connections to existing maintenance holes shall utilize a boot-type connector per ASTM C923/C923M installed in a cored opening.
      b. Cast-in-place bases shall incorporate a ring-type seal on the pipe to be imbedded in the concrete.

D. Concrete and Reinforcing Steel for Encasement
   1. Furnish products following Division 03, except strengths as follows:
      a. Compressive Strength: 2,500 psi at 28 days, class A
      b. Flexural Strength: 500 psi at 28 days
      c. Dye concrete encasement "orange" to identify communications conduit

E. The Contractor shall install conduit in excavations following drawings.
   1. If directional boring is utilized, cable or flexible conduits can be attached to the unit and pulled back to the origination point (after the drilling unit reaches its destination).

F. The Contractor shall install watertight penetrations through foundation, hand-hole and maintenance-hole walls.
   1. Wherever a hand-hole is used to simply pass through, the conduit entrances and exits will be situated at opposite ends of the hand-hole instead of 90° angles.

G. The Contractor shall assemble duct banks with non-magnetic saddles, spacers and separators.

1. Position separators for 0’-2” minimum concrete separation between outer surfaces of adjacent ducts, and:
   a. Make uniform required bends with a minimum 2’-0” radius for conduits less than 0’-3” diameter, and a minimum 4’-0” radius for conduits 0’-3” and larger.
   b. Maintain vertical or horizontal separations of 1’-0” of well-packed topsoil from any electrical service conduit run parallel to communications conduits.

H. Install concrete encasement fully surrounding reinforcing steel and ducts

I. Unless otherwise noted on the drawings, reinforce with longitudinal #5 steel bars placed at each corner and along each face at maximum parallel spacing of 1’-0” on center, and #5 tie-bars transversely placed at 1’-0” on center maximum longitudinal.
   1. Maintain maximum clearance of 0’-2” from bars to edge of forms and ducts.

J. For duct banks that are being installed for future use, extend rebar well past end of concrete for future tie-in to future concrete pour to ensure that both sections are firmly tied together to prevent slippage between the two pours.

K. Add orange colorants at mixing site at the rate of 10 lbs per cubic yard for voice and data cable.

L. Place concrete with minimum 0’-2” cover surrounding ducts and reinforcement.

M. Maintain ducts in proper place during concrete placement.

N. For duct banks that are being installed for future use, all conduits shall be extended minimum of 1’-0” past the end of the concrete and capped.

O. Transition from nonmetallic to metallic conduit where duct banks enter structures or turn upward for continuation above grade
   1. Where ducts enter structures such as hand-holes, maintenance holes, pull boxes, or buildings, terminate ducts in proper end bells, insulated L-bushings, Meyers hubs or couplings on steel conduits.
   2. Ducts shall be sealed to prevent water and debris from entering the building.

P. Extend below grade conduits to 0’-4” above the finished floor inside a building.
   1. Cover or temporarily seal open conduit ends to prevent water and other foreign matter from entering conduit.

Q. Tag conduits entering pull boxes with stamped stainless steel tags following cable and conduit schedule.

R. Backfill after concrete cures 24 hours.

S. The Contractor shall pull a 1’-0” long mandrel (0’-¼” smaller than duct diameter) through ducts.
   1. Pull a rag swab or sponge through to remove debris, until it shows clean.

T. Where fiber optic cables will be used and/or where indicated in the drawings, innerduct shall be provided.

U. The Contractor shall provide a metered pull tape in all underground conduits and innerduct:
   1. Pre-lubricated, woven polyester, low friction, and high abrasion resistant yarn.
   2. Minimum average tensile strength shall be 1,130 lbs for 0’-1.5” and smaller conduits and innerduct.
   3. Minimum average tensile strength shall be 1,800 lbs for conduits larger than 0’-1.5”.

3.04 CLEANING

A. Refer to section 270200.

END OF SECTION

SECTION 271500
COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.01 SUMMARY

A. This section of the horizontal cabling portion of a structured cabling system includes:
   1. UTP Copper cabling
   2. Termination and patch cables

B. Provide all horizontal cabling, terminating hardware, adapters, and cross-connecting hardware necessary to interconnect all system equipment including equipment located in communications rooms.

C. Related Sections
   1. Section 270200 - Basic Materials and Methods for Communications Systems
   2. Section 270526 - Grounding and Bonding for Communications Systems
   3. Section 270528 - Pathways for Communications Systems
   4. Section 271100 - Communications Room Fittings

1.02 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Conflicts
   1. Refer to section 270200.

D. Codes and Standards
   1. Refer to section 270200.

1.03 SUBMITTALS

A. Refer to sections 270200 and 271300.

1.04 QUALITY ASSURANCE

A. Refer to section 270200.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Refer to sections 270200 and 271300.

B. Storage temperature range: -40°F to 149°F (-40°C to 65°C)

1.06 PROJECT/SITE CONDITIONS

A. Refer to section 270200.

1.07 WARRANTY

A. Refer to section 270200.

1.08 MAINTENANCE AND SUPPORT

A. Refer to section 271300

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Labeling
   1. Refer to section 270200.

B. Firestopping
   1. Refer to section 270200.

2.02 ACCEPTABLE COPPER MANUFACTURERS

A. UTP Plenum Rated Cable Cat6 (blue)
   1. Berk-tek
   2. General Cable
   3. Owner approved alternate

B. Data/Voice Outlet Components Cat6
   1. Leviton
   2. Panduit
   3. Owner approved alternate

C. Patch Panels (24 or 48 port)
   1. Leviton
   2. Panduit
   3. Owner approved alternate

D. Copper Patch Cords Cat6 Pre-assembled
   1. Panduit
   2. Leviton
   3. Owner approved alternate

E. Wall and/or Rack Mount 110 Termination Blocks
   1. Panduit
   2. Leviton
   3. Owner approved alternate

F. Faceplate for wall-mount telephones
   1. Leviton 4108W-1SP
   2. Panduit KWP6
   3. Owner approved alternate

2.03 ACCESSORIES

A. Mount one laminated full-size hard copy in color of an as-built floor plan designating workstation locations, pathways, and communications room locations. Confirm hard copy size with Owner.

B. Provide clear plastic lamination serving each communication room.

C. Install the laminated drawings within a protective Plexiglas encasement on the wall of the servicing communications rooms. To ease accessibility the Plexiglas encasement shall be in either flip-down format or file folder format.

2.04 HORIZONTAL COPPER CABLING

A. Recognized cabling for providing the signal medium from the work area to the communications room shall include the following:
   1. Category 6 UTP cable

B. Category 6 UTP Cable Requirements
   1. 23/24 AWG solid bare copper.
   2. Cable jacket shall comply with NEC Article 800 for use as a plenum cable and shall be UL and c (UL) Listed Type CMP (communications multipurpose plenum).
   3. Cable shall terminate on an eight-pin modular jack at each outlet. All horizontal cabling shall meet or exceed the ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components.
   4. Cables shall be marked as UL verified with a minimum of Category 6 rating.
   5. The cable shall support Voice, Analog Base band Video/Audio, Fax, Modem, Switched-56, T-1, ISDN, RS-232, RS-422, RS-485, 10BASE-T Ethernet, Token Ring, 100Mbps TP-PMD, 100BASE-T Ethernet, 155 Mbps ATM, AES/EBU Digital Audio, 270 Mbps Digital Video, 622 Mbps 64-CAP ATM and emerging high-bandwidth applications, including 1 Gbps Ethernet, gigabit ATM, as well as all 77 channels (550 Mhz) of analog broadband

video.

6. The maximum horizontal cable tested length for Category 6 copper cable from the termination of the cable in the communications room to the outlet is 295'-0". It's contractor's responsibility to reroute as necessary to bring all cable runs within distance limit without additional cost to the project. Plan ahead and get approval or exception from Owner before pulling the cables that would ne over the distance limit.
7. Cable shall meet or exceed the following electrical characteristics:
    a. Cable shall be specified to 250 MHz. Cable shall meet the manufacturer's guaranteed electrical performance and physical specifications.

2.05 TERMINATION HARDWARE

A. Patch panels
    1. Patch panels shall be rated to match installed cable plant
    2. The wiring block shall accommodate #23 AWG cable conductors.
    3. All modular cross connect panels shall be UL-listed.

B. Work Area Outlet Cat6
    1. Universal eight-position jack pin/pair assignments
    2. Jack Color:
        a. Data: Blue (or approved alternate).

C. Work Area Outlet Faceplates:
    1. White or ivory to match electrical outlets.

2.06 PATCH CABLES

A. Verify exact quantities and lengths with Owner prior to purchase

B. Patch Cable requirements:
    1. Category 6, stranded UTP cable
    2. Standard modular non-keyed, 8-position 8-conductor plug
    3. 94V-0 rated
    4. UL listed
    5. Meets FCC Part 68

C. Provide 3'-0", 5'-0", 7'-0", and 10'-0" Patch Cords at the communications room for each installed port.
    1. Coordinate with Owner on the active equipment layout prior to purchase to ensure correct sizing of patch cords from patch panels to switching equipment.
    2. When connecting voice ports to a copper riser, provide a one-pair stranded 8P8C connector on one end and 110GS on the other end and shall be of appropriate length for application.

D. Provide a 10'-0" Station Cord for each work area outlet port.

E. Place each size/length patch cord in a separate container, and mark the containers that hold the patch cords with the length of patch cords contained within.

F. All cords shall conform to the requirements of ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard, Horizontal Cabling Section, and be part of the UL LAN Certification and Follow-up Program.

G. Cords shall be equipped with an eight-pin modular connector on each end, wired straight through and shall be of appropriate length for application.

H. All rated patch cords shall be round, and consist of #23 AWG copper, stranded conductors, tightly twisted into individual pairs.

I. Patch cords shall be made and warranted by the manufacturer of the cabling system installed in this project and shall meet or exceed patch cord specifications as outlined in TIA standards.

2.07 IDENTIFICATION (LABELING) SYSTEM

A. Refer to sections 270200 and 271300.

PART 3 - EXECUTION

3.01 EXAMINATION

3.02 PREPARATION

A. Refer to section 270200.

B. The Contractor shall check pathways, raceways, and other elements for compliance with space allocations, installation tolerances, debris, hazards to cable installation, and other conditions affecting installation prior to installation.

3.03 INSTALLATION REQUIREMENTS

A. Refer to section 270200.

B. All installation shall be done in conformance with ANSI/TIA-568-C standards, BICSI methods, industry standards and manufacturer`s installation guidelines.
   1. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities.
   2. Failure to follow the appropriate guidelines shall require the Contractor to provide in a timely fashion the additional material and labor necessary to properly rectify the situation.
   3. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

C. Install cable using techniques, practices, and methods that are consistent with specified data cabling and the installed components and that ensure specified performance levels of completed and linked signal paths, end to end.
   1. Pull cables in smooth and regular motions using methods that prevent cable kinking.
   2. Pull cables simultaneously if more than one is being installed in the same raceway/pathway.
   3. If necessary, use approved cable pulling lubricant
   4. Use fish tape, cable, rope, basket weave wire/cable grips, and other tools that will ensure no damage to the media or raceway.
   5. Install open cabling parallel and perpendicular to surfaces or structural members following surface contours where possible.
   6. Do not bend cable greater than a bend radius of 0’-1”.

D. Provide a 10’-0” service loop at the communications room and shall provide a 3’-0” service loop above the access ceiling or cable trays unless specified otherwise.
   1. All service loops shall be a minimum of 1’-6” (18”) in diameter and be accessible for maintenance.

E. Coordinate loop placement and orientation with the technology consultant.
   1. This allows for future changes or expansion without installing new cables.

F. Install cables in continuous “home run” lengths from work station outlet to specified patch panel.
   1. No intermediate punch down blocks or splices may be installed or utilized between the communications rooms and the workstation outlet without written Owner permission.

G. All cable must be handled with care during installation so as not to change performance specifications.
   1. Factory twists of each individual pair must be maintained up to the connection points at both ends of the cable.
   2. There shall never be more than 0’-1/2” of unsheathed cable at either the wiring closet or the workstation termination locations.

H. All cabling and associated hardware shall be placed so as to make efficient use of available space.
   1. All cabling and associated hardware shall be placed so as not to impair equipment`s efficient use of their full capacity.

3.04 CABLING METHODS

A. The Contractor shall provide cabling in accessible spaces, cable tray, (surface and/or enclosed raceway), conduits, and/or J-Hook cable support system.
   1. Within consoles, racks, cabinets, desks, and counters, in accessible ceilings spaces and in gypsum board partitions where open cable method may be used.
   2. Use UL or ETL listed plenum rated cable in all spaces.
   3. Provide all necessary installation materials, hardware, tools and equipment to perform insulation displacement type terminations at all data outlets, patch panels, and voice termination materials.

B. Conceal raceway and cabling except in unfinished spaces as is practical.

C. Exposed Cable
   1. All station cabling shall be installed inside walls or ceiling spaces whenever possible.
   2. Exposed station cable will only be run where indicated on the drawings and will only be allowed when no other options exist.
      a. Owner must approve all exceptions.

D. The Contractor shall utilize conduits/cable tray as indicated on the drawings.

E. All cabling placed above drop ceilings must be supported by cable tray, J-hooks, caddy bags or conduit.
   1. The Contractor shall permanently affix cable supports to the building structure or substrates and provide attachment hardware and anchors designed for the structure to which attached and are suitably sized to sustain the weight of the cables to be supported.
      a. Attaching cable to pipes or other mechanical items is not permitted.
      b. Cabling shall not be attached to ceiling grid wires.
   2. Multiple cables are to be dressed every 5’-0” to 7’-0”.
      a. Maximum cable sag between cable hooks is 3”-6”.

F. The Contractor shall route data and voice cables separately in a neat and orderly fashion.
   1. No cable ties or wraps shall be used to secure the cables in the runway outside of the communications rooms. Cable ties shall be rated for the environment.

G. Keep all items protected before and after installation with dust and moisture proof barrier materials/envelopes.

H. If wiring is terminated on patch panels, data, voice jacks prior to painting, carpet installation, and general finish clean up, these jacks shall be placed in a protective envelope to ensure dust, debris, moisture, and other foreign material do not settle onto jacks’ contacts.
   1. Envelope will be removed on final trim out after other trades have completed their finish work.
   2. It shall be the Contractor’s responsibility to ensure the integrity of these protective measures throughout the life/installation of the project.
      a. Cable bundles brought into the communications rooms shall be routed and dressed in such a manner that prior to termination the cables are not subject to damage and misuse such as installers walking on the bundles that are on the floor.
      b. Cable pulling force shall not exceed 25 lbs of pulling tension or cable manufacturer’s recommended pulling tensions.
      c. Do not leave cables on the floor unprotected or cable bundles hanging from the ceilings. Coil them up in a temporary manner and protect them from damage.

I. Communications room cables shall be combed and dressed in a manner as to prevent twists, “braiding” and crossed cables in the cable bundle from the communication room entrance to the termination point at the rear of the patch panel.
   1. Behind the patch panel, the cable bundle shall be attached to the rear cable support bar, and shall drop out each cable in a neat, cascading manner to prevent crossed and/or interwoven cables to each patch panel port termination point.
      a. Use Velcro wraps instead of cables ties for all bundling in the communications rooms.

b. Plastic/nylon tie-wraps are not allowed to permanently secure cables inside the communications room.

3.05 CABLING SEPARATION

A. Comply with TIA rules for separating unshielded copper communication and data-processing equipment cables from potential EMI sources, including electrical power lines and equipment.

B. Maintain a minimum spacing of 1’-6” (18”) from electrical feeders and/or branch circuit wiring including, but not limited to, light fixtures, sources of heat and EMI sources.

C. Maintain a minimum spacing of 1’-0” from auxiliary systems cabling.

D. Maintain a 1’-0” separation where cables must pass perpendicularly to electrical, plumbing, or other wiring, conduit, or piping systems.
   1. Use non-conduit bushings, if necessary to maintain separation, which allow for the addition of a reasonable number of cables in the future.

E. Maintain communications pathways away from electrical apparatus such as motor driven equipment and transformers, minimum separation distance of 10’-0” is recommended.

3.06 CABLING TERMINATION

A. Terminate cables in consistent consecutive order.

B. Terminate cables onto 8P8C modular patch panels without damaging twisted pairs or jacket.

C. Arrange cables on patch panels and voice termination hardware in ascending order of room numbers and outlet numbers within rooms.

D. Provide a 10’-0” service loop for horizontal cables at each rack in communications rooms.
   1. Locate loop at ceiling deck or on bottom of cable runway in minimum 1’-6” (18”) diameter.

E. Provide a 3’ service loop for horizontal cables at work area outlets. Locate service loop above or below data/voice outlet were vertical cable run transitions to horizontal run.

F. Maintain twists in cable pairs to within 0’-1/2” of termination.

G. Building Systems Cabling (BAS, FA, elevator line, etc)
   1. Coordinate exact placement and connectivity requirements with applicable trade prior to installation.
   2. Group all building systems cables in one group.
   3. Clearly label cable number and function, in the last positions on the horizontal cabling blocks in each communications room.

H. Limit cable-bending radius to 20X the cable diameter during installation, and 15X the cable diameter after installation.

I. Start numbering at the left of the main door to the room and continue in a clockwise direction around the room.
   1. The cables within the room will be terminated starting with the cables located to the left of the main door to the room and continue around the room in a clockwise direction.

3.07 TERMINATION HARDWARE

A. Station Hardware
   1. Flush mount jacks shall be mounted in a faceplate with back box.
   2. Outlets shall not be mounted on temporary, movable, or removable surfaces, doors, or access hatches without prior Owner approval.
   3. 8P8C Jack Pin Assignments for work area outlets shall match the T-568B wiring scheme.

B. Patch panels
   1. Copper cables shall be terminated in eight position/eight conductor (8P8C) modular patch panels.
   2. All Modular jack panels shall match the T-568B wiring scheme.

C. Work Area Outlet
   1. 8P8C non-keyed modular outlets for applications up to one Gbps and ANSI/TIA-568-C compliant for the specified transmission requirements

D. Work Area Outlet Faceplates:
   1. Furnish and install blank plates in all unused ports.

3.08 SPECIAL CIRCUITS

A. The Contractor shall coordinate with the Owner on the cable termination plan for special circuits, including cables to wireless access point locations, security, elevators, fire alarms, etc.

B. Wireless Access Points
   1. Install two (2) cable(s) from dedicated wireless patch panel(s) in communications room to outlets having 8P8C connectors within a BISCUIT box.
   2. Enclosures shall be NEMA rated for the environment to which they are exposed.
   3. 30’-0” of cable slack shall be coiled and hung on a “J”-hook at the enclosure location.

3.09 IDENTIFICATION AND LABELING

A. Labeling system shall consist of a hand-held portable printer and labels appropriate to the application. Handwritten labels are not acceptable.

B. Labelling scheme shall meet Owner’s IT cabling standard and industry standards and best practices. Submit labelling scheme for approval before work to start.

C. Fiber termination hardware (designation strip) shall have a 0’-3/4” x 0’-1/4” thermal transfer printable label with a permanent acrylic adhesive

D. All labels shall be permanent and shall not fade, peel, or deteriorate due to environment or time.

E. The Contractor shall provide a copy of the finalized plan in writing to the Owner representative and DBR for review and authorization to proceed.
   1. Coordinate with Owner for specifications on labeling of all hardware, cabling, and related equipment prior to any testing.

F. Labeling requirements:
   1. Label cable terminations on designation strips
   2. Label all cable at each terminating point.
   3. Label each port of the work area outlet.
   4. Cable identification numbers shall not be duplicated.
   5. Label patch panels in the communications rooms to match those on the corresponding voice and data outlets.
      a. The font shall be at least 0’-1/8” in height.
   6. Where a wireless access point is installed above an acoustical ceiling, label the ceiling grid frame below the access point, displaying the data port number and, if applicable, the access point identification number. Coordinate labeling of grid with Owner and Architect prior to application of labels.
   7. Label each distribution rack, block and other terminating equipment unit and field within that unit within 0’-4” from the block or patch panel termination. Keep labels in a neat and orderly lineup.
   8. Label each connector and each discrete unit of cable-terminating and connecting hardware within connector fields, in wiring closets and equipment rooms.
      a. Where similar jacks and plugs are used for both communication and data-processing equipment, use a different color for jacks and plugs of each service.
   9. Post the cable schedule in a prominent location in each wiring closet and equipment room. List incoming and outgoing cables and their designations, origins, and destinations.

G. Location and termination field description
   1. Room location
   2. Rack-mount or Wall mount
   3. Termination field type
      a. Specific patch panel ports versus a separate dedicated patch panel

H. Unique identifiers
   1. Segregation and position on equipment rack

2. Port color-coding
3. Unique labeling

I. Documentation
1. Provide electronic copy of final comprehensive schedules for project in software and format selected by Owner.
   a. All labels shall correspond to as-built drawings and to final test reports.
2. All cable inventory data documentation shall be submitted in format coordinated with and approved by Owner so that data can be incorporated into existing databases.
3. Documentation shall include cable identification number, source and destination, type of cable, length of cable and number of pairs or fibers.
4. Complete cross connect documentation is required.

3.10 FIELD QUALITY CONTROL

A. Refer to section 270200.

3.11 POST-INSTALLATION TESTING

A. Contractor shall test each pair or strand of every cable prior to acceptance. (100% PASS)

B. Contractor shall submit acceptance documentation as defined below. No cabling installation is considered complete until test results have been completed, submitted and approved.

C. Standards Compliance and Test Requirements:
1. Cabling shall meet ANSI/TIA-568-C.2 Category 6 Horizontal cabling requirements.

D. Attenuation, NEXT, PSNEXT, Return Loss, ELFEXT, and PSELFEXT data that indicate the worst case result, the frequency at which it occurs, the limit at that point, and the margin.
1. These tests shall be performed in a swept frequency manner from 1 MHz to highest relevant frequency, using a swept frequency interval that is consistent with TIA and ISO requirements.
2. Information shall be provided for all pairs or pair combinations and in both directions when required by the appropriate standards.
3. Length, propagation delay, and delay skew relative to the relevant limit.
   a. Length, propagation delay, and delay skew shall be tested relative to the relevant limit.
   b. Test shall also include mutual capacitance and characteristic impedance.
      1) Any individual test that fails the relevant performance specification shall be marked as a ‘FAIL”.

E. Cable Test Documentation:
1. Cable test documentation shall be submitted in hard copy and electronic formats.
   a. If proprietary software is used, disk or CD shall contain any necessary software application required to view test results.
   b. Electronic reports shall be accompanied by a Certificate signed by an authorized representative of the Contractor warranting the truth and accuracy of the electronic report.
   c. Certificate shall reference traceable circuit numbers that match the electronic record.
2. Each test record shall contain the cable ID as follows:
   a. “MEDIA TYPE – SOURCE ROOM – DESTINATION ROOM – STRAND/PAIR #”, e.g. MM-MC-HC23-001.
3. Test results saved within the field-test instrument shall be transferred into an accessible database utility that allows for the maintenance, inspection and archiving of the test records.
   a. These test records shall be uploaded to the PC unaltered, i.e., “as saved in the field-test instrument”.
   b. The file format, CSV (comma separated value), does not provide adequate protection of these records and shall not be used.
4. Test reports shall include the following information for each cabling element:

a. Wire map results that indicate that 100% of the cabling has been tested for shorts, opens, miss-wires, splits, polarity reversals, transpositions, presence of AC voltage and end-to-end connectivity.
b. Length, propagation delay, and delay skew relative to the relevant limit. Any individual test that fails the relevant performance specification shall be marked as a FAIL.
c. Cable manufacturer, cable model number/type, and NVP
d. Tester make & model, serial number, hardware version, and software version.
e. Cable ID and project name
f. Auto-test specification used
g. Overall pass/fail indication
h. Date of test

F. Cable Test Equipment
1. Contractor shall supply all of the required test equipment used to conduct acceptance tests.
2. Test equipment used under this contract shall be from manufacturers that have a minimum of 5 years experience in producing field test equipment. Manufacturers shall be ISO 9001 certified.
3. Testing equipment shall be UL-verified to meet Level III accuracy.
   a. The cable installers shall have a copy of this reference in their possession and be familiar with the contents.
4. Testing equipment shall be within the calibration period recommended by the manufacturer.
5. Testing equipment shall have the latest software and firmware installed.
6. Testing equipment of a given type shall be from the same manufacturer, and have compatible electronic results output.
7. Test adapter cables shall be approved by the manufacturer of the test equipment.
   a. Adapter cables from other sources are not acceptable.
   b. Adapter cables must be replaced after 1000 tests to ensure accuracy.
8. Test equipment must have a dynamic range of at least 100 dB to minimize measurement uncertainty.
9. Test equipment must be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
10. Test equipment must include S-Band time domain diagnostics for NEXT and return loss (TDNXT and TDRL) for accurate and efficient troubleshooting.
11. Test equipment must be capable of running individual NEXT, return loss, etc measurements in addition to auto tests. Individual tests increase productivity when diagnosing faults.
12. Test equipment must include a library of cable types, sorted by major manufacturer.
13. Test equipment must be able to internally group auto tests and cables in project folders for good records management.
    a. Test equipment must store at least 1000 auto tests in internal memory.
14. Test equipment must include DSP technology for support of advanced measurements.
15. Test equipment must make swept frequency measurements in compliance with TIA standards.
16. The measurement reference plane of the test equipment shall start immediately at the output of the test equipment interface connector.
17. There shall not be a time domain dead zone of any distance that excludes any part of the link from the measurement.
18. Acceptable testers:
    a. Fluke DTX CableAnalyzer
    b. Owner approved equivalent

3.12 CLEANING

A. Refer to section 270200.

3.13 ACCEPTANCE

A. Once all work has been completed, test documentation has been submitted and approved, and the Owner is satisfied that all work has been completed in accordance with contract documents, the Owner will notify Contractor in writing of formal acceptance of the system.

B. Contractor's RCDD shall warrant in writing that 100% of the installation meets the requirements specified herein.

C. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100% PASS rating, and submittal and approval of full documentation as described above. Tests with the "* PASS" (asterisk) will not be acceptable.

1. These circuits must be repaired to meet "PASS".

END OF SECTION

SECTION 272100
DATA COMMUNICATION NETWORK EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Provide the Local Area Network (LAN) active components and interfaces to support present and future communications systems requirements.

B. Provide wireless connectivity for all new construction and/or remodel.

1.02 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Related Work:
1. Section 270200 - Basic Materials and Methods for Communications Systems
2. Section 270526 - Grounding and Bonding for Communications Systems
3. Section 270528 - Pathways for Communications Systems
4. Section 271100 - Communications Room Fittings
5. Section 271300 - Communications Backbone Cabling
6. Section 271500 - Communications Horizontal Cabling

D. Conflicts.
1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

E. References:
1. National Electrical Manufacturers Association (NEMA)
2. American Society for Testing Materials (ASTM)
3. National Electric Code (NEC)
4. Institute of Electrical and Electronic Engineers (IEEE)
5. UL Testing Bulletin
6. American National Standards Institute (ANSI) X3T9.5 Requirements for UTP at 100 Mbps

1.03 DEFINITIONS

A. ANSI - American National Standards Institute

B. ATM - Asynchronous Transfer Mode

C. EIA - Electronics Industries Alliance

D. Gbps - Gigabits per second

E. IEEE - Institute of Electrical and Electronic Engineers

F. ISO - International Organization for Standardization

G. Mbps - Megabits Per Second

H. MIMO - Multiple-In and Multiple-Out

I. Multipath - The possible multiple routes of a single source of RF energy due to reflection, refraction, or diffraction.

J. NEC - National Electrical Code

K. NEMA - National Electrical Manufacturing Association

L. RF(Radio Frequency) - Signal generated by a radio transmitter and sent out through an antenna. The frequency of the transmission is described in terms of the number of cycles per

second or Hertz (Hz).

M. SFP - Small Form-Factor Pluggable Hot-pluggable transceiver used for both telecommunication and data communication applications. Comes in both copper and fiber.

N. SNMP - Simple Network Management Protocol

O. TIA - Telecommunications Industry Association

P. TR - Telecommunications Room

Q. UL - Underwriter's Labratories

R. VoIP - Voice over Internet Protocol

S. WAP - Wireless Application Protocol

T. WPA/WPA2 - WiFi Protected Access / WiFi Protected Access IEEE 802.11

1.04 DESIGN AND PERFORMANCE STANDARDS

A. Standards supported should include, but be not limited to, IEEE 802.3, 10BASET, IEEE 802.3u, 100BaseTX, 1000BaseFX, IEEE 802.11, IEEE 802.3ae-2002, Ethernet MIB (RFC 1643), SNMP MIB II (RFC 1213).

B. All designs must adhere to OWNER Cyber Security Standards.

1.05 SUBMITTALS

A. Qualifications: Demonstrate compliance with requirements of Paragraph 1.07.A.
   1. Submit Technical Implementation Plan in accordance with 2.06. C.
   2. Submit manufacturer's technical data for each product provided.

B. Submit technical and operations manuals. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed. Manuals shall include required maintenance to be performed.
   1. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed. Manuals shall include required maintenance to be performed.
   2. Manuals shall be suitable for the training of future personnel by the City, and for use as a reference by currently employed personnel in performing work assignments.

C. As-built documentation. Notes shall be kept during initial installation and shall be made a permanent part of the installation manual pages as required.

D. For each active device installed, provide a printed configuration including a printout of the device as displayed on the network management system. Printed configuration parameters for each port on the device shall accompany the written report.

E. Other information in support of the design, fabrication, and installation of the LAN system.

F. An implementation schedule listing dates for LAN equipment installations for approval by the City Engineer. The dates of LAN equipment installations shall be in accordance with dates for installation of the various special systems and users. It is incumbent upon the LAN implementers to include the dates for special system and user installs into the schedule.

G. Include spares list to be approved by OWNER IT Project Manager for approval.

1.06 CONTRACTOR'S DUTIES

A. Perform all work, coordination, systems integration, engineering design, and testing, and shall provide all products required in order to ensure a fully operative system and proper installation of equipment. System operability and proper installation shall be verified via completion of the acceptance test plan.

B. Coordinate all institution activities and details with the Owner Information Technology (OWNER IT) Representative. The OWNER IT Representative shall be responsible for approving the final configuration of all equipment supplied as part of this specification.

C. Provide all system documentation and submittals.

D. Provide warranty and maintenance support as specified.

E. Provide all calculations and/or analysis to support design and engineering decisions as specified in Submittals.

F. Provide and pay for all labor, materials, and equipment. Pay required sales, gross receipts, and other taxes.

G. Secure and pay for plan check fees, permits, fees, and licenses necessary for execution of Work as applicable for the project.

H. Give required notices.

I. Comply with all codes, ordinances, regulations, and other legal requirements of public authorities that bear on performance of Work.

1.07 QUALITY ASSURANCE

A. Contractor Qualifications:
   1. The contractor must be certified by the manufacturer of the products to be installed adhere to the engineering, installation and testing procedures, and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
   2. All members of the installation team must be certified by the manufacturer(s) as having completed the necessary training to complete their part of the installation.
   3. Contractor shall provide five references for projects of approved equivalent scope, type and complexity of work completed within the last five years.

B. Equipment and materials supplied for the LAN shall be a standard product of manufacturers regularly engaged in the manufacture and installation of information backbone technologies and shall be the manufacturer`s latest standard design. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components. Electrically powered equipment shall be UL approved. Electronic equipment shall meet the requirements of the FCC (Federal Communications Commission) Title CFR 47 Part 15.

C. All hardware, software, firmware, and/or operating system requirements given are the minimum requirements. The Contractor`s product shall meet or exceed these requirements. The product selected shall meet the operational, functional, and performance requirements specified herein. Additionally, due to the rapid advancement and antiquation of technology related products, the supplied product shall be the
   1. “contemporary technical equivalent” of that specified. “Contemporary technical equivalent” shall be based on a comparison of technology at the time of publication of specification to the technology at the time of the first product submittal. Final product
      a. approval is at the sole discretion of the City.

1.08 MAINTENANCE AND SUPPORT

A. Provide the manufacturer’s standard maintenance and support services for all hardware and software associated with this system at no additional charge for a period of not less than three years. It will be the responsibility of the OWNER IT Representative to provide the operational maintenance and support of the installed system. Coordination through the City Engineer and the OWNER IT Representative shall be required by the contractor to ensure that all documentation for the manufacturer’s maintenance and installation support programs are in place.

B. BAll lead technicians performing installation shall have a minimum of two years experience on the proposed system and be manufacturer certified on all hardware/software applications.

1.09 EXTENDED WARRANTY

A. Provide the manufacturer’s warranty for all equipment installed at no additional charge for a period of not less than three years. The warranty shall ensure that the installed
   1. equipment will conform to its description and any applicable specifications, and shall be of good quality for the known purpose for which it is intended. The warranty shall allow for replacement or repair at the discretion of the City Engineer and shall include all upgrades for firmware and/or operating systems.

B. Software License
   1. Required software licenses shall be identified and supplied by the Contractor. Licenses shall be "Site Licenses" which shall cover all equipment installed now or in the future.
   2. All software licenses and warranties shall be registered in the Owner designated name.

1.10 PROCUREMENT

A. Procure equipment specified in this document as dictated by the timeline in Appendix B in order to make sure that the technology is acquired in a timely fashion, but not outdated by the installation date.

B. Submit a copy of the Appendix B “Technology Implementation Schedule” as part of the equipment submittals required elsewhere in this document. The Contractor shall complete the columns headed “Quantity”, “Procurement Lead Time”, Start Date or Dependent”, and “Installation Duration.

C. The “Procurement Lead Time” shall be expressed in days or weeks and shall include time required for the contractor’s personnel to order and receive the material. Substantiation may be required.

D. “Start Date or Dependent” and “Installation Duration” should be an accurate estimate based upon known facts in the project. Substantiation may be required.

E. The Contractor shall not procure any materials requiring submittals until the City Engineer approves the submittal for that material and the Technology Implementation Schedule.

F. The Contractor shall not purchase any materials requiring submittals until the date established by the City Engineer as Purchasing Authorized Date. The Purchasing Authorized Date will be reflected in the “Purch Auth” Column of “Appendix B as part of the Submittal Review process.

PART 2 - PRODUCTS

2.01 EQUIPMENT MANUFACTURERS

A. LAN Equipment: Unless otherwise specified, furnish products manufactured by Cisco Systems. Substitutions for specified Cisco Systems components are NOT permitted.

B. Wireless Access Point: Aruba or submitted and approved equivalent.

C. Wireless Access Point Enclosure: American Access Technologies, Inc. or submitted and approved equivalent.

D. Cat 6 Media extenders Veracity Global or submitted and approved equivalent.

2.02 GENERAL LAN REQUIREMENTS

A. The LAN configuration shall be a hierarchical star utilizing centralized core switches that star out to individual edge level devices located throughout the premises in designated areas. Single Mode Fiber Optic Cable (provided in Section 271300) provides the connectivity between all devices. Each edge level device services the OWNER communications equipment (Administrative LAN workstations, building management stations, etc.) via UTP Copper Cabling.

B. All LAN equipment shall provide Internet Protocol (IP) switching across all types of network technologies and topologies, including Ethernet, Fast Ethernet and Gigabit Ethernet.

C. The LAN architecture shall be based on 10 Gbps between the two core networking switches located in the MDF and the edge level networking equipment located in the TR. In addition, the edge level equipment shall be dual homed to the separate core devices where applicable.

D. Each active device shall be accessible from a network, console or auxiliary RS-232 port. A configuration specialist shall be able to enter supervisory mode and change default configurations as appropriate for required operation of special system components.

E. Each active device shall be capable of generating Simple Network Management Protocol (SNMP) or SNMP3 alarms. The device shall be respondent to RMON inquiries from an expert level network management inquirer.

F. All network equipment shall be compliant to physical and operational parameters. The equipment shall be capable of responding to SNMP, SNMP3 and/or RMON network management program calls from the Network Management System.

G. Network equipment shall provide multimedia and multicast support through use of Protocol Independent Multicast (PIM), Internet Group Management Protocol (IGMP).

H. Network equipment shall support full-duplex connectivity on links (10Base-TX, 100Base-TX, 1000Base-TX, 100Base-F/TX, and 1000Base-FX).

I. All fiber interfaces on network switches must support Digital Optical Monitoring (DOM) feature.

J. All network equipment shall be Virtual Local Area Network (VLAN) compatible based on both port and MAC addresses. VLAN assignments shall be configurable from a centralized administrative console.

K. Network equipment shall not require re-configuration of end-station network interface cards or network interface card drivers to accommodate intra-VLAN and inter-VLAN traffic.

L. Network equipment shall support automated VLAN creation and administration capabilities.

M. Network equipment shall support port mirroring. This shall be done by sending frames directly from a specified port to another switch port or from an external network analyzer.

N. Network equipment for use in the main MDF and TRs shall belong to one family of product. The equipment must allow for common sparing of all Interface Processor Modules and all Supervisor Modules.

O. Network equipment shall support Terminal Access Controller Access Control System (TACACS), in order to provide secure port filtering. The equipment must enable individual ports to allow access only to certain workstations.

P. All active LAN devices shall include all software as required for interconnectivity. All active devices shall have fully functional network management options installed.

2.03 LAN HARDWARE REQUIREMENTS

A. All equipment shall be rack mountable in standard 19-inch racks. Contractor is responsible for providing fans, shelves, drawers, special power wiring, ground connections, and adapters of any kind necessary to accommodate the system installation, operation, testing, or maintenance. Contractor shall provide the appropriate factory or custom rack mount adapters for all equipment installed in the equipment rack, whether specifically itemized or not. Contractor shall cover unused slots using blank panels.

B. Fiber and Copper Patch Cords Adequately sized fiber and copper patch cords shall be provided for each installed port in the LAN under Section 271500, “Horizontal Media Infrastructure”

C. Core Networking Equipment
   1. The core layer networking equipment shall be located in the MDF as shown in the contract drawings.
   2. The chassis shall accommodate a minimum of nine (9) interface modules and provide connectivity to mixed network topologies. The use of a chassis is to support networking topologies without the use of external bridges or routers. The chassis shall have redundant power supplies, in the form of hot-swappable modules which can equally share the chassis power load. If one power supply fails the system shall notify the network manager and also provide a display on the front of the chassis. The chassis shall support quality of service through support of IP Precedence, Resource Reservation Protocol (RSVP), and 802.1p.
   3. The switch backplane shall provide a minimum of 1440 Gbps switching fabric on the network bus.
   4. The chassis shall include modules with a minimum of 24 Gigabit Ethernet (single mode fiber) ports to be connected to distribution layer switches in the Terminal MDFs.
   5. The chassis shall support:
      a. Redundant supervisor modules.
      b. Hot swappable line cards.

c. Layer 2 and Layer 3 IP switching.
d. Up to 240 10/100/1000 Ethernet ports.
e. Support broadcast suppression.
f. Support IGMP snooping and pruning.

6. The core switching equipment shall, at a minimum, a Cisco Catalyst 6509 with the following modules:
   a. Two Supervisor 1440 modules with integrated fabric, Mutlilayer Switching Feature Card 4 (MSFC4) and Policy Feature Card 4 (PFC4).
   b. Fabric-enabled Gigabit Ethernet module(s) with enough SFP ports to support the connectivity requirements for core to core and core to distribution switch uplinks. All SFP ports shall include Long Wavelength / Long Haul (1000Base LX/LH) SFPs (single-mode).
   c. Fabric-enabled, inline power 48-port 10/100/1000Base TX module(s) to provide connectivity for the Layer 3 switch ports.
   d. Network Analysis Module.
   e. Intrusion Detection Module.
   f. Firewall Services Module.
   g. Two 6000W AC power supplies.

D. Edge Level Equipment
1. The edge level networking equipment shall be located in the individual TR as shown in the contract drawings unless noted otherwise.
2. The devices shall provide a minimum of 10 Gbps switching fabric.
3. The device shall include a module(s) with the appropriate RJ45 Category 6 UTP 10/100/1000BaseTX ports to support the port requirements shown on the drawings. In addition, the device shall have the capability to “stack” with additional contract devices to increase the available port count.
4. The edge level devices shall have the capability to simultaneously accommodate a minimum of two Gigabit Ethernet uplinks and 24 10/100/1000 VoIP Ethernet ports.
5. The devices shall support the bonding and trunking of Fast Ethernet and Gigabit Ethernet ports.
6. The edge level switching equipment shall be Cisco Catalyst C9300-24U-E or submitted and owner-approved equivalent. Use 24 port switch if 16 ports or less are active. Upgrade to the 48 port switch (C9300-48U-E) if more than 16 ports are active. Switches must also come with network module C9300-NM-4G (4 x 1gb), single-mode SFPs, and three year term license (C9300DNA-E-24-3Y for 24 port and C930DNA-E-48-3Y for 48 port). Switches are to be ordered with the following power supply - PWR-C1-1100WAC 1100W AC power supply.
7. The edge level equipment for industrial environment applications shall be Cisco IE-3200-8P2S-E or submitted and owner-approved equivalent. The switch supports 8 POE/POE+ copper connections and 2 SFP ports for uplinks. Power supply to be provided is PWR-IE170W-PC-AC=.

2.04 OUTDOOR ACCESS POINTS

A. AP-270 series specifications
1. AP-275 and IAP-275
   a. 2.4-GHz and 5-GHz radios, each with 3x3 MIMO and three integrated omni-directional antennas
      1) AP-274 and IAP-274
   b. 2.4-GHz and 5-GHz radios, each with 3x3 MIMO and three combined, diplexed external antenna connectors

B. Wireless radio specifications
1. AP type: Outdoor, dual radio, 5-GHz 802.11ac and 2.4-GHz 802.11n
   a. In addition to 802.11n data rates, the 2.4-GHz radio supports 802.11ac 256- QAM modulation. This gives TurboQAMenabled clients a 33% boost to deliver up to 600 Mbps.

2. Supported frequency bands (country-specific restrictions apply):
    a. 2.4000 GHz to 2.4835 GHz
    b. 5.150 GHz to 5.250 GHz
    c. 5.250 GHz to 5.350 GHz
    d. 5.470 GHz to 5.725 GHz
    e. 5.725 GHz to 5.875 GHz
3. Available channels: Dependent upon configured regulatory domain
4. Dynamic frequency selection (DFS) optimizes the use of available RF spectrum
5. Supported radio technologies:
    a. 802.11b: Direct-sequence spread-spectrum (DSSS)
    b. 802.11a/g/n/ac: Orthogonal frequency-division multiplexing (OFDM)
    c. 802.11n/ac: 3x3 MIMO with up to three spatial streams
6. Supported modulation types:
    a. 802.11b: BPSK, QPSK, CCK
    b. 802.11a/g/n: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM (with Turbo QAM clients)
    c. 802.11ac: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM
7. Transmit power: Configurable in increments of 0.5 dBm
8. Maximum (aggregate, conducted total) transmit power (limited by local regulatory requirements):
    a. 2.4-GHz band: +28 dBm (23 dBm per chain)
    b. 5-GHz bands: +28 dBm (23 dBm per chain)
9. Advanced cellular coexistence (ACC) feature to minimize interference from cellular systems
10. Maximum ratio combining (MRC) for improved receiver performance
11. Cyclic delay diversity (CDD) for improved downlink RF performance
12. Short guard interval for 20-MHz, 40-MHz and 80-MHz channels
13. Space-time block coding (STBC) for increased range and improved reception
14. Low-density parity check (LDPC) for high-efficiency error correction and increased throughput
15. Explicit transmit beam-forming (TxBF) for increased reliability in signal delivery
16. Supported data rates (Mbps):
    a. 802.11b: 1, 2, 5.5, 11
    b. 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54
    c. 802.11n: 6.5 to 450 (MCS0 to MCS23, 1 to 3 spatial streams)
    d. 802.11ac: 6.5 to 1,300 (MCS0 to MCS9, 1 to 3 spatial streams)
17. 802.11n high-throughput (HT) support: HT 20/40
18. 802.11ac very high throughput (VHT) support: VHT 20/40/80
19. 802.11n/ac packet aggregation: A-MPDU, A-MSDU Power
20. Maximum power consumption: 23 watts
21. Direct AC source: 100-240-Volt AC
22. Power over Ethernet (PoE): 48 Vdc (nominal) 802.3at-compliant source

C. Antennas
1. AP-274: Six N-type female connectors for external antennas
2. AP-275: Six integrated omni-directional antennas for 3x3 MIMO with maximum antenna gain of 5 dBi in 2.4 GHz and 5 dBi in 5 GHz. Built-in antennas are optimized for horizontal mounted orientation of AP-275.

D. Other interfaces
1. One PoE+ PD port 10/100/1000BASE-T Ethernet network interface (RJ-45)
2. One port 10/100/1000BASE-T Ethernet network interface (RJ-45)
3. AC power interface, power cords sold separately
4. Serial console interface (micro USB)
5. Reset button
6. Visual indicator (LED):

a. Power/system status; automatically disabled after initial operation period

E. Mounting
1. Must be ordered separately
2. Optional mounting kits:
a. AP-270-MNT-V1: Aruba 270 series AP long mount kit for pole/wall mounting. Reduces impact of obstruction by pole or extends away from corner.
b. AP-270-MNT-V2: Aruba 270 series AP short mount kit for pole/wall mounting

F. Mechanical AP-274
1. Dimensions/weight (excluding mount):
a. 23 cm (W) x 24 cm (D) x 19 cm (H) with aesthetic cover
b. 9.0” (W) x 9 4” (D) 7 5” (H)
c. 2.7 kg/6 lbs
d. 23 cm (W) x 24 cm (D) x 14 cm (H) without aesthetic cover
e. 9.0” (W) x 9 4” (D) x 5 5” (H)
f. 2.4kg/5 3 lbs

G. Mechanical AP-275
1. Dimensions/weight (excluding mount):
a. 23 cm (W) x 24 cm (D) x 27 cm (H)
b. 9.0” (W) 9 4” (D) x 1 6” (H)
c. 2.4 kg/5 3 lbs

H. Environmental
1. Operating:
a. Temperature: -40° C to +65° C (-40° F to +150° F)
b. Humidity: 5% to 95% non-condensing
2. Storage and transportation:
a. Temperature: -40° C to +70° C (-40° F to +158° F)
3. Operating Altitude: 3000m
4. COwnersis Rating: IP66 and IP67
5. Wind Survivability: Up to 165 mph
6. Shock and Vibration: ETSI 300-19-2-4 spec T41.E 4M3

I. Regulatory
1. FCC/Industry of Canada
2. CE Marked
3. R&TTE Directive 1995/5/EC
4. Low Voltage Directive 72/23/EEC
5. EN 300 328
6. EN 301 489
7. EN 301 893
8. UL/IEC/EN 60950
9. EN 60601-1-1, EN60601-1-2

J. Regulatory Model Numbers
1. AP-274 and IAP-274: APEX0101
2. AP-275 and IAP-275: APEX0100

K. Certifications
1. CB Scheme Safety, cTUVus
2. UL2043 plenum rating
3. Wi-Fi Alliance certified 802.11a/b/g/n/ac

L. Warranty
1. Limited lifetime warranty

M. Minimum operating system software versions
1. ArubaOS 6.4

2. Aruba Instant 4.1

N. RF Performance Table

	Maximum transmit power (dbm) per transmit chain	Receiver sensitivity (dbm) per receive chain
802.11b 2.4 GHz		
1 Mbps	23.0	-92.0
2 Mbps	23.0	-92.0
5.5 Mbps	23.0	-90.0
11 Mbps	23.0	-88.0
802.11g 2.4 GHz and 802.11a 5 GHz		
6 Mbps	23.0	-88.0
54 Mbps	18.0	-75.0
802.11n HT20 2.4 GHz and 5 GHz		
MCS0/8	23.0	-88.0
MCS7/15	17.0	-71.0
802.11n HT40 2.4 GHz and 5 GHz		
MCS0/8	23.0	-85.0
MCS7/15	17.0	-68.0
802.11ac VHT20 5 GHz		
MCS0	23.0	-88.0
MCS9	16.0	-65.0
802.11ac VHT40 5 GHz		
MCS0	23.0	-85.0
MCS9	16.0	-62.0
802.11ac VHT80 5 GHz		
MCS0	23.0	-82.0
MCS9	16.0	-59.0

O. Enclosures
1. Wireless Access Points shall be installed in lockable, stainless steel Nema 4 Enclosure when mounted outdoors or in garage spaces.
2. Include back-plate, ground bus-bar, cable management, document holder, pole/wall mount adapters.
3. Provide 120VAC@15A quad receptacle with surge protection per drawings.
4. Enclosure shall be bonded to ground per NEC.
5. All conduit penetrations shall be made to prevent water ingress through the connections.
6. Enclosure size per drawings.

P. Lightning arrestors
1. AP-LAR-1 N-type male to N-type female in-line lightning surge arrestor (2GHz- 6GHz). (AP-274 ONLY).

Q. Installation materials
1. AINS2KKIT-00 Optional Weather proofing materials: Suggested for antenna end connections only. (AP-274 ONLY).

R. RF cables for non-direct mount of antenna (optional) (AP-274 ONLY).
1. AP-CBL-1 For remoting omnis or antennas with pigtails
2. ANT-CBL-1 1m Flexible Cable
3. ANT-CBL-2 2m Flexible Cable
4. AFC7DL03-01 3m Low loss cable. AP-LAR-1 recommended
5. AFC7DL04-01 4m Low loss cable. AP-LAR-1 recommended

S. Antenna for Radio 0 (5 GHz) (AP-274 ONLY)

1. ANT-3x3-5005 MIMO, Omni, 5 dBi, 5 GHz, Direct mount to cOwnersis or remoted with N male to N female cable (x3)
2. ANT-3x3-5010 MIMO, Omni, 10 dBi, 5 GHz, Direct mount to cOwnersis or remoted with N male to N female cable (x3)
3. ANT-2x2-5314 MIMO, Sector 30° x 30°, 14 dBi, 5 GHz, Requires N male to N male cables (x2)
4. ANT-3x3-5712 MIMO, Sector 70° x 25°, 12 dBi, 5 GHz, Requires N male to N male cables (x3)
5. ANT-3x3-D608 MIMO, Sector 60°, 2.4/5 GHz, Requires N male to N male cables (x3)
6. ANT-3x3-D905 MIMO, Sector 90°, 2.4/5 GHz, Requires N male to N male cables (x3)

T. Antenna for Radio 1 (2.4 GHz) (AP-274 ONLY)
1. ANT-3x3-2005 MIMO, Omni, 5 dBi, 2.4 GHz, Direct mount to cOwnersis or remoted with N male to N female cable (x3)
2. ANT-2x2-2314 MIMO, Sector 30° x 30°, 14 dBi, 2.4 GHz, Requires N male to N male cables (x2)
3. ANT-2x2-2714 MIMO, Sector 70°, 14 dBi, 2.4 GHz, Requires N male to N male cables (x2)
4. ANT-3x3-D608 MIMO, Sector 60°, 2.4/5 GHz. Requires N male to N male cables (x3)
5. ANT-3x3-D905 MIMO, Sector 90°, 2.4/5 GHz. Requires N male to N male cables (x3)

U. AP mount kit
1. AP-270-MNT-V1 Aruba 270 Series Access Point Long Mount Kit. Pole/Wall Mount for P-270 300 mm from vertical mounting asset.
2. AP-270-MNT-V2 Aruba 270 Series Access Point Short Mount Kit. Pole/Wall Mount for AP-270 75-mm from vertical mounting asset.

V. Ethernet Surge Protection Device (SPD)
1. Use in field for outdoor applications. Device shall be rated for outdoor use.
   a. Transtector 1101-935(Gigabit POE) No exceptions.
   b. Transtector ALPU-L130(Gigabit POE+) No exceptions.
   c. Transtector ALPU-F140(Gigabit POE++) No exceptions.

2.05 ETHERNET AND POE+ EXTENSION UNIT

A. The IT™ 828 Gigabite Ethernet and PoE+ Extension Unit.

2.06 POE+ POWER INJECTOR

A. Enable-IT 360 60W- 56VDC IEEE 802.3AT Gigabit PoE + Injector.

2.07 MOBILITY CONTROLLER

A. Aruba Model 7200 Series Mobility Controllers. Refer to drawings for Qty.

Model Number Aruba 7200 Controller	Number of Aps Supported
7240	2048

B. Front Panel
1. The front panel of the Aruba 7200 mobility controller contains the following components:
   a. Four 10GBase-X (SFP+) ports
   b. Two Dual-Media Ports
   c. LINK/ACT and Status LEDs
   d. Management/Status LED
   e. LCD Panel and Navigation Buttons
   f. Console Connections - RJ-45 and Mini-USB
   g. Expansion Slot (reserved for future use)

C. Physical
1. Device Dimensions (without mounting brackets) (HxWxD)
   a. All Models: 1.75” x 17.5” 17.5”
   b. All Models: 4.4 cm x 44.5 cm x 44.5 cm

2. Device Dimensions (without mounting brackets) (HxWxD)
   a. All Models: 1.75” x 17.5” 17.5”
   b. All Models: 4.4 cm x 44.5 cm x 44.5 cm
3. Device Weight (with one AC power supply installed)
   a. All Models: 16.43 lbs (7.45 kg)

D. Power Supply Specifications
1. 350W AC Power Supply
   a. AC Input Voltage: 100 VAC to 240 VAC
   b. AC Input Current: 5-2.5A
   c. AC Input Frequency: 50 - 60 Hz
   d. Weight: 2.8 lbs (1.3 kg)

E. Operating Specifications
1. Operating Temperature Range: 0°C to 40°C (32°F to 104°F)
2. Operating Humidity Range: 5% to 95% (RH), non-condensing

F. Package Checklist
1. Inform your supplier if there are any incorrect, missing, or damaged parts. If possible, retain the carton, including the original packing materials (see Table). Use these materials to repack and return the unit to the supplier if needed.

Item	Quantity
Aruba 720 Series Controller	1
Power Supply Unit - Installed	1
Fan Tray - Installed	1
Expansion Slot Cover - Installed	1
Black Panel over unpopulated PSU Intake - Installed	1
Rack Mounting Brackets	2
M6 x 15mm Rack Mounting Screws	4
M4 x 6mm Rack Mounting Bracket Screws	8
USB Console Cable	1
Power Cable	1
Aruba 7200 Series Installation Guide (Printed)	1
End User License Agreement (Printed)	1
Aruba Document Pointer (Printed)	1

2.08 CLEARPASS POLICY MANAGER

A. ClearPass Policy Manager-5000. Refer to drawings for Qty.
1. Aruba ClearPass Policy Manager 5K hardware platform supporting a maximum of 5,000 authenticated devices.
2. Appliance Specifications:
   a. CPU - (1) Quad Core Xeon
   b. Memory - 8 GB
3. Hard drive storage:
   a. (2”) SATA (7.2K RPM) 500GB hard drives, RAID -1 controller
4. Appliance Scalability:
   a. Maximum devices - 5,000
5. Form Factor:
   a. Dimensions (17.53" W x 1.7" H x 16.8" D) -
   b. Weight (max config) - 18 Lbs
6. Power:
   a. Power consumption (maximum) - 250 watts max
   b. Power supply - Single

c. AC input voltage - 110/220 VAC auto-selecting
d. AC input frequency - 50/60 Hz auto-selecting

2.09 LAN PERFORMANCE REQUIREMENTS

A. The wired system shall perform as designed providing a minimum of 10/100/1000 Mbps to each end user device and 1Gbps from edge switch to core switch on the backbone

2.10 TELEPHONE SYSTEM HARDWARE REQUIREMENTS

A. Courtesy Telephones
1. Courtesy Telephone stations shall be class of service restricted to internal calls only, i.e. no local, collect, long distance toll (1+), toll free, (800, 888, 877, 866), operator assisted (0,0+), or directory assistance (411, 555-1212, etc.) calls shall be allowed.
2. Each Courtesy Telephone shall be capable of dialing 9+911 for an emergency and have the capacity to dial six-digit internal directory numbers (DN).
3. Each Courtesy Telephone shall transmit its DN to internal called parties.
4. Each Courtesy Telephone shall have a call party name display (CPND) associated with its DN.
5. Each Courtesy Telephone shall be manufactured by CEECO:
   a. Model SSW-321-F-ACHW-PBVC-C
   b. CALL RESTRICT Stainless steel wall telephone, chrome tone dial, MCRK-2 P.C. Lexan board, 32” armored cord, WHITE handset, pushbutton volume control and confidence. CAC 6.00 software.
   c. 301-037 Security tool - 5/32” #9020 BLUE. Required for installation.
   d. pmccreary@ceeco.netCEEC Contactpmccreary@ceeco.net1-888-357-0798
6. Courtesy Phone Stainless Steel Backboards
   a. “COURTESY PHONE” Letters 1 ¼” Height Helvetica Medium engraved and painted black
   b. Distributed by Volume Millwork Inc.
   c. Part#: 10-SPTELLETTE
   d. Description: Courtesy Tellette
   e. Contact: Edwin Chatoor (713) 538-1451 - robin@vmillwork.com
   f. Must be lockable using key (contractor to request in writing from OWNER Technology what key the lock shall be keyed to)

2.11 CAT 6 MEDIA EXTENDER

A. Manufactured by Veracity Global
1. ModelOutreach Max XT
   a. POE/POE + compatible
   b. IP 66 rating
   c. Can be wall mounted but preferred method is inside of aNEMA enclosure
   d. RJ45 connectors

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install components in accordance with contract drawings, manufacturer’s instructions and approved submittal data.

B. System installation and construction methods shall conform to the requirements of the Federal Communications Commission.

C. The Contractor shall install all system components including furnished equipment, and appurtenances in accordance with the manufacturer`s instructions, and adjustments required for a complete and operable system.

D. Grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

E. The OWNER IT Representative shall perform final configuration of the network equipment. This includes, but is not limited to: VLAN configuration, IP addressing schemas, final port

assignments, and trunking/bonding configurations. Installation contractor shall ensure that the proper documentation is provided to assist in the final system configuration.

F. The Contractor shall coordinate with the cabling contractor with the installation if the iPatch/imVision crossconnect panel to create a true cross-connect per iPatch/imVision standards.

3.02 PRODUCT HANDLING

A. The Contractor shall be responsible for any and all loss or damage in the shipment and delivery of all material until transfer of title to the City.

3.03 HARDWARE INSTALLATION

A. The Contractor shall obtain written permission from the City Engineer before proceeding with any work which requires cutting into or through any part of the building structures such as, but not limited to, girders, beams, concrete, carpeted or tiled floors, partitions or ceilings. The Contractor shall also consult with the City Engineer before cutting into or through any part of the building structures where fireproofing or moisture proofing could be impaired.

B. The Contractor shall take all steps necessary to ensure that all public areas remain clear or are properly marked during installation or maintenance.

C. The Contractor shall develop a detailed network map to be utilized as a road map during the implementation of the LAN. This map shall show all segments, all interconnects between segments and all active network devices. This network map shall not include the individual nodes interconnected to each concentrator, but will have the modules, interfaces, protocols, addresses and other identifying features for each concentrator and other active device.

D. The Contractor shall also develop a Cable Plant interconnectivity chart showing all fiber patch panels and individual identifiers for each fiber associated with the interconnectivity of each network device.

E. Prior to installing Wireless Access Points, conduct and document an RF site survey to determine the maximum operating range between an AP (fixed location) and mobile stations for a specified transmit power level. Survey shall also identify holes of coverage due to multi-path, interference sources, and interference from other wireless installations.

F. The contractor shall place materials only in those locations that have been previously approved. The City Engineer shall approve any other locations, in writing.

3.04 SYSTEM STARTUP

A. The Contractor shall not apply power to the system until after:
   1. System and components have been installed and inspected in accordance with the manufacturer`s installation instructions.
   2. A visual inspection of the system components Owner been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
   3. System wiring Owner been tested and verified as correctly connected as indicated.
   4. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
   5. The City Engineer and the OWNER IT Representative have approved the installation.

B. Satisfaction of the above requirements shall not relieve the contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as a result of contractor’s deficient work/defective equipment.

3.05 ACCEPTANCE TESTING

A. The contractor shall develop and execute an onsite acceptance-testing program.

B. The plan shall address all requirements identified in this specification and test all contractor supplied cabling and hardware components. The plan shall follow accepted industry testing practices and have a method of independent verification described.

C. Any specified item that does not satisfy the requirements of this specification shall be replaced, upgraded, or added by the contractor as necessary to correct the noted deficiencies. After correction of a noted deficiency, re-testing shall be performed to verify the effectiveness of the corrective action.

3.06 IDENTIFIERS, LABELS AND LABELING SYSTEM

A. All Identification and Labeling shall follow Specification: 270553 Identification and Labeling of Communication Infrastructure. Any deviation from the specification must be approved by OWNER IT prior to installation.

3.07 APPENDIX A

A. LAN Equipment Schedule (EXAMPLE)

Item	Qty
COMM ROOM 11611	
WS-C3650-24PS	3
GLC-LH-SMD 1000BASE - LX/LH "long haul" SFP Single- mode	6
COMM ROOM 11715	
WS-C3650-24PS	1
GLC-LH-SMD 1000BASE- LX/LH "long haul" SFP Single- mode	2
COMM ROOM 11908	
WS-C3650-24PS	2
GLC-LH-SMD 1000BASE- LX/LH "long haul" SFP Single- mode	4
COMM ROOM 12015	
WS-C3650-24PS	1
GLC-LH-SMD 1000BASE- LX/LH "long haul" SFP Single- mode	2
COMM ROOM 11812	
WS-C3650-24PS	2
GLC-LH-SMD 1000BASE- LX/LH "long haul" SFP Single- mode	4
COMM ROOM 12606	
WS-C3650-24PS	3
GLC-LH-SMD 1000BASE- LX/LH "long haul" SFP Single- mode	6
MDF	
WS-X6848-SFP-2T (for 6509)	4

GLC-LH-SMD 1000BASE-LX/LH "long haul" SFP Single- mode	36
WS-X6824-SFP-2T (for 6509)	2

3.08 APPENDIX B

A. TECHNOLOGY IMPLEMENTATION SCHEDULE (EXAMPLE)

	(from Designer)		(Contractor Submittal)				(Subm	
	Product Description	Spec. Ref.	Qty.	Procurement Lead Time	Start Date or Dependent	Installation Duration	Submittal Approved	Purch.
1	WS-C3650-24PS	2.04.D						
2	GLC-LH-SMD 1000BASE-LX/LH "long haul" SFP Single-mode	2.04.D						
3	WS-X6824-SFP-2T (for 6509)	2.04.C						
4	General Workstation	2.04.G						
5	Network Printer	2.04.H						
6	Cisco Wireless Access Point	2.04.I						
7	Wireless Access Point Enclosure	2.04.J						
8	Cisco 16-port 10 Gigabit Ethernet Copper Module with DFC4 WS-X6816-10T-2T	2.04.E						
9	Cisco 48-port SFP fiber Gigabit Ethernet Module with DFC4 WS-X6848-SFP-2T	2.04.E						

10	Cisco Gigabit Ethernet Module WSX6848-GE-TX	2.04.E						
11	Cisco IOS® Software	2.04.E						
12	Release 15.05Y or higher	2.04.E						

END OF SECTION

SECTION 31 00 00 EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Division 03 Section 30 00 “Structural Cast-In-Place Concrete” for encasings, cradles, and appurtenances for utility systems.

C. Division 31 Section 10 00 “Site Clearing” for site stripping, grubbing, topsoil removal and tree protection.

D. Division 31 Section 22 13 “Rough Grading” for grading and rough contour site.

E. Division 31 Section 23 16 “Excavation” for building foundations.

F. Division 31 Section 23 23 “Backfill” to sub-grade elevations.

G. Division 31 Section 23 33 “Trenching and Backfilling”

1.2 SUMMARY

A. Contractor shall furnish all labor, materials, equipment and incidentals as shown, specified and necessary to complete the work of site preparation, erosion control, surface drainage, subsurface drainage, ground water control, construction of compacted fills, excavation, installation and removal of sheeting and bracing, backfilling and final site grading, including underfloor areas.

B. Contractor shall provide all backfill materials, including select backfill, crushed stone, backfill, clay, granular embedment, topsoil, porous granular fill and the satisfactory disposal of surplus and unacceptable materials.

C. No classification of excavated materials will be made. Excavation includes all materials regardless of type, character, composition, moisture, or condition thereof.

D. Contractor shall perform all earthwork, including backfilling all demolition areas.

1.3 DEFINITIONS

A. Excavation: Consists of the removal of material encountered to sub-grade elevations and the reuse or disposal of materials removed.

B. Sub-grade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.

D. Sub-base Course: The layer placed between the sub-grade and base course in a paving system or the layer placed between the sub-grade and surface of a pavement or walk.

E. Flexible Base Course: The layer placed between the sub-base and surface pavement in a paving system.

F. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water.

G. Unauthorized Excavation: Consists of removing materials beyond indicated sub-grade elevations or dimensions without direction by the Project Architect/Engineer. Unauthorized excavation, as well as remedial work directed by the Architect/Engineer, shall be at the Contractor's expense.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

I. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.4 COORDINATION

A. The Contractor shall expedite placement of compacted fills and embankments as per the Project Schedule.

1.5 PROJECT CONDITIONS

A. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active. All existing underground utilities within the areas of buildings must be removed.

1.6 SOURCES OF MATERIALS

A. Fill materials for backfill and site grading may be obtained from on-site excavation work and/or obtained by the Contractor from off-site sources at Contractor's expense.

B. Select backfill (Flexible Base) materials shall be obtained by the Contractor from off-site sources at Contractor's expense.

C. Topsoil, except for topsoil stripped from the new work areas that meets the specific requirements for this material, shall be obtained by the Contractor from off-site sources at Contractor's expense. Reference Landscape plans.

D. Granular embedment materials shall be obtained by the Contractor from off-site sources at Contractor's expense.

E. Crushed stone fill materials shall be obtained by the Contractor from off-site sources at Contractor's expense.

F. Porous granular fill shall be obtained by the Contractor from off-site sources at Contractor's expense.

G. Pit run sand shall be obtained by the Contractor from off-site sources at Contractor's own expense.

H. Clay materials for backfill shall be obtained from on-site excavation work and/or obtained by the Contractor from offsite sources at Contractor's expense.

1.7 QUALITY ASSURANCE

A. Owner will employ a Testing Laboratory to perform Soil Testing and Inspection Service for quality control testing during grading and excavation operations.

1.8 TESTING SERVICES

A. The testing of products: Testing for moisture content during placement and compaction of fill materials, and of compaction requirements for compliance with technical requirements of the Specifications shall be performed by the testing laboratory as designated in Section 01 45 29 Testing Laboratory Services.

B. Testing Agency shall:

1. Test the Contractor's proposed materials in the laboratory and/or field for compliance with the Specifications.
2. Perform field moisture content and density tests to assure that the specified compaction of backfill materials has been obtained.
3. Report all test results to the Owner, Project Architect/Engineer and the Contractor.

C. Authority and Duties of Testing Agency: Technicians representing the testing laboratory shall inspect the materials in the field and perform tests, and shall report their findings to the Owner, Project Architect/Engineer and the Contractor. When the materials furnished or Work performed fails to fulfill Specifications requirements, the technician will direct the attention of the Owner, Project Architect/Engineer and the Contractor to such failure.

D. Technicians representing the Testing Agency: Shall not act as foreman or perform other duties for the Contractor. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Project Architect/Engineer for final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or release any requirements of the Specifications, nor to approve or accept any portion of the Work.

E. Responsibilities and Duties of the Contractor: The use of testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the Drawings and Specifications.

1. Contractor shall secure and deliver to the testing agency, without cost, preliminary representative samples of the materials he proposes to use and which are required to be tested.
2. Contractor shall furnish such casual labor as is necessary to obtain and handle samples at the Project or at other sources of material.
3. Contractor shall advise the Owner and the Testing Agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

1.9 REFERENCE STANDARDS: The Contractor shall comply with applicable provisions and recommendations of the following:

A. ASTM A 36, Structural Steel.

B. ASTM A 328, Steel Sheet Piling.

C. ASTM D 422, Particle-Size Analysis of Soils.

D. ASTM D 423, Liquid Limit of Soils.

E. ASTM D 427, Shrinkage Factors of Soils.

F. ASTM D 698 Moisture-Density Relations of Soils, using 5.5 lb Rammer and 12-in drop.

G. ASTM D 1140, Amount of Material in Soils Finer than the No. 200 Sieve.

H. ASTM D 1556, Density of Soil in Place by the Sand-Cone Method.

I. ASTM D 1557, Moisture-Density Relations of Soils, using 10.0 lb (4.5 kg) Rammer and 18- in. Drop.

J. ASTM D 2166, Unconfined Compressive Strength of Cohesive Soil.

1.10 SUBMITTALS

A. Should sheet and shoring be necessary, the Contractor shall prepare Drawings for the following: Sheeting and bracing for excavations over 5 feet deep. The Drawings shall be

prepared by a Professional Engineer licensed in the State of Texas. The Drawings shall be submitted to the Project Architect/Engineer for establishing that the terms of the Specifications are complied with. Calculations shall not be submitted. Drawing submissions will not be checked and will not imply approval by the Project Architect/Engineer of the Work involved. The Contractor shall be wholly responsible for designing, installing and operating whatever system is necessary to accomplish satisfactory sheeting, bracing, dewatering, and protection.

B. Test Reports: Testing Laboratory shall submit copies of the following reports directly to the Owner, Project Architect/Engineer and Contractor:
   1. Pavement sub-grade.
   2. Field density tests.
   3. Optimum moisture - maximum density curve for each soil used for backfill.
   4. Tests of actual unconfined compressive strength or bearing test of each strata.

C. Samples of all select backfill, backfill, flowable fill, clay, drainage material, granular embedment, porous granular fill, pit run sand and topsoil shall be submitted by the Contractor to the testing laboratory. Samples of the proposed material shall be submitted at least fourteen days in advance of its anticipated use.

1.11 SITE CONDITIONS

A. Geotechnical Information: A Geotechnical Investigation has been performed for the Owner by others. This report is available for review by Bidders. The Owner makes no warranty or representation as to the accuracy of said report. Bidders are encouraged to perform their own tests and draw their own conclusions from those tests before submitting bids. Owner is not responsible for Bidders' conclusions which result from the Geotechnical information found in the Owner's report.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill and Fill Materials:
   1. Materials acceptable for use as backfill or fill shall be materials obtained from excavations on site or from off-site sources whose gradation shows not more than 15 percent passing the No. 200 standard sieve as determined by ASTM D 1140, and whose Plasticity Index is not in excess of 20 percent as determined by ASTM D 424. The material shall contain no vegetative matter.
   2. All material for use as backfill and fill shall be tested by the testing laboratory and approved by the Project Architect/Engineer.

B. Select Backfill (Flexible Base - Base Material):
   1. Select backfill for compaction backfill shall conform to the 2014 Texas Department of Transportation Standard Specifications Items 247 gradation Type A, Grades 1 or 2 as follows:

Sieve Size	Percent Retained on Sieve
2 – ½” inch	0
1 – ¾” inch	0-10
No. 4	45 - 75
No. 40	60 - 85

   2. The select backfill mixture shall contain no clay lumps or organic matter. The fraction passing No. 40 sieve shall have a liquid limit not greater than 40 and a

plasticity index between 7 and 15 as determined by ASTM D 424. The select backfill shall be deposited in uniform layers not exceeding 8 inches in uncompacted thickness. The backfill shall be compacted by a suitable vibratory roller or platform vibrator to not less than 95 percent of laboratory maximum density as determined by ASTM D 1557, unless otherwise noted on plans.

C. Granular embedment material shall be crushed rock or pea gravel with not less than 95 percent passing a ½-inch sieve and not less than 95 percent retained on a No. 4 sieve.

D. Crushed stone shall be crushed rock conforming to the following gradation:

Sieve Size	Percent Retained on Sieve
3 inch	0
2-1/2 inch	0 -10%
2 inch	30 - 65%
1-1/2 inch	85 - 100%
3/4 inch	95 - 100%

E. Porous Granular Fill:

1. Porous granular fill for compaction backfill shall conform to the following:

Sieve Size	Percent Retained on Sieve
1-3/4 inch	0% - 10%
No. 4	45% - 75%
No. 40	60% - 85%
No. 200	90% - 100%

2. The porous granular fill material shall contain no clay lumps or organic matter. The fraction passing the No. 40 sieve shall be non-plastic. The porous granular fill shall be deposited in uniform layers not to exceed 6 inches in uncompacted thickness. The backfill shall be compacted to not less than 100% of the laboratory maximum density as determined by ASTM D-1557.
3. All material for porous granular fill must be tested by the testing laboratory and approved by the Project Architect/Engineer.
4. No porous granular fill shall be placed without the Project Architect/Engineer's approval.

F. Pit Run Sand:

1. Pit run sand for compaction backfill for use as shown conform to the following:

Sieve Size	Percent Retained on Sieve
No. 4	0
No. 200	90 - 100%

2. Pit run sand material shall contain no organic material. The maximum plastic limit of the material shall be less than 10. The pit run sand shall be deposited in uniform layers not to exceed 8 inches in uncompacted thickness. The backfill shall be compacted to not less than 95% of laboratory maximum density as determined by ASTM-D-698.
3. All material for pit run sand must be tested by the testing laboratory and approved by the Project Architect/Engineer.

4. No pit run sand shall be placed without the approval of the Project Architect/Engineer.

G. Clay

1. Material for use as clay liner over top of backfill and/or select backfill or as otherwise shown shall conform to the following:

Sieve Size	Percent Retained on Sieve
No. 4	0 - 15%
No. 200	30 - 100%

2. The minimum plastic limit shall be 25. Clay shall be deposited in uniform layers not to exceed 8 inches in uncompacted thickness. The clay shall be compacted to not less than 95% of maximum density as determined by ASTM D- 698.
3. All material for clay must be tested by the testing laboratory and approved by the Project Architect/Engineer.
4. No clay shall be placed without the approval of the Project Architect/Engineer.

H. Drainage Material:

1. Drainage material for use as shown on the Drawings shall conform to the following:

Sieve Size	Percent Retained on Sieve
2 inch	0%
1-1/2 inch	0 - 10%
1 inch	45 - 75%
3/4 inch	90 - 100%
½ inch	95 - 100%

2. The drainage material shall be crushed rock. The drainage material shall be compacted by two passes of a hand activated vibratory compactor. The material shall have a LA abrasion number of 35 or less.
3. All drainage material must be tested by the testing laboratory and approved by the Project Architect/Engineer.
4. No drainage material shall be placed without the Project Architect/Engineer approval.

I. Accessories:

1. Detectable Warning Tape: Acid-and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, six (6) inches wide and four (4) mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 2'-6" deep. Detectable Warning Tape to be used on all PVC piping except perforated subsurface piping.
   a) Tape Colors: Provide tape colors to utilities as follows:
      (1) Red: Electric.
      (2) Yellow: Gas, oil, steam, and dangerous materials.
      (3) Orange: Telephone and other communications.
      (4) Blue: Water systems.
      (5) Green: Sewer systems.
      (6) Brown: Force mains

2. Filter Fabric: Manufacturer's standard nonwoven pervious geotextile fabric of polypropylene, nylon or polyester fibers, or a combination.
3. Provide Filter Fabrics: That meet or exceed the listed minimum physical properties determined according to ASTM D 4759 and the referenced standard test method in parentheses:
   a) Grab Ensile Strength (ASTM D 4632): 100 lb.
   b) Apparent Opening Size (ASTM D 4751): #100 U.S. Standard Sieve.
   c) Permeability (ASTM D 4491): 150 gallons per minute per sq. ft.

PART 3 - EXECUTION

3.1 SITE PREPARATION

A. The portions of the site on which the Work is to be constructed shall be cleared of all objectionable materials and debris (see Section 31 10 00, Site Clearing). Trees within the project limits except those indicated in Drawings to remain shall be completely removed, including stumps and roots. All materials and debris shall be disposed off site in accordance with applicable regulations.

3.2 STRIPPING AND STORING OF TOPSOIL

A. Those portions of the site on which the new Work is to be constructed shall be stripped of all topsoil to a minimum depth of 6 inches prior to other earthwork operations. Stripped materials shall not be used for compacted fill.

B. The stripped topsoil shall be stockpiled at the place or places approved by the Project Architect/Engineer.

C. Topsoil to be suitable for re-use shall meet the requirements for topsoil described by Landscape Architect/Engineer above, and shall be free from trash, debris, and surface vegetation.

D. After all of the other Work has been completed in each area, topsoil shall be placed and graded in accordance with the Grading Plan and as specified in the Landscape Drawings and Specifications.

3.3 EROSION CONTROL AND DEWATERING

A. In general, the construction procedures outlined herein shall be implemented to ensure minimum damage to the environment during construction.

B. Whenever possible, access and temporary roads shall be located and constructed to avoid environmental damage. Provisions will be made to regulate drainage, avoid erosion and minimize damage to vegetation.

C. Where areas must be cleared for storage of materials or temporary structures, provisions shall be made for regulating drainage and controlling erosion, subject to Project Architect/Engineer approval.

D. Temporary measures shall be applied to control erosion and to minimize the siltation of the project site and adjacent property. Such measures shall include, but not be limited to, the use of silt fences, berms, baled straw silt barriers, gravel or crushed stone, mulch, grasses, slope drains and other methods. These temporary measures shall be applied to erodible materials exposed by any activities associated with the construction of this Project.

1. Special care shall be taken to eliminate depressions that could serve as mosquito pools.
2. Temporary measures shall be coordinated with the construction of permanent drainage facilities and other Work to the extent practicable to assure economical, effective, and continuous erosion and siltation control.
3. Contractor shall provide special care in areas with steep slopes. Disturbance of vegetation shall be kept to a minimum to maintain stability.

E. Remove only those trees, shrubs and grasses indicated in the Drawings as such. Protect the rest to preserve their aesthetic and erosion-control values.

F. Install erosion and sediment control practices according to soil conservation district standards and specifications. The practices shall be maintained in effective working condition during construction and until the drainage area has been permanently stabilized.

G. In the event of any temporary work stoppage, the Contractor shall take steps to prevent any temporary or permanent environmental damage to the area undergoing construction.

H. In the event the Contractor fails to satisfactorily control erosion and siltation, the Owner reserves the right to employ outside assistance or to use its own forces to provide the corrective measures indicated. The cost of such Work, plus engineering costs, will be deducted from monies due the Contractor.

I. Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein is inspected by the Project Architect/Engineer and backfill operations have been completed and approved.

1. The different working areas on the site shall be kept free of surface water at all times. The Contractor shall install drainage ditches and dikes and shall perform all pumping and other work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations and fill areas. The diversion and removal of surface water shall be performed in a manner that will prevent the accumulation of water behind temporary structures or at any other locations within the construction area where it may be detrimental.
2. The Contractor will be held responsible for the condition of any pipe, conduit or channel which he may use for drainage purposes and all such pipes, conduits or channels shall be left clean and free of sediment.

J. Refer to Article 3.18 of this Section for the TPDES General Permit requirements.

3.4 EXCAVATION

A. Contractor shall excavate and backfill in advance of the construction, test pits to determine conditions or location of the existing utilities. Contractor shall perform all Work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling and replacing pavement for the test pits.

B. Contractor shall be responsible for the definite location of each existing utility involved within the area of his excavation for Work under this Contract. Care shall be exercised during such location work to avoid damaging and/or disrupting the affected utility. The Contractor shall be responsible for repairing, at his expense, damage to any structure, piping or utility caused by his Work.

C. Explosives will not be permitted on this project.

D. Contractor and/or Contractor's independently retained employee or structural design/geotechnical/safety/equipment consultant, if any, shall review the Drawings and any available geotechnical information and the anticipated installation site(s) within the project Work area in order to develop the Contractor's plans to implement the project described in the Contract Documents. The Contractor's plans shall provide for adequate trench safety systems that comply with, as a minimum, OSHA standards for trench excavations. Specifically, Contractor and/or Contractor's independently retained employee or safety consultant shall develop and implement a trench safety program in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation. Contractor shall be required to provide an on-site representative to insure compliance and review of the trench safety program. Contractor shall be required throughout the construction process to insure that the appropriate safety system(s) is utilized for the soil condition encountered during the construction of the project.

E. Sheeting and shoring shall be provided as necessary for the protection of the Work and for the safety of personnel. The clearances and types of the temporary structures, insofar as they affect the character of the finished work, will be subject to the approval of the Project Architect/Engineer, but the Contractor shall be responsible for the adequacy of all sheeting, bracing, cofferdamming, etc. No separate payment is to be made for providing or removing steel or wood sheet piling; payment shall be considered as having been included in the price bid for the Contract. All shoring, bracing and sheeting shall be removed as the excavations are backfilled and in a manner such as to prevent injurious caving; or, if so directed by the Project Architect/Engineer, because in his opinion, removal would be damaging to structures or personnel, shall be left in place. Sheeting left in place shall be cut off 3 feet below the surface. Payment for sheeting left in place shall be considered as having been included in the Contract Price. All sheeting and bracing must be maintained until replaced by other sheeting and bracing or until the permanent construction is able to withstand lateral pressures from soil and water. Remove sheeting and bracing from excavations unless otherwise ordered in writing by the Project Architect/Engineer. Removal shall be done so as to not cause injury to the Work. Removal shall be equal on both sides of excavations to ensure no unequal loads on pipe or structure. Defer removal of sheeting and bracing, where removal may cause soil to come into contact with concrete until the following conditions are satisfied:

1. Concrete has cured a minimum of 7 days.
2. Wall and floor framing up to and including grade level floors are in place.

F. Excavation of every description and of whatever substances encountered within the grading limits of the Project shall be performed to the lines and grades indicated on the Drawings. All excavation shall be performed in the manner and sequence as required for the Work.

1. Excavation Work shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards. Excavations shall provide adequate working space and clearances for the Work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.
2. Slope sides of open excavations to a slope of two horizontal to one vertical.
3. Subgrades for parking areas and trench bottoms shall be firm, dense, and thoroughly compacted to a 95% maximum density. The finished elevation or

stabilized subgrades shall not be above subgrade elevations shown on the Drawings.

4. Exposed soil after excavations have been made shall be protected against detrimental damage and change in condition from physical disturbance and rain. Wherever possible, concrete footings shall be done the same day the excavation is made. If this is not done, the footing excavations shall be properly protected.

G. All excavated materials that meet the requirements for backfill shall be stockpiled within the site (but not less than 25 feet from the surface borders of any excavation) for use as backfill, or for providing final site grades. All excavated materials which are not considered suitable for fill, and any surplus or excavated material which is not required for fill shall be disposed of off the site by the Contractor. Upon completion of the Work all on-site waste and disposal areas shall be cleaned and the debris removed from the site.

1. Materials deposited off the site shall be transported and placed in accordance with all applicable rules and regulations of all authorities having jurisdiction thereof. No surplus or unacceptable excavated materials of any kind shall be deposited in any stream or water course or dumped on public property. The different Work areas on the site shall be kept free of surface water at all times.

3.5 EXCAVATIONS FOR STRUCTURES

A. Excavations for the construction of structures and foundations shall be carefully made to the depths indicated or required. Bottoms for footings, slabs, and grade beams shall be level, clean and clear of loose material, the lower sections to be true to size. Footings slab and grade beam bottoms shall be approved by the Project Architect/Engineer before any concrete is placed thereon.

B. When the excavation has reached the design subgrade, the exposed subgrade shall be proof rolled. Proof rolling operation shall be inspected by the Project Engineer. Any soft or unconsolidated zones or area detected by proof rolling operations shall be undercut as directed by the Project Engineer. The undercut subgrade shall be scarified to a minimum depth of 6-inches and compacted to a minimum of 95% of the maximum density as determined by ASTM-D-698. After the undercut subgrade has been scarified and compacted the undercut shall be backfilled with select backfill to the design subgrade elevation in accordance with these specifications. The final subgrade shall be inspected and approved by the Project Engineer.

C. In excavations for structures, where, in the opinion of the Project Architect/Engineer, the ground, not affected by high water level, is spongy or otherwise unsuitable for the contemplated foundation, the Contractor will be required to remove such unsuitable earth and replace it with suitable material properly compacted.

D. Excavations for structures which have been carried below the depths indicated shall be refilled to the proper grade with select backfill material properly compacted, in accordance with these Specifications.

E. All pavement structure excavations shall be hand-trimmed to permit the placing of full widths, and subsurface drainage piping. Rounded and undercut edges will not be permitted.

F. Excavation shall be extended a minimum of two feet on each side of structures, footings, etc., unless otherwise indicated on the Drawings.

3.6 DRIVEWAY ENTRANCE DRIVE EXCAVATIONS

A. Excavation shall consist of excavation for the Driveway entrance drive in conformity with the lines, grades, cross sections, and dimensions shown on the Drawings and shall include the excavation of all unsuitable material from the subgrade.

B. The subgrade shall be compacted to 95% maximum dry density at optimum moisture.

3.7 TRENCH EXCAVATIONS

A. Trenches shall be excavated to a width which will provide adequate working space and clearances for proper pipe installation, jointing, and embedment, and subsurface drainage installation:

1. Where pipe elevations are not shown on the Drawings, trenches shall be excavated to a depth sufficient to provide a minimum cover over the top of the pipe of 4 feet.

B. Except where otherwise required, pipe trenches shall be excavated 6 inches below the underside of the pipe to provide for the installation of granular embedment pipe foundation material.

C. Where in earth, trench bottoms for 6 inch or smaller pipe may be excavated below the pipe subgrade and granular embedment material provided as specified or the trench bottom may be graded to provide uniform and continuous support (between bell holes or end joints) or the installed pipe.

D. Over-depths in trench excavation shall be backfilled with select backfill material properly compacted. Whenever unsuitable material that is incapable of properly supporting the pipe is encountered in the undercut required for bedding material, the unsuitable material shall be removed to the depth required and the trench backfilled to the proper grade with select backfill material properly compacted.

E. Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

F. Where existing piping cross the new pipeline trench excavation, they shall be adequately supported and protected from damage due to construction. All methods for supporting and maintaining these facilities shall be subject to approval by the Project Architect/Engineer. Care shall be taken to insure that the existing pipeline grades and alignment are maintained and that the pipe joints are not disturbed. Backfill shall be carefully placed and tamped to prevent damage or future settlement. Any damage or misalignment of the existing piping due to construction or settlement shall be repaired by the Contractor at his expense. Where sanitary sewer lines cross potable water lines, encase sewer line in concrete. Reference Utility drawings for locations.

3.8 TRENCH AND EXCAVATION SAFETY PROGRAM

A. Contractor shall provide trench excavation protection.

B. Trench excavation protection shall be accomplished as required by the provisions of CFR 29, Part 19261, Subpart P - Excavations, Trenching and Shoring of the Occupational Safety and Health Administration Standards and Interpretations.

C. Contractor shall submit a trenching plan, which has been approved and sealed by a professional engineer registered in the State of Texas, to Project Architect/Engineer prior to commencing construction.

D. The trenching plan submitted by Contractor shall, as a minimum, comply with the requirements of the OSHA Safety and Health Standards.

E. It is the sole duty, responsibility and prerogative of the Contractor, not the Owner, Engineer, or Project Architect/Engineer to determine the specific applicability of the designed trench safety systems to each field condition and to make inspections of the trench safety systems.
   1. The Contractor shall maintain a permanent record of inspections.

F. The Contractor shall protect persons from injury at excavations, by barricades, warnings and illumination. Any work within the Public Right-of-Way shall comply to the latest revisions and requirements of the Texas Manual on Uniform Traffic Control Devices.

G. Contractor shall coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.

H. Prior to commencing excavation, Contractor shall give written notice to emergency medical service (EMS) stating location and nature of work. Contractor shall post phone number of emergency medical service near phone at each site.

I. See Sections 01 50 00 and 31 23 33 for additional trenching requirements.

3.9 UNAUTHORIZED EXCAVATION

A. All excavation outside the lines and grades shown, and which is not approved by the Project Architect/Engineer, together with the removal and disposal of the associated material shall be at the Contractor's expense. The unauthorized excavation shall be filled and compacted with approved backfill by the Contractor at his expense.

3.10 PLACEMENT OF FILL AND BACKFILL

A. All select backfill and backfill required for structures, trenches and site demolition backfill required to provide the finishes grades shown and as described herein shall be furnished, placed and compacted by the Contractor.

B. Backfill excavations as promptly as Work permits, but not until completion of the following:
   1. Acceptance by the Project Architect/Engineer of construction below finish grade.
   2. Inspection, testing, approval, and recording of locations of underground piping.
   3. Removal of concrete formwork.
   4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
   5. Removal of trash and debris.

C. Fill containing organic materials or other unacceptable material shall be removed and replaced with approved fill material.

3.11 PLACEMENT OF SELECT BACKFILL, BACKFILL, AND FILL

A. Select backfill shall be placed to the grades shown on the Drawings. The lift thickness and compaction moisture content range given herein are approximate. These values will be determined from the laboratory test results on the fill materials. Every lift of fill material shall be tested unless the Project Architect/Engineer determines that less quality control testing is acceptable.

B. All select backfill shall be placed in horizontal loose lifts not exceeding 8 inches in thickness and shall be mixed and spread in a manner assuring uniform lift thickness after placing. Each lift shall be compacted by not less than two complete coverages of the specified compactor. Select backfill shall be placed to the underside of all compactor.

Select backfill shall be placed to the underside of all concrete slabs. The maximum slope of select backfill to the subgrade shall be one vertical to one horizontal.

C. Backfill and fill around and outside of structures and over select backfill shall be deposited in layers not to exceed 8 inches in uncompacted thickness and mechanically compacted, using platform type tampers. Compaction of structure backfilled by rolling will be permitted provided the desired compaction is obtained and damage to the structure is prevented. Compaction of select backfill and/or backfill by inundation with water will not be permitted. All materials shall be deposited as specified herein and shown on the Drawings.

D. The material shall be placed at a moisture content that falls in the range of laboratory optimum moisture content of minus two (-2) to plus three (+3) percentage points. It shall be compacted to a density as determined by ASTM D 1557 at 95% to the maximum laboratory dry density for that material. The contractor shall provide equipment capable of adding measured amounts of water to the backfill and/or select backfill material to bring it to a condition within the range of the required moisture content. The Contractor shall provide equipment capable of disking, aerating, and mixing the soil to insure reasonable uniformity of moisture content throughout the fill material and to reduce the moisture content of the borrow material by air drying if necessary. If the subgrade or lift of earth material must be moisture conditioned before compaction, the fill material shall be sufficiently mixed or worked on the subgrade to insure uniform moisture content throughout the lift of material to be compacted. Materials at moisture content in excess for the specified limit shall be dried by aeration or stockpiled for drying. The moisture content shall be maintained as described above until the fill is permanently covered.

E. No backfill or fill material shall be placed when free water is standing on the surface of the area where the fill is to be placed. No compaction of fill will be permitted with free water on any portion of the fill to be compacted. No fill shall be placed or compacted in a frozen condition or on top of frozen material. Any fill containing organic materials or other unacceptable material previously described shall be removed and replaced with approved fill material prior to compaction.

F. Each lift of compacted material shall be compacted by the designated number of coverages of all portions of the surface of each lift by a smooth-drum vibratory roller for granular material having a static weight not less than 5,500 pounds, a sheepsfoot roller for cohesive material exerting a pressure of 250 psi on the surface of the feet, or equivalent equipment approved by the Project Engineer prior to commencement of the Work. One coverage is defined as the condition obtained when all portions of the surface of the fill material have been subjected to the direct contact of the compactor. The compactor shall be operated at a forward speed not exceeding 40 feet per minute.

G. Compaction shall be performed with equipment suitable for the type of fill material being placed. The Contractor shall select equipment which is capable of providing the minimum density required by these Specifications. The gross weight of compacting equipment shall not exceed 7,000 pounds within a distance of ten feet from the wall of any completed structure. Equipment shall be provided that is capable of compacting in restricted areas next to structures and around piping. The effectiveness of the equipment selected by the Contractor shall be tested at the commencement of compacted fill Work by construction of a small section of fill within the area where fill is to be placed. If tests on this Section of fill show that the specified compaction is not obtained, the Contractor

shall increase the amount of coverages, decrease the lift thickness or obtain a different type of compactor.

H. Levels of backfill against concrete walls shall not differ by more than 2 feet on either side of walls unless walls are adequately braced or all floor framing is in place up to and including grade level slabs. Particular care shall be taken to compact structure backfill which will be beneath pipes, roads, or other surface construction or structures. In addition, wherever a trench passes through structure backfill, the structure backfill shall be placed and compacted to an elevation 12 inches above the top of the pipe before the trench is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.

I. The compaction requirements specified are predicated on the use of normal materials and compaction equipment. In order to establish criteria for the placement of a controlled fill so that it will have compressibility and strength characteristics compatible with the proposed structural loadings, a series of laboratory compaction and/or compressive strength tests will be performed on the samples of materials submitted by the Contractor. From the results of the laboratory tests, the final values of the required percent compaction, the acceptable compaction moisture content range, and the maximum permissible lift thickness will be established for the fill material and construction equipment proposed.

3.12 BACKFILL IN PIPE TRENCHES

A. Pipeline trenches may be backfilled prior to pressure testing, but no structure shall be constructed over any pipeline until it has been tested.

B. All pipe larger than 6 inches in diameter shall be placed on granular embedment material. Pipe 6 inches in diameter and smaller shall be placed in granular embedment material unless the trench bottom has been graded to provide uniform and continuous support of the installed pipe.

C. Embedment materials both below and above the bottom of the pipe, classes of embedment to be used, and placement and compaction of embedment materials shall conform to the following requirements:

1. Granular embedment shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It will be permissible to slightly disturb the finished subgrade surface by withdrawal of pipe slings or other lifting tackle. After each pipe has been graded, aligned, and placed in final position on the bedding material, and shoved home, sufficient pipe embedment material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and alignment during subsequent pipe jointing and embedment operations. Embedment material shall be deposited and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement.
2. Compacted backfill will be required for the full depth of the trench above the granular pipe embedment material. Where the trench for one pipe passes beneath the trench for another pipe or electrical ductbank, for the lower trench shall be compacted to the level of the bottom of the upper trench.
3. Each layer of embedment material shall be compacted by at least two complete coverages of all portions of the surface of each lift using approved compaction equipment. One coverage is defined as the conditions reached when all portions

of the fill lift have been subjected to the direct contact of the compacting surface of the compactor.

4. The method for compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.
5. The degree of compaction required for granular embedment is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D-1557.

3.13 BACKFILL IN ELECTRICAL DUCTBANK TRENCHES

A. Compacted backfill will be required for the full depth of the trench above the electrical ductbank. Where the trench for one ductbank passes beneath the trench for another pipe or ductbank select backfill shall be placed to the level of the bottom of the upper trench.

B. Placement and compaction of backfill in electrical ductbank trenches shall conform to the requirements of these Specifications.

C. The electrical ductbank shall be placed in sand envelopes shown on the Drawings.

3.14 COMPACTION DENSITY REQUIREMENTS

A. The degree of compaction required for all types of fills and exposed subgrades shall be as listed below. Material shall be moistened or aerated as necessary to provide the moisture content that will facilitate obtaining the specified compaction.

Material	ASTM	Required Density	Lift Thickness
Exposed Subgrade Crawl In Underfloor Space	D698	90%	6 inches
Select Backfill (Playground/ Non-use Open Areas)	D698	90%	6 inches
Select Backfill Below Parking Areas	D1557	95%	6 inches
Moisture Conditioned Subgrade	D698	95%	8 inches
Backfill/Around Structures	D698	95%	8 inches
All Other Backfill	D698	95%	8 inches
Backfill/Flexible Base	D1557	95%	8 inches
Backfill/Pipe Trenches	D698	95%	12 inches
Backfill/Electrical	D698	95%	
Porous Granular Fill	D698	95%	6 inches
Porous Granular Embedment/Pipe Trenches	D698	95%	8 inches
Pit Run Sand around Utility Trenches	D698	95%	8 inches
Clay	D698	90%	8 inches

The testing laboratory shall perform tests necessary to provide data for selection of fill material and control of placement water content.

C. Field density tests to insure that the specified density is being obtained will be performed by testing laboratory during each day of compaction work. Number of test shall be approved by Project Architect/Engineer.

D. If the tests indicate unsatisfactory compaction, the Contractor shall provide the additional compaction necessary to obtain the specified degree of compaction. All additional compaction work shall be performed by the Contractor at no additional cost to the Owner until the specified compaction is obtained. This Work shall include complete removal of unacceptable (as determined by the Project Architect/Engineer) fill areas and replacement and recompaction until acceptable fill is provided.

3.15 CRUSHED STONE PLACEMENT

A. Crushed stone shall be placed where shown on the Contract Drawings.

3.16 SHEETING, SHORING AND BRACING

A. Excavations for structures and pipe lines shall be open excavation, sheeted, shored and braced where necessary to prevent injury to workmen, structures, or pipe lines.

B. All municipal, county, state and federal ordinances, codes, regulations and laws shall be observed.

C. Used material shall be in good condition, not damaged or excessively pitted. All steel or wood sheeting designated to remain in place shall be new. New or used sheeting may be used for temporary work.

D. All timber used for breast boards (lagging) shall be new or used, meeting the requirements for Douglas Fir Dense Construction grade or Southern Pine No. 2 Dense S3.

E. All steel work for sheeting, shoring, bracing, cofferdams etc., shall be designed in accordance with the provisions of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", of the AISC except that field welding will be permitted.

F. Steel sheet piling shall be manufactured from steel conforming to ASTM A 328. Steel for soldier piles, wales and braces shall be new or used and shall conform to ASTM A 36.

G. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

H. Unless otherwise shown, specified, or ordered, all materials used for temporary construction shall be removed when work is completed. Such removal shall be made in a manner not injurious to the structure or its appearance or to adjacent Work.

3.17 SHEETING LEFT IN PLACE

A. Steel sheet piling shown to be left in place or ordered in writing to be left in place by the Project Architect/Engineer, shall consist of rolled sections of the continuous interlocking type unless otherwise approved. The type and design of the sheeting and bracing shall conform to the above specifications for all steel work for sheeting and bracing. Steel sheeting installed but not removed shall be new.

B. Steel sheet piling to be left in place shall be driven straight to the lines and grades as shown or directed. The piles shall penetrate into firm materials with secure interlocking throughout the entire length of the pile. Damaged piling having faulty alignment shall be pulled and replaced by new piling.

C. The type of guide structure used and method of driving for steel sheet piling to be left in place shall be subject to the approval of the Project Architect/Engineer. Jetting will not be permitted.

D. Contractor shall cut off piling left in place to the grades shown or ordered by the Project Architect/Engineer and shall remove the cutoffs from the site.

E. Contractor shall thoroughly clean wales, braces and all other items to be embedded in the permanent structure, and shall make provisions that the concrete surrounding the embedded element is sound and free from air pockets or harmful inclusions. The provisions shall include the cutting of holes in the webs and flanges of wale and bracing members, and the welding of steel diaphragm waterstops perpendicular to the centerline of brace ends which are to be embedded.

F. Subsequent to removal of the inside face forms, and when removal of bracing is permitted, steel shall be cut back at least 2 inches inside the wall face and the opening patched with cement mortar. The concrete shall be thoroughly worked beneath wales and braces, around stiffeners and in any other place where voids may be formed.

G. Portions of sheeting or soldier piles and breast boards which are in contact with the foundation concrete shall be left in place, together with wales and bracing members which are cast into the foundation or superstructure concrete.

3.18 FINAL GRADING AND EMBANKMENTS

A. To the extent available backfill material from excavations shall be placed in accordance with these Specifications to final grades with a minimum compacted depth of 6 inches.

B. After other outside Work has been finished, and backfilling and embankments completed and settled, all areas on the site of the Work which are to be graded shall be brought to a subgrade suitable with the indicated elevations, slopes, and contours with suitable excess excavation material. Subgrade shall be left below the finished grades shown on the Drawings to allow for topsoil placement. Reference Landscape Specifications for topsoil depth, where applicable.

3.19 TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES) GENERAL PERMIT

A. The Contractor shall prepare and submit the following items to the Owner.

1. Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity. This notice shall be prepared and filed with the TCEQ at least 48 Hrs. before the start of construction.
2. Conform to the storm water pollution prevention plan.
3. Notice of Termination (NOT) of coverage under the TPDES General Permit.
4. The above documents will be filed with the TCEQ by the General Contractor. Contractor is to coordinate with Project Civil Engineer as necessary.

END OF SECTION

SECTION 31 10 00 SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of site clearing is shown on drawings.

B. Site clearing includes, but is not limited to:

1. Removal of unwanted vegetation in the areas to receive site improvements, buildings, pavements, or fill and/or other areas of the site as directed by the Architect/Engineer.
2. Topsoil stripping.
3. Clearing and grubbing.
4. Removing above-grade improvements.
5. Removing below-grade improvements.

1.3 JOB CONDITIONS

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect improvements on adjoining properties and on Owner's property.
2. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

C. No trees shall be removed until the building, drives, pavement areas, walks and other proposed improvements have been staked-out. After these areas have been staked-out, the Owner, and Architect/Engineer shall meet at the site with the Contractor to concur on which trees can be removed and which shall remain. The Contractor shall make minor modifications if directed to save existing trees which the Owner desires to have remain.

D. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation not indicated or directed to be removed, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards as directed by the Architect/Engineer at all trees near areas affected by the construction to protect trees and vegetation to be left standing.

E. Provide protection for roots over 1-1/2" diameter cut during construction operations. Cut faces shall be coated with emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

PART 2 - PRODUCTS

Not applicable to work of this section.

PART 3 - EXECUTION

3.1 SITE CLEARING

A. General: Prior to site clearing, the Contractor shall stake-out the limits of new construction. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions within the limits of new construction. Remove such items elsewhere on site or premises as specifically indicated or directed. Removal includes digging out stumps and roots. The Contractor shall not remove any trees which are located outside the limits of new construction unless indicated on the drawings to be removed or unless directed to do so by the Architect/Engineer. The Contractor shall take necessary precautions to protect all trees which are to remain, including providing barricades around trees located within ten feet (10') of any area of new construction.

B. Topsoil: Topsoil is defined as fertile, friable clay loam (less than 60% clay content) surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 1" in diameter, and without weeds, roots, and other objectionable material. Topsoil must be capable of sustaining vigorous root growth.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
2. Remove heavy growths of grass from areas before stripping.
3. Stockpile acceptable topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust. The Contractor shall, however, be responsible for providing any and all additional topsoil as required.
4. Dispose of unsuitable or excess topsoil same as waste material, herein specified.

C. Clearing and Grubbing: Clear entire site of shrubs and other vegetation, including all underbrush.

1. Completely remove stumps, roots, and other debris protruding through ground surface.
2. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
3. Place acceptable fill material in horizontal layers not exceeding 8" loose depth, and thoroughly compact to a density equal to adjacent original ground.

D. Removal of Improvements: Remove all existing above-grade and below-grade improvements.

3.2 DISPOSAL OF WASTE MATERIALS

A. Burning on Owner's Property: Burning will not be permitted.

B. Removal from Owner's Property: Remove all waste materials and unsuitable and excess topsoil from Owner's property and dispose of off site in a legal manner.

END OF SECTION

SECTION 31 22 13 ROUGH GRADING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Remove topsoil and stockpile for later reuse.

B. Excavate subsoil and stockpile for later reuse.

C. Grade and rough contour site.

1.2 RELATED WORK

A. Section 31 00 00 – Earthwork.

B. Section 31 23 16 – Excavation.

C. Section 31 23 23 – Backfill.

D. Section 31 23 33 – Trenching and Backfilling

1.3 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01 70 00 'Project Closeout'.

B. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.4 PROTECTION

A. Protect benchmarks, existing structures, fences, and roads.

B. Protect above or below grade utilities that are to remain.

C. Repair all damage.

1.5 QUALITY ASSURANCE

A. Owner is to employ a Testing Laboratory to perform Soil Testing and Inspection Service for quality control testing during grading and excavation operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Excavated material, graded free of roots, rocks larger than one (1) inch, subsoil, debris, and large weeds.

B. Subsoil: Excavated material, graded free of lumps larger than six (6) inches, rocks larger than three (3) inches, and debris.

C. Borrow: Borrow material for this project should consist of non-expansive select materials. Borrow material for this project shall be approved by the Architect/Engineer before use.

D. Site Excavated Materials: Site materials may be used for fill, provided they are re-compacted to 95 percent (minimum) of the maximum dry density as obtained in the Standard Compaction Procedure (ASTM D-698) and placed in maximum eight-inch thick loose lifts. The width of actual compacted material will extend 2 feet beyond the edges of the proposed walkways and pavement areas. All areas that are not designated as walkways will be compacted to a minimum of 90%.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify the site conditions before beginning Work.

B. Verify that survey benchmark and intended elevations for the Work are as indicated on Survey. Contractor will be responsible for verifying all horizontal distances for new and existing improvements.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known below grade utilities. Stake and flag locations.

C. Identify and flag above grade utilities.

D. Maintain and protect existing utilities remaining which pass through Work areas.

E. Notify utility companies to remove and relocate utilities.

F. Upon discovery of unknown utility or concealed conditions, discontinue affected Work; notify Project Architect/Engineer.

3.3 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be re-landscaped, or re-graded and stockpile in area designated on site.

B. Do not excavate wet topsoil.

C. Stockpile topsoil to depth not exceeding eight (8) feet. Cover to protect from erosion.

3.4 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be re-landscaped or re-graded marked areas and stockpile in area designated on site.

B. Do not excavate wet subsoil.

C. Stockpile subsoil to depth not exceeding eight (8) feet.

D. When excavating through roots is necessary, perform Work by hand.

3.5 TOLERANCES

A. Top Surface of Subgrade: Plus or minus one (1) inch.

3.6 FILLING

A. Fill areas to new contours and elevations with approved materials only.

B. Granular Fill: Place and compact materials in continuous layers not exceeding eight (8) inches uncompacted depth compacted to 95 percent.

C. Subsoil and Topsoil Fill: Place and compact material in continuous layers not exceeding eight (8) inches uncompacted depth, compacted to 95 percent.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building a minimum of two (2) inches in ten (10) feet, unless indicated otherwise in Drawings.

F. Make grade changes gradual. Blend slope into level areas.

G. Remove surplus fill materials from site.

3.7 FIELD QUALITY CONTROL

A. Field inspection and compaction testing of fill material will be performed under provisions of Section 01 45 01 ‘Quality Control’ and as specified on Drawings.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

C. Frequency of Tests: Perform one test for every 5,000 S.F. per lift, with a minimum of 3 each per test location.

END OF SECTION

SECTION 31 23 16 EXCAVATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General, Supplementary Conditions, Special Conditions and Division-1 Specification Sections, apply to Work of this Section.

1.2 SECTION INCLUDES

A. Excavation for building foundations.

B. Excavation for paving, trenching and drainage fill course.

C. Excavation for utility trenches.

D. Excavation for retaining walls.

1.3 RELATED SECTIONS

A. Section 01 45 01 - Quality Control.

B. Section 31 00 00 - Earthwork.

C. Section 31 22 13 - Rough Grading.

D. Section 31 23 23.13 - Backfill.

E. Section 31 23 33 – Trenching and Backfilling

1.4 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as indicated on the Boundary Survey.

PART 2 - PRODUCTS

2.1 Fill Material outside of building area to comply with ASTM D2487. Use only approved fill material, free of clay, rock, gravel larger than 3" in any dimension, debris, frozen materials, vegetable and other deleterious matter.

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.

C. Notify Project Architect/Engineer if unidentified below grade utilities are encountered during excavation operations for instructions on how to proceed.

D. Protect above and below grade utilities which are to remain.

E. Protect features remaining as a portion of final landscaping.

F. Protect benchmarks, existing sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

3.2 EXCAVATION

A. Excavate subsoil required to accommodate pavement structures, slabs-on-grade, paving and site structures and construction operations.

B. Excavate to working elevations for foundation and underfloor Work. Coordinate all special requirements; reference Structural Drawings and Specifications.

C. Excavation cut not to interfere with normal 45 degree bearing splay of foundation.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation.

E. Hand trim excavation. Remove loose matter.

F. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. Larger material will also be removed under this Section.

G. Notify Project Architect/Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.

H. Correct unauthorized excavation at no extra cost to Owner.

I. Correct areas over-excavated by error in accordance with Section 31 23 23 'Backfill'.

J. Remove excess material from site.

K. Compact fill in areas to receive paving and walkways to 95% soil density; See Structural and Civil Drawings and Specifications for compaction requirements for structural components.

L. Compact the exposed sub-grade areas in the underfloor to 90% soil density.

M. Trenching: trenching for utilities to be carried to the building unless otherwise indicated in Drawings.

3.3 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01 45 01 'Quality Control'.

B. Provide for visual inspection of bearing surfaces.

3.4 PROTECTION

A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

B. Protect bottom of excavations and soil adjacent to and beneath foundation, from flooding and freezing.

END OF SECTION

SECTION 31 23 23.13 BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building perimeter and site structure backfilling to subgrade elevations.

B. Site filling and backfilling at all demolition areas that are excavated.

C. Fill under pavement structures and walkways.

D. Backfilling for retaining walls.

E. Consolidation and compaction.

F. Fill for over-excavation.

G. Geotextile fabric.

1.2 RELATED SECTIONS

A. Section 01 45 01 – Quality Control: Testing Laboratory Services: Testing Fill compaction.

B. Section 31 00 00 - Earthwork.

C. Section 31 23 16 - Excavation.

D. Section 31 23 33 – Trenching and Backfilling.

1.3 REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D-698- Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.

C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ASTM D-1557- Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00 ‘Submittal Procedures’.

B. Samples: Submit 10 lb. sample of each type of fill to testing laboratory, in air-tight containers.

C. Mix designs and testing information for Lean Concrete and Controlled Low Strength Material.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Fill as specified on Drawings.

B. Lean Concrete: concrete conforming to Section 03 30 00 with a compressive strength of 2,000 psi.

C. Controlled Low Strength Material (CLSM – Flowable Fill): concrete conforming to City of San Antonio Standard Specification Item No. 413, or approved equal, with a 28 day unconfined compressive strength of 80 to 150 psi.

2.2 ACCESSORIES

A. Vapor Retardant: 10 mil thick, polyethylene.

B. Geotextile fabrics as shown on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be reused are acceptable.

3.2 PREPARATION

A. Generally, compact sub-grade to density requirements for subsequent backfill materials.

B. Cut out soft areas of sub-grade not capable of in-situ compaction. Backfill with approved fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.3 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy sub-grade surfaces.

C. Maintain optimum moisture content of backfill materials to attain required compaction density.

D. Slope grade away from walkways minimum 2%, unless noted otherwise.

E. Make grade changes gradual. Blend slope into level areas.

F. Remove surplus backfill materials from site unless otherwise directed by project Architect/Engineer.

G. Leave fill material stockpile areas completely free of excess fill materials.

3.4 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus one inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. Owner will employ a Testing Laboratory to perform soil testing and inspection services for quality control testing. Field inspection and testing will be performed under provisions of Section 01 45 01 ‘Quality Control'.

B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D1557 and with Section 01 45 01 ‘Quality Control’.

C. Compaction testing will be performed in accordance with ANSI/ASTM D1556 and with Section 01 45 01 ‘Quality Control’.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

E. Proof roll compacted fill surfaces under paving.

3.6 PROTECTION OF FINISHED WORK

A. Recompact fills subjected to vehicular traffic. Reference Final Site Grading Plan for special Flexible Base requirements.

END OF SECTION

SECTION 31 23 33 TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavate trenches for utilities from outside of new building and new building additions to new utilities.

B. Compacted bedding under fill over utilities to subgrade elevations.

C. Backfilling and compaction.

1.2 RELATED SECTIONS

A. Section 01 45 01- Quality Control

B. Section 01 50 00 – Temporary Facilities and Controls

C. Section 31 00 00 – Earthwork

D. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface

E. Section 31 23 16 – Excavation

F. Section 31 23 23.13 - Backfill

1.3 REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D-698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, using 5.5 lb rammer and 12 inch drop.

C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ANSI/ASTM D-1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb rammer and 18 inch drop.

1.4 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings. Coordinate with other utilities, including new storm piping.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Materials as specified in Section 31 00 00- Earthwork.

2.2 BED MATERIALS

A. Type 1 - Coarse Stone, Crushed Gravel Pit run, Angular, washed natural stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2 inches	100
One inch	95
3/4 inch	95 to 100
5/8 inch	75 to 100
3/8 inch	55 to 85

No. 4	35 to 60
No. 16	15 to 35
No. 40	10 to 25
No. 200	5 to 10

B. Type 2 - Pea Gravel: Natural stone, washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following:

Minimum Size: 1/4 inch.

Maximum Size: 5/8 inch.

C. Type 3 - Sand: Natural river or bank sand, washed; free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

Sieve Size	Percent Passing
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

D. Subsoil: Reused, Imported, free of gravel larger than 3 inch size, and debris.

E. Concrete: Flowable fill, Lean concrete with a compressive strength of 750 psi to be used where over excavation occurs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill and bedding materials to be reused, is acceptable.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Maintain and protect existing utilities remaining, which pass through work area.

C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

D. Protect above and below grade utilities which are to remain.

E. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with Type 2 fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.3 EXCAVATION

A. Excavate subsoil required for sanitary sewer, water, gas, storm sewer, electrical duct bank and underground telephone conduits piping to existing utilities or as shown on Drawings.

B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.

C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

D. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

E. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.

F. Correct unauthorized excavation at no cost to owner.

G. Correct areas over-excavated by error in accordance with Part 2 of the Bed Materials section on this spec.

H. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.4 BEDDING

A. Bedding for utility lines - Where acceptable materials are encountered at the pipe bearing level, they shall be acceptable for bedding purposed. Where unacceptable materials, such as water, silt, mulch, trash, debris, or rock, in ledge or boulder are found at the pipe-bearing level, if flexible pipe is used, the trench should be over excavated as directed and backfilled with crushed stone or gravel, 1/4" to 1-3/4" size. The embedding shall extend up the sides of the pipe sufficiently to embed the lower quadrant of the pipe.

3.5 BACKFILLING

A. Initial Backfill - Shall extend from the bedding surface to 12” above the top of the pipe. Where acceptable laying conditions exist, the excavated materials may be used as initial backfill material. Where unacceptable laying conditions, and materials are encountered, or where flexible pipe is to be laid, the initial backfill shall consist of well graded gravels, crushed screenings or sand, or material approved by the Architect/Engineer.

B. Secondary backfill shall extend from 12” above the pipe to the top of the trench, and shall consist of materials removed from the trench, and shall be free from brush, debris, and junk, and contain no stones greater than 6”.

C. Initial backfill material shall be on job site at time of inspection.

D. Place utility pipe on minimum eight (8) inch deep bed of coarse filter aggregate.

E. Lay pipe to slope gradients noted on layout drawings, with maximum variation from true slope of 1/8 inch in ten (10) feet

F. Install coarse filter aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of twelve (12) inches.

G. Place filter fabric over leveled top surface of filter aggregate cover prior to subsequent backfilling operations. Geotextile fabric similar to Mirafi 140N, to reduce the infiltration and loss of fines from backfill material.

H. Increase compaction of each successive lift. Refer to Section 31 23 23 ‘Backfill’ for compaction requirements. Do not displace or damage pipe when compaction

I. Backfill trenches to contours and elevations with unfrozen materials.

J. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

K. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.

L. Soil Backfill Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.

M. Maintain optimum moisture content of backfill materials to attain required compaction density.

N. Remove surplus backfill materials from site.

O. Leave fill material stockpile areas completely free of excess fill materials.

3.6 TOLERANCES

A. Top Surface of Backfilling: Under Paved Areas: Plus or minus one inch from required elevations.

B. Top Surface of General Backfilling: Plus or minus one inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 45 01-Quality Control.

B. Tests and analysis of fill material will be performed in accordance with ASTM- D698 and with Section 01 45 01 Quality Control.

C. Compaction testing will be performed in accordance with ANSI/ASTM D1556, ASTM D-1557, ASTM D698 and with Section 01 45 01 Quality Control.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

E. Frequency of Tests: Perform one test for every 200 lineal feet of pipe per lift.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01 45 01 – Quality Control.

B. Recompact fills subjected to vehicular traffic.

END OF SECTION

SECTION 32 12 16 ASPHALT PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Asphaltic concrete paving and surface sealer.

B. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 31 22 13 - Rough Grading.

C. Section 31 23 23 - Backfill

1.3 REFERENCES

A. Texas Department of Transportation Standard Specifications, 2014 Edition.

1.4 PERFORMANCE REQUIREMENTS

A. Paving: Designed for parking.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Texas Department of Transportation Standard Specifications.

B. Mixing Plant: Conform to Texas Department of Transportation Standards.

C. Obtain materials from same source throughout.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable Texas Department of Transportation Standards for paving Work on public property.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Asphalt Cement: In accordance with Texas Department of Transportation Standards Item 340, Hot Mix Asphaltic Concrete Pavement, Type D Virgin Mix (No RAP or RAS will be accepted) and as indicated in Drawings.

2.2 ACCESSORIES

A. Primer: Homogeneous, medium curing, liquid asphalt. In accordance with Texas Department of Transportation Standards Item 300, Asphaltic, Oils and Emulsions.

B. Tack Coat: Homogeneous, medium curing, liquid asphalt. In accordance with Texas Department of Transportation Standards Item 300, Asphaltic, Oils and Emulsions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify base conditions prior to commencing Work.

B. Verify that compacted sub-grade is dry and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.2 PREPARATION – PRIMER

A. Apply primer in accordance with Texas Department of Transportation Standards.

B. Apply primer evenly and smoothly on base or sub-base over sub-grade surface at uniform rate not to exceed 0.20 gallons/square yard of surface or as approved by Civil Engineer.

C. Use clean sand to blot excess primer.

3.3 PREPARATION - TACK COAT

A. Apply tack coat in accordance with Texas Department of Transportation Standards. Apply at a rate of 0.11 gallons/square yard or surface or as approved by Civil Engineer.

B. Apply tack coat to contact surfaces of existing asphalt surfaces where the new entrance drives transition to the existing street.

3.4 PLACING ASPHALT PAVEMENT

A. Install Work in accordance with Texas Department of Transportation Standards.

B. Place asphalt within twenty-four (24) hours of applying primer or tack coat.

C. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

D. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.5 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with ten (10) foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from True Elevation: Within ½ inch.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 45 01 ‘Quality Control.’

B. Take samples and perform tests in accordance with Texas Department of Transportation Standards.

3.7 PROTECTION

A. After placement, protect pavement from mechanical injury.

END OF SECTION

SECTION 32 13 13 CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General, Supplementary Conditions, Special Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Rigid pavement and approaches.

B. Aggregate base course.

1.3 RELATED SECTIONS

A. Section 31 00 00 - Earthwork.

B. Section 31 23 23.13 – Backfill

C. Section 32 16 00 - Curbs and sidewalks.

D. Section 07 90 00 - Joint Sealants.

E. Section 03 30 00 – Structural Cast–in Place Concrete.

1.4 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

C. ACI 330 – Guide for Design and Construction of Concrete Parking Lots.

D. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

E. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

F. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

G. ASTM C33 - Concrete Aggregates.

H. ASTM C94 - Ready Mix Concrete.

I. ASTM C150 - Portland Cement.

J. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces.

K. Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges of the Texas Department of Transportation, 2014 edition.

1.5 PERFORMANCE REQUIREMENTS

A. Concrete pavements and approaches: Designed for vehicular traffic.

1.6 SUBMITTALS

A. Samples: Submit for approval samples, manufacturer's product data, test reports and material certifications as required in referenced Sections for concrete Work.

B. Certificates: Manufacturer's certification that sealer meets Specification requirements.

C. Shop Drawings: submit for approval copies of dimensioned layout of the Work, showing pattern, jointing and reinforcing.

D. Product Data: Provide data on joint filler, dowel assemblies (load transfer devices), concrete mix design, and curing compound.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301 requirements of Section 03 30 00 'Structural Cast-In Place Concrete'.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable TxDot standards for concrete paving work.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

A. Form Materials: Conform to ACI 301 As specified in Section 03 30 00 'Structural Cast-In Place Concrete'.

2.2 REINFORCEMENT

A. Reinforcing Steel and Wire Fabric: Type specified in Section 03 20 00 'Structural Concrete Reinforcement'.

B. Dowels: ASTM A615; 60 ksi yield grade, painted plain steel. One half greased, or sleeved to prevent bond.

2.3 CONCRETE MATERIALS

A. Concrete Materials: As specified in Section 03 30 00 'Structural Cast-In Place Concrete'.

B. Cement: ASTM C150 Normal - Type I Grey color.

C. Fine and Coarse Mix Aggregates: ASTM C33.

D. Air Entrainment: ASTM C260.

E. Chemical Admixture: ASTM C494, Type A - Water Reducing

2.4 ACCESSORIES

A. Curing Compound: FS TT-C-800, Type 1, 30 percent solids ASTM C309, Type 1.

B. Liquid Surface Sealer.

C. Tie Brick or approved equal rebar supports.

D. Dowel Baskets (Load Transfer Devices).

2.5 CONCRETE MIX - BY PERFORMANCE CRITERIA

A. Mix and deliver concrete in accordance with Section 03 30 00 'Structural Cast-In Place Concrete'.

B. Select proportions for normal weight concrete in accordance with Section 03 30 00 'Structural Cast-In Place Concrete'.

C. Provide concrete to the following criteria:

1. See Paragraph 3.11, this Section.

D. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.

E. Use calcium chloride only when approved by Engineer.

F. Use set retarding admixtures during hot weather only when approved by Engineer.

2.6 SOURCE QUALITY CONTROL

A. Test samples in accordance with ACI 301.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted sub-grade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.2 SUBBASE

A. Prepare sub-base in accordance with Section 31 00 00 ‘Earthwork’.

3.3 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Notify Civil Engineer minimum twenty-four (24) hours for observation prior to commencement of concreting operations.

3.4 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble form work to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to form work during concrete placement.

D. Positioning and supporting devices for steel reinforcement bars shall be Tie Brick or approved equal and of sufficient number to maintain the position of the bars within the allowable tolerances, but in no case will the chairs be less than five (5) feet on center.

3.5 REINFORCEMENT

A. Place reinforcement as indicated.

B. Interrupt reinforcement at expansion joints.

C. Place dowels to achieve alignment as detailed using dowel baskets.

3.6 PLACING CONCRETE

A. Place concrete in accordance with Item 360-Concrete Pavement of the Texas Department of Transportation Specification.

B. Ensure reinforcement, inserts, embedded parts, formed joints and dowel assemblies are not disturbed during concrete placement.

C. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

D. Place concrete to pattern indicated.

3.7 JOINTS

A. Place expansion joints at maximum of 60 feet intervals.

B. Place isolation joints as required to isolate pavement from structure, joint filler between paving components and building or other appurtenances.

C. Provide saw cut control joints at 15 feet intervals, longitudinal and 15 feet transverse. Provide at closer spacing where indicated in drawings for visual effect.

3.8 FINISHING

A. Paving: Light broom-finish and trowel joint edges.

B. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 45 01. During the placing of concrete, the testing laboratory representative must be present during the entire pour.

B. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.

C. One (1) additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.

D. One (1) slump test will be taken for each set of test cylinders taken.

E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.10 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

3.11 SCHEDULES

A. Concrete approaches: 4000 psi 28 day Portland cement concrete, seven (7) inches thick with #4 steel reinforcing bars at twelve (12) inches on center both ways, medium broom finish, and troweled edges. Slump = 4.0” ± 1.0”.

B. Concrete pavement: 4000 psi 28 day Portland cement concrete, seven (7) inches thick with #4 steel reinforcing bars at twelve (12) inches on center both ways with medium broom finish. Slump = 4.0” ± 1.0”.

END OF SECTION

SECTION 32 14 00

UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Brick pavers set in sand setting beds.

1.3 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates.
B. Product Data: For the following:
   1. Pavers.
   2. Sand filler material
C. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C136.
D. Samples for Verification: For full-size units of each type of unit paver indicated.
E. Mockups: Build 5’x5’ mockup to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.5 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 BRICK PAVERS

A. Brick Pavers: Light-traffic paving brick; ASTM C902, Class SX Provide brick without frogs or cores in surfaces exposed to view in the completed Work.
   1. Field Pavers Basis of Design: Salvage concrete pavers.
      a. Size: 2 3/8” thick x 4” wide x 8” long
      b. Color: N/A (Existing)
      c. Pattern: See plan.
   2. Band Pavers Basis of Design: N/A
      a. Size 2 3/8” thick x 4” wide x 8” long
      b. Color: N/A
      c. Pattern: N/A
B. Efflorescence: Brick shall be rated "not effloresced" when tested according to ASTM C67.

2.3 CURBS AND EDGE RESTRAINTS

A. Plastic Edge Restraints: Not used.
B. Steel Edge Restraints: Not used.
   1. Color: N/A
C. Aluminum Edge Restraints: Not used.

D. Job-Built Concrete Edge Restraints: Cast-in-Place Concrete, normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 3000 psi.

2.4 AGGREGATE SETTING-BED MATERIALS

A. Sand for joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.

1. Provide sand of color needed to produce required color joint.

2.5 EXAMINATION

A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

2.6 PREPARATION

A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

2.7 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures. N/A

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

D. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

E. Expansion and Control Joints: Provide for sealant-filled joints at locations and of widths indicated. Provide compressible foam filler as backing for sealant-filled joints. Install joint filler before setting pavers.

F. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

G. Provide steps made of pavers as indicated. Install paver steps before installing adjacent pavers.

2.8 AGGREGATE SETTING-BED APPLICATIONS

A. Place leveling course and screed to a thickness of 1 to 1-1/2 inches taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

B. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size unit pavers.

1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

C. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. After edge pavers are installed and there is completed surface or before surfaces is exposed to rain.
2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
3. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with non-stinging plastic sheets to protect them from rain.

D. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

E. Do not allow traffic on installed pavers until sand has been vibrated into joints.

F. Repeat joint-filling process 30 days later.

2.9 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.

2. Do not allow protective coating to enter floor drains. Trap, collect, and remove coating material.

END OF SECTION 32 14 00

SECTION 32 13 20R1 CURBS AND SIDEWALKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide concrete curbs and sidewalks as shown and specified.

B. The types of Work covered by these Specifications are conventionally formed or machine formed curbs and conventionally - formed sidewalks.

C. The thickness and extent of curbs and sidewalks are shown on the Drawings.

D. Perform work on this Section in accordance with phasing requirements.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 00 00 – Earthwork

B. Section 03 20 00 – Structural Concrete Reinforcement

C. Section 03 30 00 – Structural Cast-In-Place Concrete

1.4 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM D 1190, Concrete Joint Sealer, Hot Poured Elastic type, or as otherwise shown on drawings.

B. Applicator Qualifications: Demonstrate previous experience in installing concrete curbs and sidewalks.

1.5 SUBMITTALS

A. Samples: Submit for approval samples, manufacturer's product data, test reports and material certifications as required in referenced Sections for concrete Work.

B. Certificates: Manufacturer's certification that sealer meets Specification requirements.

C. Shop Drawings: submit for approval copies of dimensioned layout of the Work, showing pattern, expansion joints and reinforcing.

D. LEED Submittal Requirements:

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars: Deformed steel bars and shall comply with requirements of Section 03 20 00, Structural Concrete Reinforcing.

B. Concrete Materials: Comply with requirements of Section 03 00 00 for formwork, concrete materials, admixtures, bonding materials, curing materials and others as required.

C. Expansion Joint Material: Comply with requirements of Section 07 90 00 for expansion joint fillers.

2.2 CONCRETE MIX, DESIGN AND TESTING

A. Comply with requirement of applicable provisions of Section 03 30 00, Structural Cast-In-Place Concrete, for concrete mix design, sampling and testing, and quality control.

B. Design the mix to produce concrete having a minimum compressive strength, of 3,000 psi with a 5" slump range and air content as specified in Section 03 30 00.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

A. Preparation of the sub-grade including compaction shall be completed for the full width of the Work.

1. Where the sub-grade is constructed by excavation of existing grade, the top six (6) inches of the sub-grade shall be compacted to at least 95 percent of maximum density at optimum moisture content.
2. Where the sub-grade shall be made smooth and compacted per these Specifications or as shown on the Drawings.
3. The existing grade shall be brought to the final lines and grades utilizing select backfill as specified in Section 31 00 00 - Earthwork. The compaction requirements of Section 31 00 00 apply to this Section.

B. Base: Base shall be provided as shown on the Contract Drawings. The material shall be select backfill as specified in Section 31 00 00 - Earthwork, and compacted as specified.

3.2 FORM CONSTRUCTION

A. Set forms to line and grade. Install forms over full length of curbs and sidewalks.

3.3 REINFORCEMENT

A. Locate, place, and support reinforcement as specified in Section 03 20 00, unless otherwise shown. Size of reinforcement shall be as shown on Drawings.

3.4 CONCRETE PLACEMENT

A. General: Comply with the requirements of Section 03 30 00 for mixing and placing concrete, and as specified.

B. For concrete curbs and sidewalks, place concrete in one course, monolithic construction, for the full width and depth of curbs and sidewalks.

3.5 JOINTS

A. General: Construct expansion, contraction, and construction joints with faces perpendicular to surface of the concrete curb and sidewalk. Construct transverse joints at right angles to the Work centerline and as shown on Drawings.

B. Scored Contraction Joints: Provide these joints at ten (10) feet on centers for concrete curbs and five (5) feet on centers for sidewalks. Provide at closer spacing where indicated in Drawings for visual effect.

C. Construction Joints: Place joints at locations where placement operations are stopped for a period of more than ½ hour, except where such pours terminate at expansion joints.

D. Expansion Joints: Provide ½” inch expansion joint filler and NP1 sealant where Work abuts structures; at returns; and at 30 foot spacing for straight runs. If curbs and

sidewalks are not poured monolithically, provide expansion joints where each abuts the other.

E. Place top of expansion joint material not less than ½” inch or more than 1 inch below concrete surface. Apply joint sealer on top of expansion joint material, flush with concrete surface, and in accordance with manufacturer's instructions.

3.6 CONCRETE FINISHING

A. All sidewalk surfaces to receive light broom finish. All curbs to be smooth finish. Smooth surfaces to receive smooth finish by screening and floating.

B. Work edges of curb and sidewalk, and transverse joints; and round to 1/4 inch radius.

C. Complete surface finishing by drawing a fine-hair broom across surface, perpendicular to line of traffic.

3.7 CURING

A. Protect and cure finished concrete curbs and sidewalks, complying with applicable requirements of Section 03 30 00.

3.8 REPAIR AND CLEANING

A. Repair or replace broken or defective curbs and sidewalks as directed by the Architect/Engineer.

B. Sweep Work and wash free of stains, discolorations, dirt or other foreign material.

3.9 REPAIR OF EXISTING CONCRETE CURB AND SIDEWALK AREAS

A. Repair and/or patch any and all damage to existing concrete curbs and sidewalk surfaces resulting from construction operations with materials to match existing.

3.10 SCHEDULE

A. Concrete Sidewalks: 3,000 psi twenty eight (28) day concrete five (5) inches thick with #3 steel reinforcing bars at 12" on center both ways Portland Cement with medium, broom finish.

B. Concrete Curbs: 4,000 psi twenty eight (28) day concrete, Portland Cement medium, broom finish.

C. Concrete Ramps: 3,000 psi 28 day concrete, cast in place, Portland Cement, medium broom finish.

END OF SECTION

SECTION 32 17 23 PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 This Specification describes the minimum optical and physical properties required for a thermoplastic road marking compound that is to be applied in a molten state, onto a pavement surface, to provide traffic stripes and/or markings.

1.2 The appearance of the finished markings shall have a uniform surface, crisp edges with a minimum over-spray, clean cut-off, meet straightness requirements and conform to the design Drawings and/or Engineer instructions.

1.3 Parking Area and Asphalt Playground Area pavement marking paint: Chlorinated rubber-alkyd type, ready-mixed, complying with Federal Spec TTP115E, Type III. Reference drawings for location and color.

1.4 Drive Area pavement marking paint: Thermoplastic paint complying with TxDOT standard specifications. Reference drawings for location and color.

PART 2 - PRODUCTS

2.1 Thermoplastic pavement marking material shall be a product especially compounded for traffic markings for use on either asphaltic or Portland cement concrete surfaces.

A. The following composition requirements shall be met:

	White	Yellow
Binder	18% Min.	18% Min.
Ti02 (Type 2 Rutile)	12% Min.	N/A
Glass Spheres *	48% Min.	48% Min.
Yellow Pigment	N/A	10% Min.

NOT USED ON THIS PROJECT.

2.2 BINDERS

A. The alkyd binder shall consist of maleic modified rosin ester and other plasticizers.

2.3 PIGMENT

A. The white pigment must be a rutile titanium dioxide meeting the standards of ASTM D 476, Type V.

B. The yellow pigment must be heat-resistant and weather-stable. The yellow pigment may be either a double-encapsulated medium chrome yellow or a lead-free, organic yellow pigment (C.I. Pigment Yellow 83, opaque version). Do not mix pigment types within a batch.

2.4 PHYSICAL REQUIREMENTS

A. The Meltdown Procedure for Thermoplastic, available from the Engineer, shall be used when conducting laboratory tests to verify the following property requirements.

2.5 COLOR

A. The white thermoplastic shall be pure white and free from any tint. Using a Colorimeter, such as a Gardner color Difference Meter, the materials shall not show deviations from a magnesium oxide color standard that are greater than the following:

Scale Definition	Magnesium Oxide Standard	Sample
RD	100	75%
Reflectance		
a Red-Green	0	-5 to +5
b Yellow-Blue	0	-10 to +10

PART 3 - APPLICATION - SURFACE PREPARATION

3.1 MOISTURE

A. All surfaces shall be inspected for moisture content prior to application of thermoplastic. Approximately two square feet of a clear plastic or tar paper shall be laid on the road surface and held in place for 15 to 20 minutes. The underside of the plastic or tar paper shall then be inspected for a build up of condensed moisture from the road surface. If the amount of condensed moisture is of a sufficient amount to result in water dripping from the plastic or tar paper when held in a vertical position, thermoplastic shall not be applied. This moisture test shall be repeated until the moisture in the pavement surface has been allowed to evaporate to a level whereby there is not excessive build up of condensed moisture on the underside of the plastic or tar paper.

3.2 CLEANING

A. All surfaces shall be clean and dry before thermoplastic can be applied. Loose dirt and debris shall be removed by blowing compressed air over the area to be striped. If the thermoplastic is to be applied over existing paint lines, the paint line shall be swept with a mechanical sweeper or wire brush to remove poorly adhered paint and dirt that would interfere with the proper bonding or the thermoplastic. Latence and curing compound shall be removed from all new Portland cement concrete surfaces by loose grain abrasive pressure blasting or wire brushing.

3.3 LAYOUT

A. The pavement markings shall be placed in proper alignment with guidelines established on the pavement. Deviation from the alignment established shall not exceed 2-inches and, in addition, the deviation in alignment of the marking being placed shall not exceed 1-inch per 200 feet or pavement nor shall any deviation be abrupt.

1. Longitudinal markings shall be offset at least 2-inches from construction joints of Portland cement concrete surfaces and joints and shoulder breaks of asphalt surfaces.

3.4 PRIMER AND SEALER

A. Primer sealer shall be used on all Portland cement concrete surfaces. A primer sealer shall be used on asphalt surfaces that are over two years old and/or on asphalt surfaces that are worn or oxidized to a condition where 50 percent or more of the wearing surface is exposed aggregate.

3.5 PRIMER SEALER APPLICATION

A. When required as described, the primer-sealer shall be applied to the pavement surface in a continuous film at a minimum thickness of 3 to 5 mils. Before the thermoplastic is applied, the primer-sealer shall be allowed to dry to a tacky state. The thermoplastic shall be applied within 4 hours after the primer application.

3.6 TEMPERATURE REQUIREMENTS: AMBIENT CONDITIONS

A. The ambient air and road surface shall be 55°F and rising before application of thermoplastic can begin.

3.7 MATERIAL REQUIREMENTS

A. The thermoplastic compound shall be heated from 400°F to 450°F and shall be a minimum of 400°F as it makes contact with pavement surface during application. An infrared temperature gun shall be used to determine the temperature of the thermoplastic as it is being applied to the pavement surface.

3.8 PACKAGING: CONTAINERS

A. The thermoplastic material shall be delivered in 50 pound cardboard containers or 50 pound bags of sufficient strength to permit normal handling during shipment and handling on the job without loss of material.

3.9 LABELING

A. Each container shall be clearly marked to indicate the color of the material, the process batch number and/or manufacturer's formulation number, the manufacturer's name and address and the date of manufacture.

3.10 MANUFACTURER'S RESPONSIBILITY: SAMPLING AND TESTING

A. The manufacturer shall submit test results from an approved independent laboratory. All material samples shall be obtained twenty (20) days in advance of the pavement marking operations. The cost of testing shall be included in the price of thermoplastic material. The approved independent laboratory's test results shall be submitted to the Engineer in the form of a certified test report.

3.11 BILL OF LADING

A. manufacturer shall furnish the Material and Tests Laboratory with copies of Bills of Lading for all materials inspected. Bill of lading shall indicate the consignee and the destination, date of shipment, lot numbers, quantity, type of material, and location of source.

3.12 MATERIAL ACCEPTANCE

A. Final acceptance of a particular lot of thermoplastic will be based on the following:

1. Compliance with the Specifications for material composition requirements verified by approved independent laboratory with tests results.
2. Compliance with the specification for the physical properties required and verified by an approved independent laboratory with test results.
3. Manufacturer's test results for each lot thermoplastic have been received.
4. Identification requirements are satisfactory.

3.13 CONTRACTOR'S RESPONSIBILITY

A. The Contractor shall notify the Construction Inspector 72 hours prior to the placement of the thermoplastic markings enable the inspector to be present during the application operation. At the time of notification, the Contractor shall indicate the manufacturer and the lot numbers of the thermoplastic that he intends to use. A check should be made by the Contractor to insure that the approved lot numbers appear on the material package. Failure to do so is cause for rejection.

B. If the normal trade practice for manufacturers is to furnish warranties or guarantees for the materials and equipment specified herein, the Contractor shall turn the guarantees and warranties over to the School Project Manager for potential dealing with the Manufacturers. The extent of such warranties or guarantees will not be a factor in selecting the successful bidder.

END OF SECTION

SECTION 32 18 13
SYNTHETIC GRASS SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, tools and equipment necessary to install synthetic grass surfacing system as indicated on the plans and as specified herein; including components and accessories required for a complete installation, including but not limited to:
   1. Acceptance of prepared sub-base.
   2. Coordination with related trades to ensure a complete, integrated, and timely installation: aggregate base course, sub-base material (tested for permeability), grading and compacting, piping and drain components (when required); as provided under its respective trade section.

1.2 RELATED SECTIONS

A. Section 32 80 00 – Irrigation System

B. Section 32 91 13 – Soil Preparation

C. Section 32 93 00 – Landscape

D. Section 32 93 45 – Treatment of Existing Trees

1.3 REFERENCE STANDARDS

A. ASTM – American Society for Testing and Materials.
   1. D1577 - Standard Test Method for Linear Density of Textile Fiber.
   2. D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering.
   3. D1338 - Standard Test Method for Tuft Bind of Pile Yarn Floor Covering.
   4. D1682 - Standard Method of Test for Breaking Load and Elongation of Textile Fabrics.
   5. D5034 - Standard Test Method of Breaking Strength and Elongation of Textile Fabrics (Grab Test).
   6. D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
   7. D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.

1.4 PERFORMANCE REQUIREMENTS

A. Completed synthetic grass surfacing system shall be capable of meeting the following performance requirements:
   1. ASTM D4491: Water permeability test. Synthetic grass surface shall drain at a rate of 250 inches or more, of water per hour.
   2. ASTM D1338: Tuft bind. Synthetic grass surfacing shall have a tuft bind, without infill material of 8 pounds or more.

1.5 SUBMITTALS

A. Substitutions: Other products are acceptable if in compliance with requirements of these specifications. Submit alternate products to Architect for approval prior to bidding in accordance Section 01 25 13.

B. Comply with Section 01 33 00, Submittals Procedures. Submit for approval prior to fabrication.

C. Product Data:
1. Submit manufacturer's catalog cuts, material safety data sheets (MSDS), brochures, specifications, preparation and installation instructions and recommendations.
2. Submit fiber manufacturer's name, type of fiber and composition of fiber.
3. Submit data in sufficient detail to indicate compliance with the contract documents.
4. Submit manufacturer's instructions for installation.

D. Samples: Submit 12”x12” samples, illustrating details of finished product in amounts as required by General Requirements, or as requested by Architect.

E. List of existing installations: Submit list including respective Owner’s representative and telephone number.

F. Warranties: Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer.

1.6 QUALITY ASSURANCE

A. Comply with Section 01 43 00, Quality Assurance.

B. Manufacturer Qualifications: Engaged in manufacturing synthetic grass surfacing products for a minimum of ten (10) years.
1. The Manufacturer shall be experienced in the manufacturing and installation of specified type of synthetic grass surfacing system. This includes use of a ridged monofilament fiber, texturized monofilament fiber, backing, the backing coating, and the installation method.
2. The Manufacturer shall own and operate its own manufacturing plant. Manufacturing the fiber, tufting of the fibers into the backing materials and coating of the synthetic grass system must be done in-house by manufacturer.
3. The Manufacturer must hold ISO 9001, ISO 14001 and OHSAS 18001 certifications demonstrating its manufacturing efficiency with regards to quality, environment and safety management systems.

C. Installer/Contractor Qualifications: Company shall specialize in performing the work of this section.
1. The Company shall provide competent workmen skilled in this specified type of synthetic grass system installation.
2. The designated Supervisory Personnel on the project shall be certified, in writing by the manufacturer, as competent in the installation of specified type of synthetic grass system, including gluing seams and proper installation of the infill material.
3. The Company shall be certified by the manufacturer and licensed (if required).

D. Pre-Installation Conference: Conduct conference at project site at time to be determined by Architect. Review methods and procedures related to installation including, but not limited to, the following:
1. Inspect and discuss existing conditions and preparatory work performed under other contracts.
2. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work, The Owner’s representative, and the Architect.

E. The Installer/Contractor shall verify special conditions required for the installation of the synthetic grass system if required.

F. The Installer/Contractor shall notify the Architect of any discrepancies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 60 00, Product Requirements.

B. Deliver and store components with labels intact and legible.

C. Store materials/components in a secure manner, under cover and elevated above grade.

D. Protect from damage during storage, handling and installation. Protect from damage by other trades.

E. Inspect all delivered materials and products to ensure they are undamaged and in good condition.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate the Work with installation of work of related trades as the Work proceeds.

B. Sequence the Work in order to prevent deterioration of installed system.

1.9 WARRANTY

A. See Section 01 78 00, Closeout Submittals, for Additional Warranty Requirements.

B. The Installer/Contractor shall provide a warranty to the Owner that covers defects in materials and workmanship of the synthetic grass product for a period of eight (8) years from the date of completion. The synthetic grass manufacturer must verify that their representative has inspected the installation and that the work conforms to the manufacturer's requirements. The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism and acts of God beyond the control of the Owner or the manufacturer. The warranty shall be fully third-party insured; pre-paid for the entire 8-year term and be non-prorated. The Installer/Contractor shall provide a warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's representative. The insurance policy must be underwritten by an “AM Best” A rated carrier and must reflect the following values:

1. Pre-Paid 8-year insured warranty.

2. Must cover full 100% replacement value of total square footage installed.

3. Policies that include self-insurance or self-retention clauses shall not be considered.

4. Policy cannot include any form of deductible amount.

5. Sample policy must be provided at time of bid to prove that policy is in force. A letter from an agent or a sample Certificate of Insurance will not be acceptable.

PART 2 - PRODUCTS

2.1 MANUFACTURER AND DISTRIBUTOR

A. Approved Manufacturers: Envy Lawn, SYNlawn, and Grasso.

2.2 MATERIALS AND PRODUCTS

A. Synthetic grass surfacing system shall consist of the following:
1. Synthetic grass surfacing made with a combination of ridged monofilament

polyethylene fibers and texturized monofilament fibers, tufted into a fibrous, non-perforated, porous backing.

2. Infill: Graded dust-free silica sand that partially covers the synthetic grass. Graded dust-free acrylic coated silica sand may be substituted for silica sand as requested by Architect.
3. Glue, thread, seaming fabric and other materials used to install and mark the synthetic grass.

B. Synthetic grass surfacing system shall have the following properties:

Standard	Property	Specification
ASTM D1577	Fiber Denier	9000
ASTM D1577	Secondary Fiber Denier	5000
ASTM D5823	Pile Height	1.75”
ASTM D5793	Stitch Gauge	3/8”
ASTM D5848	Pile Weight	70 oz/square yard
ASTM D5848	Primary Backing	7.5oz/square yard
ASTM D5848	Secondary Backing	20 oz/square yard
ASTM D5848	Total Weight	97.5 oz/square yard
ASTM D1338	Tuft Bind (Without Infill)	8lbs
ASTM D4491	Turf Permeability	800 inches/hour
N/A	Infill Component	2.75 lbs/square foot

Variation of +/- 5% on above listed property values is within normal manufacturing tolerances

C. Synthetic grass surfacing product shall consist of soft spined monofilament fibers and texturized monofilament fibers tufted into a primary backing with a secondary backing.

D. Backing:
1. Primary backing shall be a double-layered polypropylene fabric.
2. Secondary backing shall consist of an application of porous urethane to permanently lock the fiber tufts in place.
3. Perforated (with punched holes), backed turf is unacceptable.
4. Turf with attached scrim in lieu of porous urethane is unacceptable.

E. Primary fiber shall be 9,000 denier, low friction, and UV-resistant fiber measuring not less than 1.75 inches high. Secondary fiber shall be 5,000 denier.

F. Infill materials shall be approved by the manufacturer.
1. Infill shall consist of graded dust-free sand. Graded dust-free acrylic coated silica sand may be substituted for silica sand as requested by Architect.

G. Glue and seaming fabric, for seaming of synthetic grass shall be as recommended by the synthetic grass manufacturer.

2.3 QUALITY CONTROL IN MANUFACTURING

A. The manufacturer shall own and operate its own manufacturing plant in North America. Both tufting of the fibers into the backing materials and coating of the turf system must be done in-house by the synthetic grass manufacturer. Outsourcing of either is unacceptable.

B. The manufacturer shall have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.

C. The manufacturer’s full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, and denier, upon receipt of fiber spools from fiber manufacturer.

D. Primary backing shall be inspected by the manufacturer’s full-time certified in-house

inspectors before tufting begins.

E. The manufacturer's full-time in-house certified inspectors shall verify "pick count", yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.

F. The manufacturer's full-time, in-house, certified inspectors shall perform product inspections at all levels of production including during the tufting process and at the final stages before the synthetic grass is loaded onto the truck for delivery.

G. The manufacturer shall have its own, in-house laboratory where samples of synthetic grass are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that all sub-base leveling is complete prior to installation.

B. Installer/Contractor shall examine the surface to receive the synthetic grass and accept the sub-base planarity in writing prior to the beginning of installation.
   1. Acceptance is dependent upon the Owner's test results indicating compaction and planarity are in compliance with manufacturer's specifications.
   2. The surface shall be accepted by Installer as "clean" as installation commences and shall be maintained in that condition throughout the process.

C. Compaction of the aggregate base shall be 90%, in accordance with ASTM D1557 (Modified Proctor procedure); and the surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-1/2 inch from design grade.

D. Correct conditions detrimental to timely and proper completion of Work.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Prior to the beginning of installation, inspect the sub-base for tolerance to grade.

B. Sub-base acceptance shall be subject to receipt of test results (by others) for compaction and planarity that sub-base is in compliance with manufacturer's specifications and recommendations.

C. When requested by Architect, installed sub-base shall be tested for porosity prior to the installation of the synthetic grass system. A subbase that drains poorly is an unacceptable substrate.

3.3 INSTALLATION

A. The installation shall be performed in full compliance with approved Shop Drawings.

B. Only trained technicians, skilled in the installation of synthetic grass systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, top-dressing, or brushing operations.

C. The designated Supervisory personnel on the project must be certified, in writing by the manufacturer, as competent in the installation of this material, including gluing seams and proper installation of the Infill material.

D. Install at location(s) indicated, to comply with final shop drawings, manufacturers'/installer's instructions.

E. The Installer/Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer's on-site representative, and submitted to the Architect and/or Owner, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer's standard procedures.

F. Synthetic grass system shall be installed directly over the properly prepared aggregate base. Extreme care shall be taken to avoid disturbing the aggregate base, both in regard to compaction and planarity.
   1. Repair and properly compact any disturbed areas of the aggregate base as recommended by manufacturer.
   2. Seams shall be flat, tight, and permanent with no separation or fraying.

G. Infill Materials:
   1. Infill materials shall be applied in thin lifts. The turf shall be brushed as the material is applied. The infill material shall be installed to a depth determined by the manufacturer.
   2. Infill material shall be installed in a systematic order.
   3. Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The Infill installation consists of graded dust-free silica sand. Graded dust-free acrylic coated silica sand may be substituted for silica sand as requested by Architect.
   4. The Installer/Contractor shall keep area clean throughout the project and clear of debris. Upon completion of installation, the finished project shall be inspected by the installation crew and an installation supervisor.

3.4 PROTECTION

Protect completed synthetic grass surfacing system throughout construction process until project completed.

3.5 RECYCLING

Manufacturer must commit in writing to offer a "take back" program that once the useful life of the turf surface has lapsed it can be removed and recycled.

END OF SECTION 32 18 13

SECTION 32 31 13 CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings, general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the Work of this Section.

1.2 DESCRIPTION OF WORK

A. Fence is to be complete with all fittings, straps, etc. required to provide a first-class installation in keeping with the highest standards for security chain link fencing. Fencing fabric shall have knurled top and barbed bottom. Gate fabric shall have knurled top and knurled bottom.

1.3 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete.

1.4 APPLICABLE CODES AND REGULATIONS

A. Comply with all applicable City of San Antonio codes and regulations.

B. All posts and rails shall conform to requirements of ASTM-A120-73 if pipe, or ASTM-A123-73 if “C’ section.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data, and installation instructions for fencing and gates.

PART 2 – PRODUCTS

2.1 All components shall be galvanized steel. Aluminum is not allowed.

2.2 Fence shall have a top rail. All tube ends shall be capped or plugged.

2.3 Fence shall have a 11-gauge bottom tension wire tied to fabric at 24” OC max.

2.4 All ties shall be #11 smooth galvanized steel wire at 24” on center on top rail, post, and bottom tension wire. Aluminum ties are not acceptable.

2.5 All gates shall generally lie in the fence line when closed and have LOCK OPEN POST to provide for locking the gate open 180° swing.

2.6 Erection shall be by mechanics experienced in fence erection with work plumb, square, straight and in line with accurately fitted tight joints, and securely anchored.

2.7 Fence fabric shall be maximum 1.5” off grade and cut into grade locally as required to maintain smooth top line. Where perimeter fence backs to an existing fence, a 3” off grade will be required for general maintenance and to maintain brush.

2.8 Concrete footing top finish shall be round, diameter to match footing, edges to be flush with grade, with a smooth one-inch crown.

2.9 Manufacturer: Subject to compliance with requirements, provide products of one of the following:

1. Allied Tube and Conduit Corp.
2. Anchor Fence, Inc.
3. Colorguard Corp.
4. Davis Walker Corp.
5. Dominion Fence and Wire Prod.
6. United States Steel.

2.10 STEEL FENCING

A. Four Foot Chain Link Fence:

1. Line Posts:
   Material – 2” by 2.72 lbs. linear feet (std. St.) galvanized steel pipe or C-section roll formed from steel conforming to ASTM A570-72, Grade E, 1.875” x 1.625” with minimum bending strength of 245 lbs. under a 6’ cantilever load.
   Spacing – 10’ maximum
2. Installation – set in concrete minimum of 10” diameter and minimum of 30” deep.
3. Corner or Terminal Posts:
   Material - 3" by 5.79 lbs./linear ft. (std. wt.) galvanized steel pipe or shall be a roll formed section 3.5" x 3.5" with minimum bending strength of 453 lbs. on 6' cantilever load.
   Installation - set in concrete minimum of 12" in diameter and minimum depth 36".
   Bracing - horizontal brace back to first line post with 2" std. wt.
   Galvanized pipe - diagonal brace top of first line post to bottom of corner or terminal post with a galvanized 3/8" steel rod with tightening device.
4. Gate Hinge Post:
   a) 10' and wider gate.
      Material - 6-5/8" by 18.97 lbs./linear ft. (std. wt.) galvanized steel pipe.
      Installation - set in concrete, minimum 18" diameter by minimum depth of 60".
   b) 5' to 9' wide gate.
      Material - 4" by 9.10 lbs./linear ft. (std. wt.) galvanized steel pipe.
      Installation - set in concrete, minimum 18" diameter by minimum depth of 48".
   c) 3' to 4' wide gate.
      Material - 3" by 5.79 lbs./linear ft. (std. wt.) galvanized steel pipe or shall be a roll formed section 3.5" x 3.5" with a minimum bending strength of 453 lbs. on a 6' cantilever load.
      Installation - set in concrete, minimum of 12" diameter by minimum depth of 36".
5. Gate - Latch Open Post:
   Material - 3" by 5.79 lbs./linear ft. or shall be a roll formed section 3.5" x 3.5" with minimum bending strength of 453 lbs. on 6' cantilever load.
   Installation - set in concrete minimum diameter 10" by minimum of 30" deep.
6. Fabric: 9 gauge, 2" x 48” galvanized chain link.
7. Fence Top Rail:
   Material - 1-5/8" diameter by 2.27 lbs./linear ft. (std. wt.) galvanized steel tube or shall be a roll formed section of 1.625" x 1.25" channel shaped rail with minimum vertical bending strength of 192 lbs. on 10' span.
8. Bottom Tension Wire:
   Material - 11 gauge galvanized steel wire.
9. Gate Construction: 6' and wider gates.
   Frame - 2" by 2.72 lbs./linear ft. (std. wt.) galvanized steel pipe. Frame to include vertical members as required to divide gate into bays not to exceed one and one half times the gate height in length. All bays shall be of equal length. Each bay shall have one diagonal member with the top end of the diagonal towards the hinge end of the gate. All corners and trussing to be welded, or bolted, using heavy duty cast malleable iron fittings.
   Filler - same as fence fabric.

Security - gate latches shall be suitable for locking.
3' to 5' wide gates same as 6' and wider except delete internal frame bracing.

B. Five and Six Foot Chain Link Fence:

1. Line Posts:
Material - 2-3/8" by 3.65 lbs./linear ft. (std. wt.) galvanized steel pipe or C - section roll formed from steel conforming to ASTM A570-72, Grade E, 1.875" x 1.625" with minimum bending strength of 245 lbs. under a 6' cantilever load.
Spacing - 10' maximum.
Installation - set in concrete minimum of 12'' diameter and minimum of 30" deep.

2. Corner or Terminal Posts:
Material - 3" by 5.79 lbs./linear ft. (std. wt.) galvanized steel pipe or shall be a roll formed section 3.5" x 3.5" with minimum bending strength of 453 lbs. on 6' cantilever load.
Installation - set in concrete minimum of 12" in diameter and minimum depth 40".
Bracing - horizontal brace back to first line post with 2" std. wt.
Galvanized pipe - diagonal brace top of first line post to bottom of corner or terminal post with a galvanized 3/8" steel rod with tightening device.

3. Gate Hinge Post:
a) 10' and wider gate.
Material - 6-5/8" by 18.97 lbs./linear ft. (std. wt.) galvanized steel pipe.
Installation - set in concrete, minimum 18" diameter by minimum depth of 60".
b) 5' to 9' wide gate.
Material - 4" by 9.10 lbs./linear ft. (std. wt.) galvanized steel pipe.
Installation - set in concrete, minimum 18" diameter by minimum depth of 48".
c) 3' to 4' wide gate.
Material - 3" by 5.79 lbs./linear ft. (std. wt.) galvanized steel pipe or shall be a roll formed section 3.5" x 3.5" with a minimum bending strength of 453 lbs. on a 6' cantilever load.
Installation - set in concrete, minimum of 12" diameter by minimum depth of 40".

4. Gate - Latch Open Post:
Material - 3" by 5.79 lbs./linear ft. or shall be a roll formed section 3.5" x 3.5" with minimum bending strength of 453 lbs. on 6' cantilever load.
Installation - set in concrete minimum diameter 10" by minimum of 30" deep.

5. Fabric: 9 gauge, 2" x 60" for 5' fence and 72" for 6' fence.

6. Fence Top Rail:
Material - 1-5/8" diameter by 2.27 lbs./linear ft. (std. wt.) galvanized steel tube or shall be a roll formed section of 1.625" x 1.25" channel shaped rail with minimum vertical bending strength of 192 lbs. on 10' span.

7. Bottom Tension Wire:
Material - 9 gauge galvanized steel wire.

8. Gate Construction: 6' and wider gates.
Frame - 2" by 2.72 lbs./linear ft. (std. wt.) galvanized steel pipe. Frame to include vertical members as required to divide gate into bays not to exceed one and one half times the gate height in length. All bays shall be of equal length. Each bay shall have one diagonal member with the top end of the diagonal towards the hinge end of the gate. All corners and trussing to be welded, or bolted, using heavy duty cast malleable iron fittings.
Filler - same as fence fabric.
Security - gate latches shall be suitable for locking.

3' to 5' wide gates same as 6' and wider except delete internal frame bracing.

C. Eight Foot High Chain Link Fence

1. Line Posts:
   Material – 2-3/8” by 3.65 lbs./linear ft. (std. wt.) galvanized steel pipe or C-section roll formed from steel conforming to ASTM-A570-72, Grade E, 2.25” x 1.70” with minimum bending strength of 316 lbs. under a 6’ cantilever load.
   Spacing – 10’ maximum.
   Installation – set in concrete minimum of 12’’ in diameter and minimum of 36” deep.
2. Corner or Terminal Posts:
   Material – 3” by 5.79 lbs./linear ft. (std. wt.) galvanized steel pipe or shall be a roll formed section 3.5” x 3.5” with minimum bending strength of 453 lbs. on 6’ cantilever load.
   Installation – set in concrete minimum of 12” in diameter and minimum of 40” deep.
   Bracing – horizontal brace back to first line post with 2” std. wt.
   Galvanized pipe – diagonal brace top of first line post to bottom of corner or terminal post with a galvanized 3/8” steel rod with tightening device.
3. Gate Hinge Post:
   8’ to 16’ wide gates
   Material – 6-5/8’’ by 18.97 – lbs./linear ft. galvanized steel pipe.
   Installation – set in concrete minimum of 18” diameter by minimum depth 72”.
   3’ to 7’ Wide Gates:
   Material – 4” by 9.10 lbs./linear ft. galvanized steel pipe.
   Installation – set in concrete minimum of 12” diameter by minimum depth 48”.
4. Gate – Latch Open Post
   Material – 3” by 5.79 lbs./linear ft. galvanized steel pipe or shall be a roll formed section 3.5” x 3.5” with a minimum bending strength of 453 lbs. on a 6’ cantilever load.
   Installation – set in concrete minimum of 12” diameter by minimum depth 30”.
5. Fabric shall be 9 gauge, 2” x 96” galvanized chain link, having barbed finished both edges.
6. Fence Top Rail:
   Material – 1-5/8” by 2.27 lbs./linear feet. Galvanized steel tube or shall be a roll formed section 1.625” x 1.25” channel shaped rail with minimum vertical bending strength of 192 lbs. on 10’ span.
7. Bottom Tension Wire:
   Material shall be 9 gauge galvanized steel wire.
8. Gate Construction:
   6’ and wider:
   Frame – 2” by 2.72 lbs./linear ft. (std. wt.) galvanized steel pipe. Frame to include vertical members as required to divide gate into bays not to exceed one and one half times the gate height in length. All bays shall be of equal length. Each bay shall have one diagonal member with the top end of the diagonal towards the hinge end of the gate. All corners and trussing to be welded, or bolted, using heavy-duty cast malleable iron fittings.
   Filler shall be same as fence fabric.
   Security – gate latches shall be suitable for locking.
   3’ to 6’ wide gates same as 6’ and wider except delete internal frame bracing.

D. Play Court Fencing (10 foot high chain link fence)

1. Line posts shall be 4” by 10.79 lbs./linear feet (std. wt.) galvanized steel pipe.
   Spacing – 8’ maximum.

Installation – set in concrete minimum of 12” in diameter and minimum of 40” deep.

2. Corner or Terminal Posts:
   Material – 6” by 18.97 lbs./linear ft. (std. wt.) galvanized steel pipe.
   Installation – set in concrete minimum of 18” in diameter and minimum of 48” deep.
   Bracing – horizontal brace back to first line post with 2” std. wt.
   Galvanized pipe – diagonal brace top of first line post to bottom of corner or terminal post with a galvanized 3/8” steel rod with tightening device.
3. Fabric – 9 gauge, 1-3/4” x 120” galvanized chain link, having knurled edges top and bottom.
4. Fence Top Rail:
   Material – 1-5/8” by 2.27 lbs./linear ft. galvanized steel tube or shall be a roll formed section 1.625” x 1.25” channel shaped rail with minimum vertical bending strength of 192 lbs. on 10’ span.
5. Bottom Tension Wire:
   Material – 9 gauge galvanized steel wire.
6. Gate Construction
   Same as for 8’ high chain link fence.

2.11 INSPECTION

A. All postholes shall be inspected and approved prior to the setting of any post in concrete. Any post set without hole inspection and approval shall be removed and reset at Contractor’s expense.

2.12 CONCRETE

A. Provide concrete consisting of portland cement, ASTM C 150 aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 3000 psi using at least 4 sacks of cement per cu. yd., 1" maximum size aggregate, maximum 3" slump, and 2% to 4% entrained air.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

B. Excavation: Drill holes for posts of diameters and spacing as shown on plans in firm, undisturbed or compacted soil.

C. Unless otherwise indicated, excavate hole depths approximately 3" lower than post bottom, with bottom of posts set not less than 36" below finish grade surface.

D. Setting Posts: Center and align posts in holes 3" above bottom of excavation. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Finish top of concrete footing in cone shape for drainage away from post.

E. Top Rails: Run rail continuously through post caps, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.

F. Center Rails: Provide center rails where shown. Install in one piece between posts and flush with post on fabric side, using special offset fittings where necessary.

G. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.

H. Tension Wire: Install tension wires before stretching fabric and tie to each post with not less than 6 ga. galvanized wire. Fasten fabric to tension wire using 11 ga. galvanized steel hog rings spaced 24" o.c.

I. Fabric: Leave approximately 2" between finish grade and bottom salvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

J. Stretcher Bars: Thread through or clamp to fabric 4" o.c., and secure to posts with metal bands spaced 15" o.c.

K. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

L. Tie Wires: Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend wire to minimize hazard to persons or clothing.

M. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

END OF SECTION

SECTION 32 80 00
IRRIGATION SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Work specified in this section: Provide all labor, materials, and services necessary to furnish and install the irrigation system as shown on the drawings and described herein.

B. Underground irrigation system shall include, but is not limited to, pipe, sleeves where required, valves and fittings, controller and wire, sensors, testing, sprinkler heads, excavating and backfilling irrigation system work, associated exterior plumbing and accessories to complete the system.

1.2 RELATED SECTIONS

A. The requirements of the "General and Supplementary Conditions of the Contract" and Division 1 specification sections shall apply to all work of this Section with the same force and effect as though repeated in full herein.

B. Site Grading: See Specifications.

C. Section 32 93 00 - Landscaping

D. Section 32 91 13 - Soil Preparation

1.3 REFERENCES

A. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2000.

B. ASTM D 2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems; 1996a.

C. Texas Water Code, Chapter 34, Chapter 344 Rules for Licensed Irrigators (TCEQ).

D. National Fire Protection Association, (NFPA); National Electrical Code.

E. National Sanitation Foundation (NSF).

1.4 SUBMITTALS

A. Certifications/Material List/Shop Drawings:

1. The Contractor shall submit copy of irrigator's license on company letterhead.
2. The Contractor shall submit letter of certification of on-site water pressure.
3. The Contractor shall furnish the articles, equipment, materials, or processes specified by name in the drawings and specifications. No substitution will be allowed without prior approval by the Owner.
4. Complete material list shall be submitted prior to performing any work. Material list shall include the manufacturer, model number and description of all materials and equipment to be used.
5. Submit copy of the Irrigation Installation Certification Letter. Original copy to be issued to City inspector.
6. Contractor Shop Drawings:
   a. Wire Routing Plan: Contractor shall submit full size drawing showing in color the routing of wires from valves to controller. Contractor shall show where wires leave mainline to controller.
   b. Temporary Irrigation Plan: Contractor shall submit full size drawing showing location of heads and valves, properly zoned and connections to the mainline.
7. Equipment or materials installed or furnished without prior approval of the Landscape Architect may be rejected and the Contractor shall be required to remove such materials from the site at his own expense.
8. Approval of any item, alternate or substitute indicates only that the product or products apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted.

9. Manufacturer's warranties shall not relieve the Contractor's liability under the guarantee. Such warranties shall only supplement the guarantee.
10. Submit complete package.
11. Submittal to be numbered ending in ".0" for first submittal and ".1" etc. for subsequent submittals.

B. Record and As-Built Drawings:
1. The Contractor shall provide and keep up-to-date an "as-built" set of prints which shall be corrected daily and show changes from the original drawings and specifications. The drawings shall show "as-built" locations, sizes and kinds of equipment installed. This set of drawings shall be kept on the site and shall be used only as a working set.
2. These drawings shall also serve as work progress sheets and shall be the basis for measurement and payment for work completed. These drawings shall be available at all times for inspection. Should drawings not be available, no observation will take place.
3. The Contractor shall make neat and legible notations on the as-built progress sheets daily as the work proceeds, showing the work as actually installed.
4. Before the date of the final inspection, the Contractor shall transfer all information from the "as-built" prints to clean bond paper. All work shall be in pen to allow proper printing of original.
5. The Contractor shall dimension from two (2) permanent points of reference i.e., building corner, sidewalk, or road intersections, etc., the location of the following items:
   a. Connections to potable water lines.
   b. Location of backflow preventer.
   c. Connections to electrical power.
   d. Location of new controller.
   e. Routing of pressure lines.
   f. Irrigation control valves.
   g. Quick-coupling valves.
   h. Isolation valves
   i. Spare Wire Routing
   j. Other related equipment as directed by the Landscape Architect.
6. On or before the date of the final inspection, the Contractor shall deliver the completed as-builts on clean bond paper or Mylar or similar material and on Compact Disk to the Architect. Delivery of the as-builts will not relieve the Contractor of the responsibility of furnishing required information that may be omitted from the as-builts.

C. Controller Charts:
1. On the inside door of controller, provide a reduced copy of the irrigation plan colored coded area of coverage per each zone and location of main line, manual valves and taps. Chart shall be created in a professional manner and be laminated.

D. Operation and Maintenance Manuals:
1. Prepare and deliver to the Owner within ten calendar days prior to completion of construction, two hard cover binders with three rings containing the following information:
   a. Index sheet stating Contractor's address and telephone number, list of equipment with name and addresses of local sources of equipment installed. Manuals and/or catalog and parts sheets on all material and equipment installed under this contract.
   b. Guarantee statement.
   c. Complete operating and maintenance instructions on all major equipment.
   d. Copy of the Irrigation Installation Certification Letter.

e. Water Schedule: Water schedule shall state watering times and frequencies of each irrigation zone. Water schedule shall be based on the local ET (evapotranspiration) rate. Schedule to include separate watering times for each of the four seasons (Spring, Summer, Fall, and Winter)

2. In addition to the above-mentioned maintenance manuals, provide the Owner's maintenance personnel with instructions for major equipment.

E. Equipment to be Furnished:

1. Supply as part of this contract the following tools:
   a. Two (2) sets of sprinkler wrenches for adjusting, cleaning or disassembling each type of sprinkler and two (2) each of any special tools required for any other equipment.
   b. Four (4) pop-up spray heads each type and four (4) nozzles of each type installed.
   c. Four (4) rotor heads and four (4) sets of nozzles.
   d. Two (2) keys for automatic controller locks.
   e. Two (2) keys and hose-swivels for quick-coupler valve operation.
2. The above-mentioned equipment shall be turned over to the Owner at the conclusion of the project. Before final inspection, verification that materials have been provided will occur.

1.5 QUALITY ASSURANCE AND REQUIREMENTS

A. Permits and Fees: The Contractors shall obtain and pay for any and all permits and all inspections as required. Contractor shall also be responsible for all fees and costs involved for irrigation tap with the City main, water and related work.

1. Irrigation Contractor shall comply with City inspector directions with agreement from Landscape Architect without extra cost to Owner.

B. Manufacturer's Directions: Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturer of the article used in this contract furnishes directions covering points not shown in the drawings and specifications.

C. Ordinances and Regulations: All local, municipal and state laws, and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations or requirements of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.

1. Installer Certification Letter: The municipality will require a letter from the Licensed Irrigation installer certifying that the irrigation system was installed in accordance with the approved irrigation plan. Original copy shall be placed with the Test & Measure report in a weatherproof bag that will be collected by the building official. Irrigation contractor is to submit a copy of his conformity letter in the submittal package.

D. Statement of Area of Coverage: Drawing does not provide 100% coverage of the site. See plans and these specifications for areas to be irrigated.

E. Installer's Qualifications: Minimum of 10 years' experience installing irrigation systems of comparable size. Irrigation contractor shall be licensed in the State of Texas and bonded.

F. Explanation of Drawings:

1. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. The Contractor shall carefully investigate

the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigations systems, planting and architectural features.

2. The words "Landscape Architect" as used herein shall refer to the Owner's authorized representative. The word "Contractor" shall herein refer to the Irrigation Contractor unless stated otherwise.
3. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.

G. Installation Review: Contractor shall record all installation deficiencies found and corrected. These documents will be complied at the completion of the project to be submitted to Owner for record.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.
B. Handling of PVC pipe and fittings: The Contractor is cautioned to exercise care in handling, loading, unloading and storing of PVC pipe and fittings.
C. Store and handle materials to prevent damage and deterioration. Do not store PVC pipe in direct sunlight for more than 7 days.

1.7 SUBSTITUTIONS

A. Any and all substitutions shall be reviewed and approved by the Owner. Reference "Supplementary Conditions of the Contract" for proper substitution request procedures.

1.8 GUARANTEE

A. The guarantee for the sprinkler irrigation system shall be made in accordance with the attached form.
B. A copy of the guarantee form shall be included in the operations and maintenance manual.
C. The guarantee form shall be re-typed onto the Contractor's letterhead and contain the following information:

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse, or neglect excepted. We agree to repair or replace any defects in material or workmanship which may develop during the period of one year from date of acceptance and also to repair or replacing of such defects at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time, as determined by the Owner, after receipt of written notice. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of written notice from the Owner, we authorize the Owner to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT:_____
LOCATION:_____
SIGNED: _____
ADDRESS: _____
PHONE:_____
DATE OF ACCEPTANCE: _____

1.9 PROJECT CONDITIONS

A. 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 area dimensions exist that might not have been considered in engineering. Such obstructions or differences should be brought to the attention of the Landscape Architect. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary and at no additional cost to the Owner.

B. The Contractor shall verify on-site pressure is not less than design pressure. Contractor shall submit letter certifying that on-site pressure exceeds design pressure by 10%. If on-site pressure does not exceed design pressure by 10%, contact Landscape Architect for resolution. If construction work is started prior to receiving certification letter, the Contractor assumes all costs for changes required to meet on-site pressure.

C. Site Utilities:
1. Determine locations of underground utilities, especially site lighting, cable, telephone, and irrigation lines. Perform all work in a manner which will avoid possible damage. Do not permit heavy equipment or trucks to damage utilities. Hand excavate, as required to minimize possibility of damage to underground utilities.
2. Coordinate work with the irrigation contractor to prevent damage to underground wire and other obstruction work located in landscape areas.
3. Known underground and surface utility lines are indicated on the utility survey. Contractor shall verify location of all known underground and surface utilities by contacting the appropriate utility companies.
4. Any damage to utilities shall be repaired by contractor.

D. Contractor is responsible for protecting all existing trees, plants, lawns, and other features designated to remain.

E. Contractor shall repair/replace any damage to adjacent facilities caused by irrigation system work operations at no additional cost to Owner.

F. Provide and install a dedicated irrigation meter and backflow preventer for the irrigation system water supply.

G. Design Pressure:
1. Design Static Pressure: 65 PSI
2. Rotary Zone: 30 PSI
3. Rotor Zone: 35 PSI
4. Tree Bubbler Zone: 30 PSI
5. Drip Zone: 30 PSI

1.10 SCHEDULES
A. The Contractor shall begin exterior landscape work upon acceptance of the Contract by the Owner. Landscape Contractor shall submit a schedule for the work to be performed to the Landscape Architect for approval.

1.11 PROTECTIONS
A. All items required to complete this contract remain the property and responsibility of the Contractor until final acceptance. Take adequate precautions to protect all work and materials against damage. Cooperate fully with other trades to insure a satisfactory completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Use only new materials of brands and types noted on drawings, specified herein, or approved equals.

B. PVC Pressure Mainline Pipe and Fittings:
1. Pressure mainline piping for sizes 1" inch through 3", shall be PVC Schedule 40.
2. All PVC pipe must bear the following markings:
   a. Manufacturer's name
   b. Nominal pipe size
   c. Schedule or Class
   d. Pressure rating in P.S.I.
   e. NSF (National Sanitation Foundation) approval
   f. Date of extrusion
4. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable I.P.S. schedule and NSF seal of approval.

C. PVC Non-Pressure Lateral Line Piping:
1. Pipe 3/4" inch and larger, shall be PVC Class 200, SDR-21. class pipe shall be with solvent-weld joints. No ½" PVC pipe shall be used.

D. Flexible PVC Tubing: All flexible PVC tubing shall be I.P.S. heavy wall hose made from rigid PVC material. Hose shall meet or exceed schedule 80 wall thickness and shall comply with ASTM D2287 and tested in accordance with ASTM D1598. Funny-Pipe not acceptable.

E. Swing Joints and Nipples:
1. Bubblers: Pre-assembled flex joints equal to Hunter SJ-Swing Joint.

F. Fittings:
1. Schedule 40 PVC molded fittings meeting ASTM D224. Fittings shall be suitable for solvent weld or slip joint ring tight seal. Threaded fittings shall be Schedule 80 PVC. Fittings for plastic to metal connections shall be Sch. 80 PVC male adapters.

G. Manual Valves:
1. Mainline shut-off valves 3.0 inches and smaller shall be USA made, schedule 80 PVC ball valves, manufactured by Spears or approved equal.
2. Isolation Valves at remote valves shall be Spears schedule 80 PVC ball valves or approved equal. Same size at remote valve.

H. Backflow Prevention Units: Existing.

I. Control Wiring:
1. Connections between the automatic controllers and the electric control valves shall be made with direct burial copper wire #14, AWG-U.F. 30 volts, using a National Electric Code Class II circuit. Install in accordance with valve manufacturer's specifications and wire chart.
2. For runs greater than 2000 feet, larger wire may be used provided it conforms to controller manufacturer's specifications for both material specification and installation.
3. Underground splice kit shall be 3M DBY water-tight, dry splice connector or approved equal. All wire splices shall be protected by a valve box. No splices shall be installed on runs less than 500 feet.
4. Common wire shall be white.
5. Where control wire leaves mainline, install in Schedule 40 PVC conduit.
6. Provide one spare red wire and one spare white wire from the tree bubbler zone valve all the way to the designated splice box. Label wires with valve ID Tag with the word, "Future 1" at both the valve box end and the splice box end.

J. Automatic Controller:
1. Automatic controller shall be of size and type shown on the plans. Final location of automatic controllers shall be approved by the Owner.
2. Mount in cabinet.
3. Unless otherwise noted on the plans, the 120-volt electrical power for the controller is available at the site. The final electrical hook-up shall be the responsibility of the Irrigation Contractor.

L. Weather Sensors:
1. Rain sensor: Wired rain sensor.
2. Freeze sensor: See above.
3. Wireless will be rejected.

M. J-Boxes: J-boxes with accessible pull points for rigid conduit shall be LB box, pulling L (SLB), or J-box.

N. Electrical Control Valves:
1. All electric control valves shall be as called for on the plans.

O. Valve Boxes:
1. Manual Valves: 10-inch box, NDS or RainBird, with green bolt down cover.
2. Electrical Control Valves: NDS or RainBird, with green bolt down cover or approved equal.
   a. 1” valve assemblies, flow sensors, pressure reducers, master valve(s): Standard rectangular box.
   b. 1.5”, 2”, 3” and drip valve assembly: Jumbo rectangular box.
3. Wire Splice: 10-inch box, NDS or RainBird, with green bolt down cover.
4. Air Relief and Flush Valves: 6” inch box, NDS or RainBird.
5. Use extensions where required.

P. Sprinkler Heads:
1. All sprinkler heads shall be of the same size, type, and deliver the same rate of precipitation with the diameter (or radius) of throw and discharge as shown on the plans and/or specified in these special provisions.
2. All sprinkler heads of the same type shall be of the same manufacturer.

Q. Sleeves:
1. Definition: a pipe with in another pipe for carrying water will be installed.
2. Wire sleeve: a pipe used to carry low voltage irrigation wires for operation of electric control valves.
3. All sleeves shall be SCH 40. Size shall be equal to twice the diameter of the pipe or combination of pipes enclosed within the sleeve.

2.2 ACCESSORIES
A. Primers, cements, solvents, and joint compounds:
1. General: All primers, cements, solvents, and joint compounds shall be approved for use by the Uniform Plumbing Code; ASTM D 2564 for PVC pipe and fittings. Utilize appropriate type for application required.
   a. Primer: Weld-On #P68 purple primer.
   b. PVC: IPS Weld-On #705 solvent cement.
   c. Flexible PVC: Weld-On #795 solvent cement.
   d. Schedule 80 PVC: Weld-On #705 solvent cement.
2. Connections for PVC and Metal Pipe: For all threaded connections between PVC and metal pipe use Heavy Duty Rectorseal thread sealing paste with virgin Teflon No. 100 as manufactured by Rectorseal Corp. Apply in accordance with manufacturer’s instructions.
B. Drainage fill: 3/4" washed gravel.
C. Filter Fabric: Dewitt’s weed barrier or approved equal.

D. Pipe bedding Sand: Washed sand.

PART 3 EXECUTION

3.1 INSPECTION

A. Site Conditions:

1. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions and inform Landscape Architect of his approval prior to proceeding with work under this section.
2. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities which are caused by his operations or neglect. Check existing utilities drawings for existing utility locations.
3. Coordinate installation of sprinkler irrigation materials including pipe, so there shall be not interference with utilities or other construction or difficulty in planting trees, shrubs and groundcovers.
4. The Contractor shall carefully check all grades to satisfy himself that he may safely proceed before starting work on the sprinkler irrigation system.

3.2 PREPARATION

A. Physical Layout:

1. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of sprinkler heads.
2. All layouts shall be observed by Landscape Architect prior to installation.
3. Remove existing paving for sleeve installation if required. Saw cut existing paving to provide uniform straight transition at new to existing paving. Replace paving to equal or better conditions.

B. Water Supply:

1. Irrigation system shall be connected to water supply points as indicated on the drawings.

C. Electrical Supply:

1. Electrical service is available at the general locations of all controllers. The Contractor shall make the final wiring of the controller consistent with the city code.
2. Connections shall be made at approximated locations as shown on drawings. Contractor is responsible for minor changes caused by actual site conditions.
3. Contractor is required, at Contractors expense to hire electrician if necessary to make adjustments to outlet and connections.

3.3 INSTALLATION

A. Trenching:

1. Prior to trenching, verify the location of all underground site utilities and protect in place.
2. Dig trenches. Trenching excavation shall follow layout indicated on drawings and as noted.
3. Provide for a minimum of eighteen (18) inches of cover for all pressure supply lines.
4. Provide for a minimum cover of twelve (12) inches for all non-pressure lines.
5. Contractor shall be responsible for rock excavation encountered to complete jobs as specified.
6. Maximum pipe depth shall be 30” inches.

B. Backfilling:

1. Install 2” sand bedding prior to placing any pipe.
2. The piping shall not be covered/backfilled until all required inspections and/or

tests are performed.

3. Trenches shall be backfilled with sand bed to 2 inches below pipe and 2 inches above pipe. The remainder of trench shall be backfilled with cleaned excavated material, consisting of earth, loam, sandy clay, sand, or other approved materials, free from large clods of earth or stones. Compact trenches to match surrounding soil. Backfill will conform to adjacent grades without dips, sunken areas, jumps or other surface irregularities.
4. If settlement occurs and subsequent adjustments in grade, pipe, valves, sprinkler heads, lawn or planting, or other construction are necessary, the Contractor shall make all required adjustments without cost to the Owner.

C. Trenching and Backfill Under Paving:
1. Trenches located under areas of paving, asphaltic concrete or concrete will be installed and base has already been compacted, shall be backfilled with 2" of sand above and below pipe. The balance of the trench is to be backfilled with flowable fill 1-2 sack cement to the bottom level of finished paving.
2. Compact backfill in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in a firm unyielding condition. All trenches shall be left flush with the adjoining grade. The Irrigation Contractor shall set in place; cap and pressure test all piping under paving.
3. General piping under existing walks is done by jacking, boring or hydraulic driving, but where any cutting or breaking of sidewalks and/or concrete is necessary, it shall be done and replaced by the Contractor as a part of the contract cost. Permission to cut or break sidewalks and/or concrete shall be obtained from the Architect.

D. Sleeves:
1. Extend sleeves a minimum of eighteen inches past edge of pavement or walls. Extend sleeves above grade by providing temporary 90˚ fittings on each end. Refer to plan detail.
Maintain sleeve locations for irrigation contractor.
2. Required sleeving will be provided by the General Contractor or Irrigation contractor as shown on plans.
3. Size of sleeves shall be equal to twice the diameter of the pipe or combination of pipes enclosed within the sleeve.
4. Provide for a minimum cover of eighteen (18) inches between the top of the pipe and the bottom pavement for all pressure and non-pressure piping installed under asphaltic paving.
5. Install sleeves at all areas where piping crosses paving or through walls and as required. All sleeves may not be shown on plans. Contractor shall be responsible for placing all sleeves with consideration for temporary irrigation as well.
6. Drainage structures shall not be used as sleeves.
7. Provide 2” wire conduit sleeve for spare future wires.

E. Assemblies:
1. Routing of sprinkler irrigation lines as indicated on the drawings is diagrammatic. Install lines (and various assemblies) in such a manner as to conform to the details per plans.
2. Install all assemblies specified herein in accordance with respective detail. In absence of detail drawing or specifications pertaining to specific items required to complete work, perform such work in accordance with industry's best standard practice.

F. Piping:
1. PVC pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture

before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.

2. Remove burrs and shavings at cut ends prior to installation. Remove all scrap PVC pipe and fittings from site.
3. Make plastic to plastic joints with solvent weld joints or slip seal joints. Use solvent recommended by manufacturer. Install pipe fittings in accordance with manufacturer's instructions.
4. Install pipe with markings facing to the top of trench for ease of observation.
5. Allow joints to set at least 24 hours before water/compaction pressure is applied to the piping.
6. Do not use crosses in pipe connections.
7. On PVC to metal connections, the Contractor shall work the metal connections first. Teflon paste shall be used on all threaded PVC to metal joints. Hand tighten male adapters plus one turn with a strap wrench. Where threaded PVC connectors required, use threaded PVC adapters into which the pipe may be welded.
8. Line Clearance: All lines shall have a minimum clearance of two (2) inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another, space minimum of 2" apart. Do not place more than three lines in a single trench.
9. All above grade piping shall be galvanized pipe with galvanized fittings. Galvanized pipe and fittings below grade shall be wrapped with protective tape.

G. Wiring:

1. Provide for a minimum cover of eighteen (12) inches for all control wiring.
2. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply wherever possible.
3. Where more than one (1) wire is placed in a trench, the wiring shall be taped together at intervals of ten (10) feet.
4. An expansion curl shall be provided within three (3) feet of each wire connection and each electric control valve. Expansion curls shall be a minimum of 36" in length at each splice connection so that in case of repair, the splice may be brought above the finish grade without disconnecting the control wires.
5. Control wires shall be laid loosely in trench without stress or stretching. Provide 36" expansion loops at 100' intervals and changes in direction.
6. All splices shall be made with approved wire connector. Use one connector sealing pack per splice.
7. Field splices between the automatic controller and electrical control valves will not be allowed.
8. Where wires leave mainline, install in Schedule 40 PVC conduit. Size as required.
9. Where wires are exposed under building, install emt conduit.
10. Provide two (2) spare control wires from controller to end of mainline, unless noted otherwise, for future use.

H. Automatic Controller: Install as per manufacturer's instructions. Remote control valves shall be connected to controller in sequence as shown on the drawings. Watertight seal all wall penetrations.

1. Provide rigid emt conduit from controller to below finished grade to accommodate valve wires. Wires to weather sensors shall also be in rigid conduit. All 90 turns shall have J-boxes installed. Clamp conduit securely to wall. Final approval will be given by Owner.
2. Wiring for Automatic Controller:
   a. 120-volt power provided to the automatic controller shall be the responsibility of the General Contractor.
   b. Wire controllers per city code. Install wires in liquid tight conduit when wire must be run above the ground. If outdoor mounting is required, all wiring to controller and to power supply will be hard-wired.

3. Contractor shall install controller map.
4. Program all advanced features: flow, ET, Cycle-Soak, Seasonal Adjust by month, Water Windows, etc.
5. Provide flow smart module.
6. Provide IQ central control cellular connection cartridge and external antenna.
   a. Program system into IQ system online.
   b. Provide district training on the online system operations.

Contractor shall install controller map.

I. Weather Sensors: Install weather sensors as per detail and notes. Provide hardware to mount to light pole.

J. Backflow Preventer: Existing.

K. Electrical Control Valves: Install where shown on drawings and details. When grouped together, allow at least eighteen (18) inches between valves. Install each electric control valve in a separate valve box.

L. Manual Valves: Install manual valves per detail.

M. Quick Coupler Valves: Install quick coupler valves per detail.

N. Sprinkler Heads:
1. Install the sprinkler heads as designated on the drawings. Sprinkler heads to be installed in this work shall be equivalent in all respects to those itemized.
2. Spacing of heads shall not exceed the maximum indicated on the drawings or maximum recommended by manufacturer.
3. Install each sprinkler head to lateral using flexible pvc. Funny Pipe is not acceptable.

O. Valve Boxes: Install valve boxes over remote-control valves. Use box extensions and brick supports to raise valve boxes to be level with finished grade. Install gravel sump under each valve.

P. Dielectric Protection: Use dielectric fittings at connection where pipes and products of dissimilar metal are joined.

Q. Thrust Blocks: All mainline pipe 2.5" and larger shall have thrust blocks installed at all fittings installed on the main line. Care shall be taken by the Contractor to not encase the fittings in concrete. Install a fabric or rubber separation between the fitting and concrete. Keep all concrete off of the pipe joints. Control, power and valve wires must be kept free of concrete by the Contractor and placed outside of the thrust. Thrust blocks shall be poured against undisturbed ground. No precast thrust blocks or stacking of concrete sacks will be allowed. Thrust blocking installed in an improper/unprofessional manner will be rejected.

R. Flushing of System:
1. After all new sprinkler lines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of sprinkler heads, the control valves shall be opened and full head of water used to flush out the system.
2. Sprinkler heads shall be installed only after flushing of the system has been accomplished.

3.4 TEMPORARY IRRIGATION

A. Contractor shall provide and install an above ground irrigation system and equipment/materials as required to establish lawn areas not covered by the automatic irrigation system. Coordinate with landscape contractor to ensure proper coverage for the

time required to establish the lawn. Remove temporary irrigation system when lawn is established and accepted by Landscape Architect or Owner.

3.5 TEMPORARY REPAIRS

A. The Owner reserves the right to make temporary repairs as necessary to keep the sprinkler system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the guarantee as herein specified.

3.6 FIELD QUALITY CONTROL

A. Adjustment of the System:

1. The Contractor shall flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible.
2. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, the Contractor shall make such adjustments prior to planting. Adjustments may also include changes in nozzle sizes and degrees of arc as required.
3. Lowering raised sprinkler heads by the Contractor shall be accomplished within ten (10) days after notification by Owner.
4. All sprinkler heads shall be set perpendicular to finished grades unless otherwise designated on the plans.
5. The Contractor shall make minor adjustments in moving or capping of heads as directed in the field by Owner or Landscape Architect as part of this work. Additional cost to Owner will not be accepted.

B. Testing of Irrigation System:

1. The Contractor shall schedule with the Landscape Architect a time for the testing of the system.
2. After installation of electric control valves, test all pressure lines under hydrostatic pressure of 80 psi, and prove watertight.
3. All piping under paved areas shall be tested under hydrostatic pressure of 80 psi, and proved watertight prior to repaving.
4. Sustain pressure in lines for not less than four (4) hours. If leaks develop, replace joints and repeat test until entire system is proven watertight.
5. All hydrostatic tests shall be made only in the presence of the Landscape Architect, or other representative of the Owner. No pipe shall be backfilled until it has been inspected, tested and approved.
6. When the irrigation system is completed, perform a coverage test in the presence of the Landscape Architect, to determine if the water coverage for planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from plans, or where the system has been willfully installed as indicated on the drawing when it is obviously inadequate, without bringing this to the attention of the Landscape Architect.
7. This test shall be accomplished before any planting operations begin. Upon completion of each phase of work, the entire system shall be tested and adjusted to meet site requirements.
8. Test and demonstrate the irrigation system running from the controller.
9. Backflow device shall be tested and certified before substantial completion is issued.
10. Flow sensors when specified shall be tested for proper operation.

3.7 MAINTENANCE

A. The entire irrigation system shall be under fully automatic operation for a period of two days prior to any planting.

B. The Landscape Architect reserves the right to waive or shorten the operation period.

3.8 CLEAN-UP

A. Clean-up shall be made as each portion of work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be swept or washed down, and any damage sustained on the work of others shall be repaired to original conditions.

3.9 FINAL OBSERVATION PRIOR TO ACCEPTANCE

A. The Contractor shall operate each system in its entirety for the Landscape Architect at time of final observation. Any items deemed not acceptable by the Landscape Architect shall be reworked to the complete satisfaction of the Landscape Architect.

B. The Contractor shall show evidence to the Architect that the Owner has received all accessories, charts, record drawings, and equipment as required before final inspections can occur.

3.10 OBSERVATION SCHEDULE

A. Contractor shall be responsible for notifying the Landscape Architect in advance for the following observation meetings:
   1. Pre-Installation Conference.
   2. Pipe and sleeving under paving installation.
   3. Pressure supply line installation and testing.
   4. Final inspection.
   5. 12 Month Warranty system operation performance test.

B. When observations have been conducted by other than the Landscape Architect, show evidence in writing of when and by whom these observations were made.

C. No site observations will commence without as-built drawings. In event the Contractor calls for a site visit without as-builts drawings, without completing previously noted corrections, or without preparing the system for said visit, he shall be responsible for reimbursing the Landscape Architect at his current billing rates per hour portal to portal (plus transportation costs) for inconvenience. No further site visits will be scheduled until this charge has been paid and received.

END OF SECTION

SECTION 32 91 13
SOIL PREPARATION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Landscape soil placement and finish grading for landscape work.
   1. Turf/grass areas.

B. Extent of soil preparation work addresses entire site.

C. Finish grading.

D. Subgrade Elevations: Excavation, filling and grading are not specified in this section.

1.02 RELATED WORK

A. Site Grading: See specifications.

B. Section 328000 – Irrigation System

C. Section 329300 - Landscape

1.03 SITE CONDITIONS

A. Verification of Dimensions:
   1. All scaled and figured dimensions are given for estimate purposes only.
   2. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and sizes, etc., and shall assume full responsibility for the correctness of all such items.

B. Existing Conditions:
   1. New work shall be tied to existing conditions and controls such as existing grades.
   2. Finished grades shall bear proper relationship to such controls.

C. The Contractor shall adjust new work as necessary and as directed to meet existing conditions and fulfill intent of the plans.

D. Obstructions: If any unknown utilities and obstacles are encountered during the construction period, stop work and immediately contact the Landscape Architect before proceeding.
   1. Such obstructions shall be removed or relocated or the work adjusted as directed by the Landscape Architect.
   2. If work proceeds without contacting the Landscape Architect, the Contractor shall be held liable for any and all damages.

E. Underground Utilities:
   1. Prior to initiating any work of this section, the Contractor shall contact the appropriate authorities in order that their personnel can locate underground utilities that may be encountered.
   2. Coordinate with other trades on project concerning installation of new utilities that may be affected.

F. Existing Vegetation:
   1. Portions of the existing vegetation shall remain as indicated on the drawings.
   2. The Contractor shall take all means necessary to protect the existing vegetation. Any existing vegetation to remain that is damaged shall be replaced.
   3. New work shall be tied to existing conditions and controls such as existing planting beds. Bed expansions shall bear proper relationship to such controls.

G. Subgrade Elevations:
   1. Excavation, filling and grading required to establish elevations shown on drawings are not specified in this section.
   2. Subgrade elevations shall be established prior to placement of landscape soils to allow for placement to depths as indicated/required.

a. Contractor is responsible to coordinate establishment of subgrade elevations as required for landscape soils and project details.
b. Conditions in which subgrade elevations have not been provided, Contractor is responsible to complete excavation required and properly dispose of resulting spoils off-site.

1.04 QUALITY ASSURANCE

A. Landscape installation or maintenance must be supervised by a staff member of the Contractor who possesses at least one of the following current certifications/designations:
1. Certified Landscape Professional Contractor (CLPC) as administered by Texas Association of Landscape Contractors (TALC).
2. College degree relating to the landscape industry or an approved equivalent.

B. It is the obligation of the bidder to provide the Owner or Landscape Architect with documentation that the above qualification is met.

1.05 SOURCE QUALITY CONTROL

A. Analysis and Standards:
1. Package standard products:
a. Packaged and sealed standard products accompanied by manufacturer's or vendors' analysis, complying with specification requirements, will be acceptable.
2. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.

B. Certified Analysis:
1. Certified analysis by a recognized laboratory acceptable to the landscape architect of soils shall be submitted by the Contractor, at his own expense, for the landscape architect's approval before delivery to the site.
a. The samples tested shall consist of a representative mixture from each source.
b. The Contractor shall have soil tested to provide data regarding:
1) Sieve/particle size distribution analysis.
2) Percentage of organic content.
3) pH factor and recommendations on type and quantity of additives required to establish satisfactory pH factor.
4) Recommendations on type and quantity of additives required to reduce salt level content.
5) Supply of nutrients to bring nutrients to satisfactory level for planting including type of fertilizer required and for rates of application of fertilizer in turf/grass areas
c. Soil tests shall be run prior to soil sample approval and at Landscape Architect's discretion throughout soil installation.
d. Note Contractor's option to utilize commercially prepared garden/landscape topsoil specified in Products section negates requirement of testing soil for incorporation of additives while recommendations for fertilizer application remain.
2. Analysis requirements apply to:
a. Topsoil (import).
b. Topsoil (stripped and stockpiled on-site).
3. Soils for landscaping to be furnished shall be subject to inspection at its source to determine whether or not it meets with requirements specified and to approved depth to which it may be stripped.
4. At time of inspection, Contractor may be required to take additional representative soil samples, under Landscape Architect's observation, to proposed stripping depth from several locations under consideration.
5. If additional samples are required, herein before procedures shall be adhered to.
6. Other references to this requirement found in soil description of this Section - Soil Materials of the specifications.

D. Presence of Non-specified Grasses and Weeds:

1. The Landscape Architect reserves the right to inspect landscape areas from time of installation to Final Acceptance.
2. Any evidence of non-specified grasses or weeds will be cause for rejection and replacement of the unacceptable areas.

1.06 SUBMITTALS

A. Furnish at Landscape Architect's office, prior to installation, the following information/samples:
1. Supervisor Qualifications.
2. Soil:
a. 1-gallon container of soils or as noted below. Clearly label each container of contents.
b. Soil analysis with fertilizer and conditioner/amendment recommendations.
c. Encompasses on-site and imported material.
3. Soil Conditioner: Label from bag (Supplier's statement of analysis if bulk), and one ounce sample.
4. Soil Amendment: Label from bag (Supplier's statement of analysis if bulk), and one ounce sample.
5. Topsoil for Common Areas (Imported): 1-gallon container/zip-lock baggie.
6. Topsoil for Common Areas (on-site): 1-gallon container/zip-lock baggie.
7. Sulphur: Label from container or supplier’s brochure (pending requirement of soils analysis).
8. Gypsum: Label from container or Supplier’s brochure (pending requirement of soils analysis).
9. Iron: Label from container or Supplier’s brochure (pending requirement of soils analysis).
10. Soil Acidifier: Label from container or Supplier’s brochure (pending requirement of soils analysis).
11. Lime: Label from container or Supplier’s brochure (pending requirement of soils analysis).
12. Pre-emergent herbicide.
13. Post-emergent herbicide.
14. Submit complete package.
15. Submittal to be numbered ending in “.0” for first submittal and “.1” etc. for subsequent submittals.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials:
1. Deliver packaged materials in original containers showing weight, analysis and name of manufacturer.
2. Protect materials from deterioration during delivery, and while stored at site.

1.08 ABBREVIATIONS

A. C.Y Cubic Yard

B. S.Y.Square Yard

C. S.F.Square Feet

D. L.F.Linear Feet

1.09 JOB CONDITIONS

A. Basic Regulations:
1. Soil preparation operations shall be conducted under favorable weather conditions during the seasons which are normal for such work as determined by acceptable practice in the locality.

B. Contractor is hereby notified of active utilities and caution shall be exercised to avoid interruption of services.

C. The Contractor is responsible for replacement of any buried utilities, irrigation lines, etc., if they are broken during the soil preparation operations.
1. Contact the appropriate utility to get the locations of underground utilities.
2. The replacement costs are at the Contractor's expense.

D. When it is necessary to cross paved areas, curbing or walks, protection against damage shall be provided by the Contractor.

E. When conditions detrimental to landscape work are encountered during soil preparation, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before initiating work.
   1. Such obstructions shall be removed or relocated or the work adjusted as directed by the Landscape Architect.
   2. If work proceeds without contacting the Landscape Architect, the Contractor shall be held liable for any and all revisions necessary.

1.10 WARRANTY & GUARANTEES

A. Repair:
   1. When any portion of the surface becomes gullied or otherwise damaged or treatment is destroyed during the Project's warranty period, the affected portion shall be repaired to reestablish condition and grade of soil to as it was prior to injury as directed.
   2. Repair work required shall be performed without cost to the Owner.

B. Repair shall be made within 10 days of notification or as soon as weather conditions are satisfactory.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

A. Topsoil mix for Common Turf Areas (Import):
   1. Fertile, friable, surface soil complying with ASTM D 5268, be easily cultivated, be free from objectionable material, have a relatively high erosion resistance and capable of sustaining vigorous plant growth in compliance with the following:
      a. Natural organic content by oven dry weight as measured by the "wet digestion" method shall not be less than eight (6.0) percent.
      b. pH shall be within the range of 6.0 - 7.8
      c. Enriched with 20% compost per volume.
   2. Free of stone lumps, clods of hard earth, plants or their roots, sticks and other extraneous matter greater than 1/2 inch and in organic materials.
      a. Screen all topsoil.
   3. Under no circumstances will topsoil be accepted unless it is free of the aforementioned contaminants.
   4. Contractor may use approved means of treating the topsoil to ensure its acceptability.
   5. Topsoil not meeting these requirements will not be accepted.
   6. Acceptable Enriched Topsoil manufacturers:
      a. New Earth Soils & Compost, San Antonio, Texas, (210) 666-3363.

B. Topsoil for Common Turf Areas (Stripped from site):
   1. Screen to be free of stone lumps, clods of hard earth, plants or their roots, sticks and other extraneous matter greater than 1" in size.
   2. Modify to conform with the requirements specified for Imported Topsoil 2.01, A., 1 above.
      a. Complete testing as specified for imported topsoil.
      b. Contractor may use approved means of treating the stripped topsoil to ensure its compliance and acceptability.
   3. Refer to Section - SOURCE QUALITY CONTROL.

D. Prior Approved soil manufacturers.
   1. Topsoil mix:
      a. Second Nature Soils, ph. (210) 960-6440.
      b. New Earth Soil & Compost's Enriched Topsoil, ph. (210) 666-3363.
   2. Compost:
      a. Second Nature Soils, (210) 960-6440.

b. New Earth Soil & Compost's Enriched Topsoil, ph. (210) 666-3363.

3. Four-Way Mix:
   a. Second Nature Soils, (210) 960-6440.
   b. New Earth Soil & Compost's Enriched Topsoil, ph. (210) 666-3363.
   c. Gardenville, San Antonio, Texas, ph. (210) 651-6115.

2.02 SOIL ADDITIVES

A. Soil Conditioner: Compost, composted for a period of eight (8) weeks or longer, organic, derived from animal manure, wood shavings, hay, seed hulls, stable bedding, or other organic residue, aerobic and friable without dust, objectionable odors, viable weed seed and in organic material.
   1. A maximum of 10% cedar flakes/shavings is allowed in conditioner.

B. Soil Amendment (Lawn):
   1. Lawn Dressing (sand and compost), screened, manufactured by: New Earth, Gardenville, or Urban Soil, San Antonio, Texas.

C. Manure: Well-rotted, unbleached stable or cattle manure containing not more than 25% by volume of straw, sawdust, or other bedding material or chemicals or ingredients harmful to plants.

D. Gypsum: Easy Gro Gypsum Soil Conditioner or approved equal.

E. Iron: Ironite as manufactured and supplied by Ironite Products Company, Humbaldt, Arizona, or approved equal.

F. Soil Acidifier: Sulphasoil distributed by or approved equal.

2.03 MISCELLANEOUS

A. Post-Emergence Herbicide: Round-Up by Monsanto Corp., or approved substitute.

B. Pre-Emergent Herbicide: Ronstar-G by Bayer Environmental Service

PART 3 – EXECUTION

3.01 GENERAL SCOPE

A. Soil preparation within the project includes the following scenarios:
   1. Placement of soil in areas disturbed by grading/earthwork.
   2. Preparation of the existing soil in place within areas not disturbed by grading/earthwork.
   3. Preparation of the existing soil in place within areas disturbed by any other construction related activities.

3.02 WEED TREATMENT

A. All site locations to receive planting where weeds exist, shall be treated with post-emergent herbicide.
   1. Repeat treatment as required that no weeds are present at the beginning of work on the landscape planting of the Project.

B. No weeds shall be present at the date of inspection for Substantial Completion of the Project and at the conclusion of the maintenance and establishment period following acceptance of the Contractor's work.

C. Post-emergent weed treatment includes:
   1. Removal of weeds and other undesirable ground cover vegetation in turf/grass and planting areas shall be accomplished a minimum of 14 days prior to soil preparation for planting operations.
   2. Care shall be taken not to affect existing trees or shrubs to be saved on the site.
   3. Care shall be taken to not affect plants on adjacent site.

D. Weed Treatment Procedure
   1. Mow grass and/or existing weeds to 3-inch height.

2. Spray herbicide on a day that is not rainy, not windy and adequately warm.
   a. Within 24 hours of cutting grass/weeds.
3. Do not disturb soil for 14 days. If live, green weeds remain, repeat as required to kill all weeds, before disturbing soil.
4. After 14 days, scalp and mechanically rake soil when the soil is not excessively hard or dry (water the soil if necessary) to remove 85% of dead foliage above grade.
5. The remaining dead material shall be allowed to accumulate in place and shall be incorporated into the soil through the rototilling of the soil preparation work.

3.03 SUBGRADE PREPARATION PRIOR TO PLACEMENT OF LANDSCAPE SOILS

A. Areas disturbed by new construction and grading.

B. Confirm establishment of subgrade elevations to achieve positive drainage after placement of landscape soils and completion of finish grading.
   1. Excavate subsoil to depth required to allow for placement of landscape soils and associated preparation.

C. The Contractor is to report immediately upon his awareness, any site condition or situation of the contiguous landscape that would cause flooding, washing or concentration of excess surface water to the areas receiving planting or turf /grass.

D. Irrigation work shall be completed after rototilling and compaction, herbicide spraying, scalping and removal of vegetative debris and rough grading, but prior to finish grading.

E. Prior to placement of landscape soils, cultivate subgrade to a minimum of 4 inches.
   1. Remove stones over 2-inch diameter and sticks, roots, rubbish and other extraneous debris of any dimension.

F. Re-grade site as required, if disturbed by weed removal, for positive drainage.

G. Excavate subsoil to depth required to allow for placement of landscape soils and associated preparation.

H. Refer to RECONDITIONING SITE in this section for treatment of:
   1. Turf/grass areas beyond those disturbed by grading.
   2. Existing planting beds areas beyond those disturbed by grading.

3.04 SOIL PLACEMENT

A. The Contractor is to report immediately upon his awareness, any site condition or situation of the contiguous landscape that would cause flooding, washing or concentration of excess surface water to the planting areas.

B. Landscape soils are to be placed to achieve the compacted depth to the specified elevation relative to site elements (e.g. curbs, paving and walls).
   1. Contractor is responsible to coordinate establishment of subgrade elevations as required for landscape soils.
   2. Conditions in which subgrade elevations have not been provided, Contractor is responsible to complete excavation required and properly dispose of resulting spoils off-site.

C. Place landscape soils to obtain uniform site grade and the minimum compacted depth required.
   1. The site shall be free from irregular surface changes and shall vary uniformly between fixed elevations.
   2. Restore landscape areas to above specified condition if any eroded places, ruts or depressions exist or otherwise disturbed after fine grading and prior to planting.
   3. Complete irrigation work prior to finish grading.

D. Depth placement (compacted) schedule:
   1. Topsoil mix:
      a. 4 inches of topsoil mix minimum in turf/grass areas unless noted otherwise on plan.
      b. Placement depths noted are to be the depth <u>after</u> compaction.

3.05 TURF/GRASS AREA SOIL PREPARATION

A. Protection:

1. Take care and preparation in work to avoid conditions which will create hazards. Post signs or barriers as required.
2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, etc. Repair or replace damaged areas.
3. Keep site well drained and landscape excavations dry.

B. Surface Preparation (in areas where grading has occurred):
1. Complete seven days maximum prior to turf/grass installation.
2. Coordinate with general cultivation required of overall area for placement of landscape soils; coordinate with civil work. Refer to Section 3.03 (this section), SUBGRADE PREPARATION.
3. Rake area to remove clods, rocks, weeds, roots, and debris.

C. Surface Preparation (in areas where existing soil is to remain in place undisturbed):
1. Complete seven days maximum prior to turf/grass installation.
2. In areas where soil will not be placed (e.g. areas not disturbed by grading), loosen area 4 inches deep, dampen thoroughly, and cultivate to properly break up clods and lumps.
   a. Incorporate 1 inch of soil conditioner into the top 4 inches (See RECONDITIONING EXISTING LAWNS this section, for additional direction).
3. Rake area to remove clods, rocks, weeds, roots, and debris.

D. Incorporation of Soil Conditioners:
1. Prior to fine grading incorporate soil conditioners, soil amendments, as well as other additives as indicated by the soils analysis, to modify the topsoil within content ranges specified by the soils analysis by rototilling or cultivating into the top four (4) inches of the soil in turf/grass areas. (See RECONDITIONING SITE this section, for additional direction.)

E. Fine grade planting areas to smooth, even surface with loose, uniformly fine texture.
1. Roll, rake and drag planting areas, remove ridges and fill depressions, as required to meet finish grade.
   a. Tolerance at 1/2-inch variance from a plane line within landscape areas established by two points at a distance of 20' (utilizing string line or 2 X 4).
2. After preparation of turf/grass areas and with soil in semi-dry condition, roll planting areas in two directions at approximately right angles.
3. Limit fine grading to areas which can be planted immediately after grading.
4. Allow for grass thickness in areas to be sodded or seeded. Finish grade of soil shall be:
   a. 1 inch below top of pavement in sodded and seeded areas.

F. Grade and shape area to receive turf/grass to bring surface to true uniform planes free from irregularities, and to provide drainage, and proper slope to catch basins.

G. After turf/grass areas have been prepared, take no heavy objects over them except turf/grass rollers or equipment with turf tires.

H. Rake or scarify and cut or fill irregularities that develop as required until area is true and uniform, free from lumps, depressions, and irregularities.

I. Turf Areas Under Existing Trees
1. Soil preparation under existing trees includes the removal by hand of surface vegetation not to remain.
   a. Herbicide shall not be used.
2. Existing soil shall be amended by incorporating 1/3 cubic yard soil conditioner per 100 square feet into top 2" of grade. Incorporate by hand only. Powered mechanical equipment shall not be used.

3.06 RECONDITIONING SITE

A. Reconditioning site includes:
1. Existing turf/grass areas damaged by Contractor's operations including storage of materials and equipment and movement of vehicles.
2. Recondition existing planting beds.

3. Areas not damaged by construction or disturbed by grading that are indicated to receive new landscape treatment.
4. Incorporating a minimum of 2 inches of soil amendment/soil conditioner without changing the elevation of the soil contiguous to curbs and sidewalks, beneath canopies of trees and other fixed features.

B. Process sequence for preparation of the soils prior to the turf/grass planting including herbiciding, excavation and placement:
1. The entire area to receive soil conditioner to be reconditioned shall be treated to kill weeds; weeds shall be completely dead.
2. The weed treatment shall be inspected and approved by the landscape architect prior to beginning this work. See WEED TREATMENT this section.
3. If rainfall has not been sufficient to loosen soil, the entire area shall be watered beginning a minimum of one week prior to cultivating operation and continued until enough moisture is present to enable cultivating.
4. Cultivate or rototill the entire area where turf/grass is to be reconditioned to a minimum 4-inch depth.
   a. Remove rocks and debris.
   b. Compact to a maximum dry density not less than 80 percent and not more than 85 percent.
   c. Work within dripline of trees to be done by hand.

C. Remove diseased and unsatisfactory turf/grass areas; do not bury into soil.
1. Remove topsoil containing foreign materials including materials resulting from Contractor's operations including oil drippings, stone, gravel and other loose building materials.
2. Replace with approved topsoil as required.

D. Excavate 2 inches of the existing soil contiguous to the walks, curbs, and other site improvements. Taper the excavation to meet existing grade 15 feet away from the beginning edge.
1. Where existing trees are within the area to be excavated and tapered and when existing grade is below the elevation of the walk, wall or etc., being tapered away from, the soil around the tree roots shall be loosened to a depth of 3 inches being careful not to damage roots.
2. When existing grade is at or above the elevation of walk, wall or etc., being tapered away from, the soil around the tree roots shall be loosened and removed to a depth corresponding to the depth of taper where the tree is, being careful not to damage roots.
3. This work shall be done by hand, unless otherwise approved by Landscape Architect, to protect the tree roots.

E. Excavated soil may be deposited within the turf/grass areas spread smooth and tapered to existing grades to follow existing drainage patterns.
1. No area shall receive more than a 3-inch depth of re deposited excavated soil at its deepest point.
2. When existing trees occur within an area where excavated soils are being spread no excavated soil shall be spread inside of the dripline of the trees.

F. Soil shall not be deposited in a manner which creates ponding in any area.

G. When excavation and redistribution of excavated soil is complete, a minimum of 2 inches of soil conditioner shall be placed over the entire area to receive soil preparation.

H. Irrigation work shall be completed after rototilling and compaction but prior to finish grading.

I. After the irrigation system is in place, the entire area shall be raked smooth removing all rocks, roots and debris 1 inch in diameter or larger.

J. The site shall be free from irregular surface changes and shall vary uniformly between fixed elevations.

K. Finish grading shall be below the top of concrete walks and other site features affected by grade:
1. One (1) inch in sodded areas.

2. One (1) inch in seeded areas.
3. Flush with top of sidewalks and curbs in crushed granite areas.
4. The site shall be ready for planting, inspected and approved by the Landscape Architect.

3.07 CLEANUP AND PROTECTION

A. During soil preparation work, all rocks, clods and other debris, shall be removed daily and the site kept neat at all times.

B. Any excess excavated subsoil or topsoil shall be removed from the site.

C. After soil preparation operations are finished, all paved areas which may have become strewn with soil or other material shall be thoroughly cleaned by sweeping, and if necessary, power washing.

3.08 INSPECTION AND ACCEPTANCE

A. Review of the soil preparation is required prior to initiating any planting work; work will not be accepted otherwise.

B. When soil preparation is completed, Landscape Architect will, upon written request by the Contractor, make an inspection to determine acceptability.

C. Where inspected soil preparation work does not comply with requirements, replace rejected work until re-inspected by the Landscape Architect and found to be acceptable.

END OF SECTION

SECTION 32 9300

LANDSCAPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work specified in this section: Provide all labor, materials, transportation, and services necessary to furnish and install all landscape planting, complete in place, as shown and specified on drawings.
B. Landscape work shall include, but is not limited to, fine grading, soil preparation, planting, seeding, sodding, pruning, fertilizing and pest/disease control.

1.2 RELATED WORK

A. The requirements of the "General and Supplementary Conditions of the Contract" and Division 1 specification sections shall apply to all work of this Section with the same force and effect as though repeated in full herein.
B. Site Grading: See Specifications.
C. Section 32 80 00 - Irrigation System
D. Section 32 91 13 - Soil Preparation

1.3 REFERENCES

A. ANSI Z60. 1, American Standard for Nursery Stock Edition, 2004.
B. ANSI A300 - American National Standard for Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance -- Standard Practices; 2001.
C. Hortus third, 1976 - Cornell University - Plant Nomenclature.
D. Grades and Standards for Nursery Stock," Texas Association of Nurserymen.
E. Turfgrass Producers International (TPI) - Guideline Specifications to Turfgrass Sodding.
F. U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and the Texas Seed Law.

1.4 SUBMITTALS

A. General Requirements:
   1. The Contractor shall furnish the articles, equipment, materials, or processes specified by name in the drawings and specifications. No substitution will be allowed without prior approval by the Owner.
   2. Complete material list shall be submitted prior to performing any work. Material list shall include the manufacturer, description of all materials to be used and samples as outlined below.
   3. Submit contractor qualifications per 1.5 Quality Assurance and Requirements.
B. Plant Selection:
   1. Submit plant schedule on contractor letterhead naming quantities and supplier of each tree for Landscape Architect's approval.
   2. Submit certification of sod species and location of sod source.
   3. Submit certification of seed mixtures and mulching agent if applicable.
   4. If material is to be approved on-site, tag and maintain plant material as representative samples. Samples may be use to complete installation, provided they remain tagged until final acceptance of entire installation.
C. Miscellaneous Materials:
   1. Submit for approval 1 gallon quantities and product information for mulch, planting mix, crushed granite, topsoil, compost & all other bulk material specified or used.
   2. Submit for approval product information on packaged materials, edger, tree

stakes, filter fabric, erosion fabric, fertilizer, herbicide, and insecticide. Samples shall be evaluated by the Landscape Architect before use on the project.

3. All samples shall be delivered in a box. Clearly mark samples with job name and contractor name.

D. Record Drawings:

1. The Contractor shall provide and keep up-to-date "as-built" prints which shall be corrected daily and show changes from the original drawings and specifications and the measured "as-built" locations, sizes of plant material installed. This set of drawings shall be kept on the site and shall be used only as a working set.
2. On or before the date of the final inspection, the Contractor shall deliver the completed As-builts to the Owner. Delivery of the record drawings will not relieve the Contractor of the responsibility of furnishing required information that may be omitted from the prints.

E. Maintenance Schedule: Submit maintenance schedule identifying procedures to be accomplished during the year. The schedule shall be typewritten and specify procedures to be accomplished month by month.

F. Submit copy of written guarantee, in the terms specified under "Guarantee" provisions of these specifications, and signed by the Contractor.

1.5 QUALITY ASSURANCE AND REQUIREMENTS

A. Permits and Fees: The Contractors shall obtain and pay for any and all permits and all inspections as required. Contractor shall also be responsible for all fees and costs involved for work.

1. Landscape Contractor shall comply with City inspector directions with agreement from Landscape Architect without additional cost to Owner.

B. Ordinances and Regulations: All local, municipal and state laws, and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations or requirements of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.

C. Personnel: Personnel shall be supervised by a Certified Landscape Professional Contractor (CLPC) as administered by Texas Association of Landscape Contractors (TALC) or hold a college degree relating to the landscape industry or an approved equivalent. Employ only experienced personnel who are familiar with the required work. Provide adequate supervision by a qualified foreman with minimum of five years experience.

D. Plant Material: Plants shall be subject to inspection and approval of Landscape Architect at place of growth or upon delivery for conformity to specifications. Such approval shall not impair the right of inspection and rejection during progress of the work. Inspection and tagging of plant material by the Landscape Architect is for design intent only and does not constitute the Landscape Architects' approval of the plant materials in regards to their health and vigor as specified in Part 2, Section 2.1 Plant Material. The health and vigor of the plant material is the sole responsibility of the Contractor.

1. General: Comply with applicable federal, state, county, and local regulations governing, landscape materials and work.
2. Any plant material in shock, decline or not meeting specified planting size, height and caliper shall be rejected by the Landscape Architect at any time during the project.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver plant material to site in containers. Protect plant material from sun-scald and wind

burn during transport to site. Prune only limbs that have broken in transport. Keep plants watered as required.

B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

C. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

1.7 SUBSTITUTIONS

A. Submit proof to Landscape Architect if plant material is not available 30 days prior to planting installation. Any and all substitutions will be reviewed and approved by Owner by Architect's Supplemental Instructions regarding substitutions procedures.

1.8 GUARANTEE

A. Guarantee plants and trees for one year after final acceptance. Replace dead materials and materials not in vigorous, thriving condition as soon as weather permits and on notification by Owner. Replace plants, including trees, which have partially died thereby damaging shape, size or symmetry.

B. Replace plants and trees with same kind and sizes as originally planted, at no cost to Owner. Provide one year guarantee on replacement plants. At direction of the Landscape Architect, trees may be replaced at the start of next year's planting or digging season. In such cases, remove dead trees immediately. Protect irrigation system and any other piping, conduit, or other work during replacement. Repair any damage immediately.

C. Guarantee excludes replacement of plants because of injury by storm, drought, hail, freeze, insects or diseases, and other acts of God after final acceptance.

1.9 PROJECT CONDITIONS

A. Site Utilities:

1. Determine locations of underground utilities, especially site lighting, gas, electrical cable, fiber optic lines, telephone, and irrigation lines. Perform all work in a manner which will avoid possible damage. Do not permit heavy equipment or trucks to damage utilities. Hand excavate, as required to minimize possibility of damage to undergroundutilities.
2. Coordinate work with the irrigation contractor to prevent damage to underground wire and other obstruction work located in landscape areas.
3. Any damage to utilities shall be repaired by contractor.

B. Condition of Surfaces: All shrub and groundcover planting areas will be left at finished grade.

C. Water will be provided on site by the contractor. Landscape contractor will provide hoses, other watering equipment and labor necessary for the work.

D. It shall be the responsibility of the contractor to verify site conditions of the site contractor's work prior to proceeding with landscape installations.

1.10 SCHEDULES

The Contractor shall begin exterior landscape work upon acceptance of the Contract by the Owner. Landscape Contractor shall submit a schedule for the work to be performed to the Landscape Architect for evaluation.

1.11 PROTECTIONS

All items required to complete this contract remain the property and responsibility of the Contractor until final acceptance. Take adequate precautions to protect all work and materials against damage. Cooperate fully with other trades to insure a satisfactory completion.

1.12 MAINTENANCE SERVICE

A. Maintain plant material until 90 days after Date of Substantial Completion.
B. Maintain plant material immediately after placement and until plants are well established and exhibit a vigorous growing condition.
C. Maintenance to include:
1. Cultivation and weeding plant beds and tree pits.
2. Applying herbicides for weed control of all areas and plant materials in accordance with manufacturer's instructions. Remedy damage resulting from use of herbicides.
3. Applying insecticides for insect control and fungicides for fungus control of all areas and plant materials in accordance with manufacturer's instructions. Remedy damage from use of chemicals.
4. Irrigating sufficiently to saturate root system of all plant material and sustain life and promote growth.
5. Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
6. Disease control. Provide chemicals as required to control any disease that may occur during the maintenance period. Notify Owner and Landscape Architect for any problems.
7. Maintaining guys and tree stakes. Adjust to keep guy wires firm. Repair or replace accessories when required.
8. Replacement of mulch.
9. Watering, mowing, edging, weeding and fertilizing of lawn areas.
10. Removal of tree staking within twelve (12) months of installation or as directed by Owner.

PART 2- PRODUCTS

2.1 PLANT MATERIALS

A. General:

1. Plants shall be in accordance with the latest edition of "American Standard for Nursery Stock" sponsored by the American Association of Nurserymen, Inc. (A.A.N.). All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free of insect infestations, plant diseases, sunscalds, fresh abrasions of the bark, excessive abrasions, in shock or other objectionable disfigurements. If the sample plants inspected are found to be defective, the Landscape Architect reserves the right to reject the entire lot or lots of plants represented by the defective samples. Any plants rendered unsuitable for planting because of this inspection will be rejected and will be the responsibility of the Contractor and removed from site.
2. The size of the plants will correspond with that normally expected for species and variety of commercially available nursery stock or as specified on drawings. The minimum acceptable size of all plants measured before pruning with the branches in normal position, shall conform with the measurements, specified on the drawings in the plant list. Plants larger in size than specified may be used with no change in contract price. If the use of larger plants is approved, the rootball for each plant will be increased proportionately.
3. Under no conditions will there be any substitutions of plants or sizes listed on the accompanying plans, except with the express consent of the Landscape

Architect.

4. Plant material shall be true to botanical and common name and variety as specified in "American Standard for Nursery Stock Editions" and "Standardized Plant Names."
5. Plants shall be hardy under climatic conditions similar to those in locality of project.

B. Shade and Ornamental Trees:
1. Healthy, vigorous, full-branched, well-shaped, trunk diameter and height requirements as specified. Trees shall be in containers unless otherwise noted on plans.
2. B&B trees shall not be accepted as an alternative for containerized materials.
3. Specified B&B trees shall have rootballs that are firm, neat, slightly tapered, heeled for a period of one (1) year.
4. Trees with loose or broken rootballs at time of planting shall be rejected.
5. Trees will be individually approved by the Landscape Architect.
6. Rootballs shall be 10" in diameter for each 1" caliper measured 6" above the tree rootball.
7. Trees shall be locally grown within a 100 mile radius of the project site.

C. Shrubs and Perennials: Nursery grown, healthy, vigorous, bushy, well branched, of normal habit of growth for species, free from disease, insect eggs and larvae. Specified sizes shall be before pruning, and plants shall be measured with their branches in normal position.

D. Turf Materials:
1. Sod: TPI, Certified Turfgrass Sod quality; cultivated grass sod; with strong fibrous root system, rich green in color, free of stones, burned or bare spots, free of foreign grasses, weeds and nut grass; Minimum age of 4 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
   a. Bermuda 'Tif-419' (Cynodon dactylon var. 'Ti-419').
   b. Deliver to site on pallets or rolls. Do not store for more than 24 hours between time of cutting and time of delivery.
2. Seed:
   a. Bermuda 'Blackjack' (Cynodon dactylon): 3# LBS/1,000SF. If seed is applied between September 15th and April 1rst, apply mix of Winter Rye Grass (Lolium perenne) - 5# LBS/1,000SF and unhulled Bermuda - 3# LBS/1,000SF.
   b. Habiturf Native Lawn Mix (Buffalo Grass (62%), Blue Grama (30%), Curly Mesquite (8%)): 6# LBS/1,000SF. Sowing dates: April 15th - May 30th (early Spring optimal) and Sept. 1rst – Oct. 15th. If seed is applied between Sept. 15th – Dec. 1rst, apply mix of Rendition Tall Fesue - 8# LBS/1,000SF and Habiturf Native Lawn Mix - 6# LBS/1,000SF.
   c. Approved Seed Suppliers: Douglas King Seeds ph. (210) 661-4191, Native American Seed Co. ph. (800) 728-4043, and Wild Seed Farm ph. (830) 990-8080.

2.2 SOIL PREPARATION MATERIALS

A. REFER TO SOIL PREPARATION SECTION 32 91 13 for soil and preparation materials.

B. Fertilizer:
1. Turf Fertilizer: Complete fertilizer with an organic base, uniform in composition, dry and free flowing. Deliver fertilizer to site in original unopened containers, each bearing manufacturer's guaranteed statement of analysis. Fertilizer shall contain 15% nitrogen, 15% phosphoric acid, 15% potash, unless otherwise approved.
2. Tree and Shrub Fertilizer: Agriform 20-10-5 planting tablets 21 gram.

C. Herbicide:

1. Pre-emergent herbicide shall be RonstarG by Bayer, or approved equal.
2. Post-emergent herbicide shall be Roundup-Pro by Monsanto Corp., or approved equal.
3. Selective herbicide by Ortho Corp. or approved equal.

D. Pesticides:
1. Fungicides: Mancozeb, Armada
2. Insecticides: Dursaban, Sevin, Volck Oil
3. Other chemicals: Submit information as required.

2.3 MISCELLANEOUS MATERIALS

A. Seed Mulching Material: Wood cellulose fiber, dust form, free of growth or germination inhibiting ingredients.
B. Seed Mulching Material for Slopes (≥33%) and Problem areas: Flexterra HP-FGM.
C. Mulch: Mulch shall be double shredded native hardwood or shredded cedar mulch. Submit 10oz. sample for approval.
D. Water: Water will be available on site.
E. Filter Fabric: 5 oz. min. non-woven, needle punched, polypropylene fabric or approved equal.
F. Stakes: New Metal T-posts, 6' ht. and 8' ht. green in color.
G. Erosion Blanket: Straw with single net biodegradable erosion blanket.
H. Tree straps: ¾" forrect green woven nylon tie. 900lbs. tensile strength. Arbor-tie or equal.

PART 3- EXECUTION

3.1 INSPECTION

A. Observe site prior to construction and accept site when satisfied with conditions. Landscape Contractor shall be responsible for shaping all planting areas as indicated on plans or as directed by Landscape Architect.
B. Inspect trees, shrubs and liner stock plant material for injury, insect infestation and trees and shrubs for improper pruning.
C. Do not begin planting until deficiencies are corrected or plants replaced. Do not start work until grading is complete and approved by Engineer or Architect.

3.2 SOIL PREPARATION

A. REFER TO SOIL PREPARATION SECTION 32 91 13 for soil and preparation requirements.
B. Final Grades:
1. Minor modifications to grade may be required to establish the final grade.
2. Finish grading shall insure proper drainage of the site. Surface drainage shall be away from all building pads.
3. All areas shall be graded so that the final grades will be 1" below adjacent paved areas, sidewalks, valve boxes, edging, concrete headers, clean-outs, drains, manholes, etc., in lawn areas and in bed areas.
4. Eliminate all erosion scars prior to mulching and commencing maintenance period.

C. Disposal of Excess Soil: Dispose of any unacceptable soil or debris offsite.

3.3 PLANTING INSTALLATION

A. General:
1. Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practices. No planting to occur when temperature will fall below 34˚F within 24 hours of planting or when temperatures exceed 97˚F.

2. All planting beds shall be free of any deleterious materials, including but not limited to concrete debris, trash, buried organic material, and base material from drive and building construction.

B. Pre-Plant Weed Control:
1. Eliminate all existing weeds and grass in lawn areas by spraying with a non-selective systemic contact herbicide. Follow manufacturer's directions for applications. Provide two applications within a two week period.
2. Clear and remove existing weeds by grubbing weeds over the entire area to be planted.
3. Prior to planting install pre-emergent per manufacturer's recommendations.
   a. Do not apply pre-emergent where seed is to be applied.
4. All regulated herbicide and pesticide applications shall be provided by a TDA licensed applicator.

C. Planting of Shade and Ornamental Trees:
1. Protect all areas from excessive compaction when trucking plants or other material to the planting site.
2. All excavated holes shall have vertical sides with roughened surfaces and shall be of a size that is twice the diameter of the rootball and the same depth as the rootball for all trees.
3. Provide percolation test prior to planting.
   a. Prior to planting fill each planting pit with water.
   b. Allow water 72 hrs. to drain.
   c. Notify Landscape Architect if water does not fully drain for alternate planting locations or planting methods to be provided by the contractor at no additional expense of the Owner.
4. Face plants with fullest growth to most visible direction.
5. Trees shall be backfilled with:
   a. 1 part existing soil/topsoil
   b. 1 part landscape amendment (4-way landscaper's mix)
   c. 1 part sand
   d. 1 lb. fertilizer per c.y. of mix
   e. Agriform tablets
5. All plants which settle deeper than the surrounding grade shall be raised to the correct level. Additional backfill shall be added as necessary.
6. If B&B is specified, remove any polyethylene rope from rootballs and trunks. Bend 1/3 of wire down away from trunk and rootball.
7. Tamp soil as backfilling occurs to minimize settling of soil.
8. After backfilling, an earthen basin shall be constructed around each plant. Each basin shall be 4" depth. Basins shall be constructed of amended backfill materials, or existing soil.
9. Install 4" layer of mulch at 4-ft. diameter at each tree.
10. Pruning shall be limited to the minimum necessary to remove injured twigs and branches.

D. Planting of Bed Areas:
1. Soil amendments shall be added to existing soil/topsoil for bed preparation. The soil mix shall be 8" of soil amendment and 1 lb. of fertilizer per 1 c.y. of mix, and 1 lb. of fertilizer per 1 c.y. of mix. Install Agriform tablets per manufacturer's recommendations.
2. Apply pre-emergent herbicide to planting beds per manufacturers instructions to control weeds.
3. Plants shall be grown in pots as indicated on the plans. Plants shall remain in those pots until transplanting.
4. Shrubs, perennials and groundcovers shall be planted in straight rows and evenly space, unless otherwise noted, and at intervals called out in the drawings. Triangular spacing shall be used unless otherwise noted on the drawings.
5. Plantings shall be watered by hose after planting until the entire area is soaked to

the full depth of each hole.

6. Care shall be exercised at all times to protect the plants after planting. Any damage to plants by trampling or other operations shall be repaired.

E. Installation of Lawn:

1. General:
   a. Contractor shall inspect final grade is free from ruts, uneven spots, and roughness. Final grade shall be smooth and free from large clods or debris. If this requirement is not met and lawn is installed, the grade shall be repaired to satisfaction of Landscape Architect and hydromulch or sod re-installed at no cost to Owner.
   b. Contractor is responsible for establishing a healthy and full stand of lawn of sod or seed. Contractor shall maintain lawn until established and approved by Landscape Architect.
   c. Winter rye grass installation shall be considered a temporary grass application. Should rye grass be installed, the contractor shall return to site after March 15 to apply bermuda grass Hydromulch and establish.
   d. Disturbed areas: All areas that are disturbed due to construction operations shall be hydromulched according to specifications. Any slopes 3:1 and greater shall be solid sodded per specifications. This will apply to areas on site whether or not identified on the plans.
2. Seeding - Bermuda or Rye Mixes:
   a. Apply seeded slurry with a hydraulic seeder at a rate of 3 lbs per 1000 sq. ft. evenly in two intersecting directions with following mixture:
      (1) Mixture 1 (Standard Mix):
         (a) 45#/1000 sq.ft. mulching agent
         (b) 20#/1000 sq.ft. water soluble fertilizer
      (2) Mixture 2 (for Slopes (over 6:1 or 17%) and Problem Areas):
         (a) 50#/1000 sq.ft. Flexterra HP-FGM mulching agent
         (b) 20#/1000 sq.ft. water soluble fertilizer

      Install mulching agent per manufacturers guidelines.
   b. Do not hydroseed area in excess of that which can be mulched on same day.
   c. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
   d. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil. Water to prevent grass and soil from drying out.
   e. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
   f. Immediately reseed areas which show bare spots.
   g. Protect buildings, walks, planting beds, etc. for overspray by using a batter board or shielding board.
   h. Contractor shall guarantee establishment of 95% seeded areas prior to substantial completion.
   i. Contractor shall continue to mow and maintain lawns areas through 90 days after Substantial Completion.
   j. Brillion seeding or drill seeding application may be used on gentle sloping areas as an alternative to hyro-seeding when approved by the Landscape Architect.
3. Seeding - Native Grass Mixes:
   a. Apply seed with a Brillion seeder or drill seeder. Refer to Native Seed Mix for sow rates
   b. If applied over existing soil, cultivate soil to at least 6 inches, then incorporate 0.5 inches of living compost with low nitrogen and low

phosphorus into top 3 inches of soil.

c. Apply ½ of the seed at a time, going opposite directions with each pass.
d. Rake lightly to cover seed to a depth of no more than ¼ inch.
e. Lightly roll/press the entire surface to firm the seedbed.
f. Where indicated, overlay entire seedbed with biodegradable erosion control straw blanket. Install per manufacturer's recommendations.
k. Apply water with a fine spray immediately after each area has been seed. Saturate to 4 inches of soil. Water to prevent seed and soil from drying out.
l. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
m. Immediately reseed areas which show bare spots.
n. Contractor shall gaurantee establishment of 85% native seed areas prior to substantial completion.
o. Contractor shall continue to mow and maintain natvie areas through 90 days after Substantial Completion.
p. No fertilizer is to be applied to Native Grass Seed areas.

4. Sodding:
   a. Prior to sod installation apply pre-emergent herbicide to surface for control of weeds. Follow manufacturers instructions.
   b. Lay sod immediately after delivery to site to prevent deterioration.
   c. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
   d. Lay smooth. Align with adjoining grass areas. New finished grade and existing grade shall be flush.
   e. Place top elevation of sod flush with adjoining edging and curb or paving.
   f. On slopes 4 inches per foot (33%) and steeper, sod shall be laid. Lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.
   g. Prior to placing sod, on slopes exceeding 6 inches per foot or where indicated, place wire mesh over topsoil. Securely anchor in place with wood pegs sunk firmly into the ground.
   h. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.
   i. After sod and soil have dried, fill joints with USGA washed sand then roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities. Roll sodded areas with roller not exceeding 150 lbs.
   j. Fertilize turf per soil testing report angency recommendations and thoroughly water in.
   k. Remove all sod netting prior to installation unless sod is being used for slope stabilization measures.
5. Contractor is responsible for the establishment of lawn areas prior to substantial completion. Provide temporary irrigation, where the permanent system is not provided, as required for growth of a full stand of lawn.
   a. Should construction project last longer than 20 days beyond specified finish date with any area of lawn in disrepair or in an unacceptable state to Landscape Architect, Landscape contractor shall install solid sod to complete the project with no additional cost to Owner.
6. Contractor is to leave a 3 to 5 foot diameter ring around each tree, whether newly planted or existing, free of turf material. Contractor is to install 4 inches of specified mulch in each tree ring as specified in this section.

3.4 INSTALLATION OF MISCELLANEOUS MATERIALS

A. Install edger 1" above finished grade. Edger shall be installed between all lawn and bed areas unless noted otherwise.

C. Mulch: All shrubs, perennial, groundcover and seasonal color beds shall be dressed with 4" layer of mulch.

D. Tree stake: Install tree stakes uniformly per details. Install guys straps to 40-50% height of tree. Secure to hold trees with a slight slack in guy with loose knotted loop around trunk. Do not pull extremely taut on trees.

E. Pruning: At no time shall new trees or plant materials be pruned, trimmed or topped prior to delivery and any alteration of their shape shall be conducted only with the approval and when in the presence of the Landscape Architect. All trees shall have a single visible uncut leader.

3.5 AREAS DISTURBED BY CONSTRUCTION

A. Recondition areas disturbed by construction operations including, but not limited to, graded areas, lay down areas, construction trailers and movement of vehicles. All compacted areas shall be tilled to 4" depth. Install 2" depth soil conditioner, rake smooth and free of any rock or other deleterious materials. Apply hydromulch seed as specified in these specifications. Solid sod all slopes 3:1 and greater. Install temporary irrigation as specified in Section 328000.

B. Reference Section 32 91 13 (Soil Preparation) for additional Site Reconditioning requirements.

3.6 MAINTENANCE OF SITE

A. Until 90 days after substantial completion, maintain all plants, materials and trees by watering, mowing, cultivating, weeding, spraying chemicals, cleaning and replacing as necessary to keep landscape in a vigorous, healthy condition. Landscape contractor is responsible for maintenance of his work whether or not existing or new irrigation system is operational. Landscape contractor is to notify the Owner and Landscape Architect for any deficiencies in the irrigation system. Failure to do so does not relieve the Landscape Contractor from replacing plant materials that have died.

1. Watering Turf: As necessary to keep top 4" of soil moist.
2. Watering Trees and Shrubs: Tree and shrub rootballs are to be kept moist to the depth of the rootball.
3. Weeding: Remove weeds and foreign grass over bed and lawn areas at least once a week. Herbicides may be used only when evaluated by Landscape Architect. Rake bed areas as required. Work will not be accepted with a presence of weeds in landscape.
4. Cultivating: Cultivate bed areas to a depth of approximately 3" at least twice a month. Care should be taken not to damage plant roots.
5. Common Area Mowing and Edging: Mow and edge newly planted lawns weekly when growth reaches 2 ½". Maintain at this height weekly.
6. Monthly applications of Fertilizer (April-September) on turf areas.
7. Pesticides, Insecticides, and Fungicides only as needed.
8. It is the responsibility of the contractor to insure plant material is in vigorous, healthy condition. Application of chemicals per manufacturer requirements and state and local codes is required as necessary to control any pest, insect, or fungal problems.

3.7 CLEAN UP

A. After all planting operations have been completed, remove all trash, excess soil, empty plant containers from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout

the site. Contractor shall pick up all trash resulting from his work at the end of each working day. Dispose of trash properly.

B. The Contractor shall leave the site area broom-clean and shall wash down all paved areas within the contract area, leaving the premises in a clean condition. All walks shall be left in clean and safe condition.

3.8 OBSERVATION SCHEDULE

A. The Contractor shall be responsible for notifying the Landscape Architect in advance for the following site visits.
   1. Pre-installation conference
   2. Plant material review
   3. Plant layout review
   4. Soil Preparation and planting operations
   5. Final walk-through

B. No site visits shall commence without all items noted in previous Observation Reports either completed or remedied.

END OF SECTION 32 93 00

SECTION 32 93 45
TREATMENT OF EXISTING TREES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Work specified in this section: Provide all labor, materials, transportation, and services necessary to furnish tree protection fencing, pruning and fertilization to existing trees.

1.2 RELATED SECTIONS

A. The requirements of the "General and Supplementary Conditions of the Contract" and Division 1 specification sections shall apply to all work of this Section with the same force and effect as though repeated in full herein.

1.3 REFERENCES

A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1.	ANSI Z60. 1	(1996)	Nursery Stock.
2.	ANSI Z133.1	(1994)	Tree Care Operations- Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush.
3.	ANSI A300	(1995)	Tree, Shrub and Other Woody Plant Maintenance- Standard Practices.

1.4 GOVERNING STANDARDS:

A. Work procedures will be guided by the current provisions of the American National Standard Institute. Complete detail of the provisions are to be found in the references listed. The two basic objectives of the pruning operation shall include:
   1. Hazard Reduction Pruning: Hazard reduction pruning shall be completed to remove visible hazards in a tree. Hazard pruning shall consist of one or more of the maintenance pruning types.
   2. Maintenance Pruning: Maintenance pruning shall be completed to maintain and improve tree health and structure and includes hazard reduction pruning.

1.5 DESCRIPTION OF WORK

A. Contractor shall employ a qualified Arborist to monitor construction activities that impact trees, pruning and feeding. Arborist is to be acceptable to the Owner's Representative.

B. Arborist shall have the following minimum qualifications:
   1. ISA International Society of Arborists Certified
   2. Meet state and contract requirements for insurance.
   3. Licensed for application and use of pesticides.
   4. Bonded.

1.6 SUBMITTALS

A. Contractor shall submit:
   1. Certification: Copy of Arborist qualifications.
   2. Mulch: Label from bag (Supplier's statement of analysis if bulk), and 1-gallon container of mulch sample.
   3. Fertilizer: Label from bag or Supplier's brochure.
   4. Backfill Soil Mix: 4-Way soil mix.
   5. Submit complete package.
   6. Submittal to be numbered ending in ".0" for first submittal and ".1" etc. for subsequent submittals.
   7. Bituminous paint.
   8. Lysol.

1.7 QUALITY ASSURANCE AND REQUIREMENTS

A. General: Comply with applicable federal, state, county, and local regulations governing, landscape materials and work.

B. Permits and Fees: The Contractors shall obtain and pay for any and all permits and all

inspections as required. Contractor shall also be responsible for all fees and costs involved for work.

1. Contractor shall comply with City inspector directions with agreement from landscape architect without additional cost to Owner.

C. Ordinances and Regulations: All local, municipal and state laws, and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations or requirements of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.

D. Personnel: Personnel shall be supervised by a Certified Arborist. Employ only experienced personnel who are familiar with the required work. Provide adequate supervision by a qualified foreman with minimum of five years experience.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

1.9 PROJECT CONDITIONS

A. Inspection: Contractor, Arborist and Owner's Representative shall review pruning work to be completed prior to initiating work.

1.10 SCHEDULES

A. The Contractor shall begin pruning and tree protection work upon acceptance of the Contract by the Owner. Arborist shall submit a schedule for the work to be performed to the landscape architect for approval.

1.11 PROTECTIONS

A. All items required to complete this contract remain the property and responsibility of the Contractor until final acceptance. Take adequate precautions to protect all existing trees against damage. Cooperate fully with other trades to insure a satisfactory completion.

1.12 MAINTENANCE SERVICE

A. All existing trees to remain shall have tree protection fencing properly installed and maintained throughout construction work period.

PART 2- PRODUCTS

2.1 MATERIALS

A. Fertilizer for Trees: Davey Arbor Green 30-10-7 for liquid suspended application, distributed by The Davey Company in San Antonio, Texas (210) 698-0515 or approved equal.

B. Tree Barricade Fencing: Fabric of square link orange 4' width, high density polyethylene with 5-7 year life. Posts of 6' height studded T-posts with painted on finish for rust protection.

C. Mulch:

1. Mulch shall be free of deleterious material and shall be stored as to prevent inclusion of foreign material. Mulch shall be native shredded hardwood mulch, manufactured by New Earth, San Antonio, Texas, 210/661-5180 or equal.
2. On-site existing tree mulch: Non-Diseased existing trees that are scheduled to be removed, and removed branches may be ground/double shredded and debris free.

D. Tree Wound Paint: Bituminous based paint of standard manufacture specifically formulated for tree wounds.

PART 3 - EXECUTION

3.1 PROTECTION FOR EXISTING TREES TO BE PRESERVED

A. All existing trees to remain on the project site shall be protected against damage from construction operations. Only remove those trees which are scheduled to be removed per plans. Contractor shall flag trees to remain for review by landscape architect.

B. Contractor shall erect fencing protection prior to beginning any clearing, demolition or construction activity, maintain in place until construction is completed.

C. All trees to remain are to be protected by barricade fencing and is subject to approval of the landscape architect. The tree protection barricade shall be placed before any excavating or grading is begun and maintained in good repair for the duration of the construction work. No material shall be stored or construction operation shall be carried on within the tree protection barricade.

D. Tree protection barricade shall be erected at the edge of the dripline where possible. In circumstances where site improvements and construction operations interfere with fencing, fencing may be located at the edge of the root protection zone. The minimum distance the barrier shall be erected is five (5) feet from the trunk of tree or clump of trees with the installation of 6” of mulch across the root zone.

E. Protect trees that are to remain, whether within barricade fencing or not, from the following:

1. Compaction of root area by equipment or material storage; construction materials shall not be stored closer to trees than the farthest extension of their limbs (dripline).
2. No vehicular traffic shall occur within the drip line of any tree.
3. The proposed finished grade within the root protection zone of any preserved tree shall not be raised or lowered more than three (3) inches. Retaining methods can be used to protect and/or provide lateral support to the area outside the root protection zone. No soil shall be spread, spoiled or otherwise disposed of under any tree within the drip line.
4. Cutting on roots by excavating, ditching, etc. Prior to excavation within the tree driplines or the removal of trees adjacent to other trees that are to remain, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment to minimize root damage. See plan for notes and details for trenching within the root-zone.
5. Strangling by tying ropes or guy wires to trunks or large branches.
6. Poisoning by pouring solvents, gas, paint, etc., on or around trees and roots.
7. Trunk damage by moving equipment, material storage, nailing or bolting.
8. Damage of branches by improper pruning.
9. Drought from failure to water or by cutting or changing normal drainage pattern past roots. Contractor shall provide means as necessary to ensure positive drainage.
10. Changes of soil pH factor by disposal of lime base materials such as concrete, plaster, lime treatment at pavement subgrade, etc. When installing concrete adjacent to the root zone of a tree, use a minimum 6 mil. plastic vapor barrier behind the concrete to prohibit leaching of lime into the soil.

F. Any damage done to existing tree crowns or root systems shall be repaired by the Arborist to the satisfaction of the Owner’s Representative. Broken branches shall be cut cleanly. Any roots cut shall be cut cleanly with a saw other means approved by the Landscape Architect.

G. Repairs to the trees necessitated by damage caused through negligence of Contractor or his employees will be completed at the Contractor’s expense. When trees other than those approved for removal are destroyed or killed, or badly damaged as a result of construction operations, the contract sum will be reduced by the value of the tree as determined by using the City of San Boerne mitigation method: $200 per inch of tree less than 24" DBH and $600 per inch of tree for trees equal to or greater than 24" DBH. If need arises for tree valuation services by the Landscape Architect or tree valuation expert, incurred fees shall be paid by the contractor.

3.2 ROOT PROTECTION ZONE

A. The Root Protection Zone (RPZ) is measured with a radius from the trunk of 12" for each caliper inch of trunk measured at four and one-half (4-1/2’) feet above grade or at the point

where the smallest diameter closest to the branching occurs. No disturbance shall occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater.

3.3 ROOT PROTECTION ZONE IMPACTS

A. Those trees to remain which have some encroachment on their root protection zone shall have the following maximum allowable impacts:
   1. No disturbance of natural grade, e.g. trenching or excavation, can occur closer to the tree than one-half the radius of the RPZ or within five (5) feet of the tree whichever is greater.
   2. No cut or fill greater than three (3) inches will be located closer to the tree trunk than ½ the RPZ radius distance.

B. Existing trees to remain shall have a minimum of a six (6) inch layer of mulch placed and maintained over the root protection zone and to the dripline. Immediate pruning and fertilization shall occur per the pruning and fertilization sections of this specification.

C. Provide water in a slow drip manner to existing trees. Provide water to apply equivalent to 1 inch once per week to deeply soak in over the area within the dripline of the tree during periods of hot, dry weather. Spray tree crowns periodically to reduce dust accumulation on the leaves.

3.4 ARBORIST'S REQUIREMENTS

A. General:
   1. Arborist is to survey the condition of existing trees to remain. Notify the landscape architect of any problems/conditions affecting the livability of trees to remain. Document site as necessary.
   2. Arborist is to install and/or inspect tree protection barriers before start of demolition and excavation activities. Notify the landscape architect of any problems/conditions that affect the livability of trees to remain.
   3. Arborist is to observe excavation of site around existing trees from start of excavation until its conclusion. Arborist shall direct excavation which occurs near major root systems, relocation of roots, and installation of tree vent systems as required to ensure livability and good health of trees. Arborist shall prescribe additional measures or protection required to provide optimal growth conditions at the construction site. Report any problems/conditions affecting the livability of trees to remain to the landscape architect.
   4. Arborist shall make periodic inspections of the construction site for possibly dangerous or damaging practices, in relation to the existing trees, occurring or developing at the site. Inform the landscape architect of any problems/conditions and develop plan to repair damage that has occurred and prevent further damage.

B. Reports:
   1. Arborist, hired by the contractor, shall provide a monthly inspection report of the construction site to the landscape architect during the course of construction work. Outlining tree work progress, protection measures, treatments, general tree health, etc.

3.5 EXCAVATION AT EXISTING TREES

A. Any excavation within the dripline of trees shall be under the direction of the Arborist. Excavate within the dripline of trees only where required and when absolutely necessary. Arborist shall be at site at all times while excavation is occurring within the dripline.

B. When excavation is required within dripline of trees, hand excavate to minimize damage to root systems when practical. Use narrow tine spading forks and comb soil to expose roots. Relocate roots back into backfill areas wherever possible. If large main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking.

C. If root relocation is not practical, clean-cut roots using sharp ax or pruning shears approximately three (3) inches back from new construction. Paint all exposed root cuts with tree paint.

D. Where existing grade is higher than new finish grade, carefully excavate within the dripline

to the new finish grade. Carefully hand excavate an additional eight (8) inches below the finish grade. Use narrow tine spading forks to comb the soil to expose the roots, and prune the exposed root structure as recommended by the Arborist. Keep the exposed roots damp by watering and mulch cover. Treat the cut roots as specified and as recommended by the Arborist.

E. After trenching and root pruning, flood trench with a mixture of water and root stimulator equal to Superthrive to saturate roots. Allow to trench to completely drain.

F. Temporarily support and protect roots against damage until permanently relocated and covered with recommended landscape material.

G. Do not allow roots and surrounding soil to dry out. Cover with mulch or wetted burlap at the end of each day.

3.6 PRUNING

A. Pruning shall be required only at existing trees where the removal of limbs and branches is needed to provide clearance for work as approved by the Owner's Representative or to repair damage to trees or as identified on the plans. Pruning shall be completed to the satisfaction of the Owner's Representative.

B. Pruning shall include but is not limited to removal of dead and broken branches, correction of structural defects or whenever the following conditions exist. Remove diseased wood, or structurally weak limbs that may cause a safety hazard. Remove branches that interfere with light fixtures. Remove branches in front of windows and which obstruct traffic signs or street intersections. Prune trees according to their natural growth characteristics leaving trees well shaped and balanced. No more than 20 percent of the tree crown shall be removed.

3.7 SCHEDULE

A. All pruning shall be completed to remove branches/laterals one (2) inch and greater.

3.8 TREE CROWN PRUNING

A. Existing trees disturbed by construction shall have a maximum of 20 percent of the viable portion of a tree's crown removed as approved by the Owner's Representative. Removal of more than 20 percent of the viable portion of a tree's crown will necessitate the tree's removal and replacement at the Contractor's expense. Replacement shall be governed at the ratio of 1 inch of new tree per inch of tree removed up to trees of size less than 24" caliper. For trees 24" caliper and greater the ratio shall be 3 inches per new tree per inch of tree removed. Replacement trees are to have a one (1) year warranty.

3.9 PAINT CUTS: Paint cuts more than 1 inch in diameter with an approved tree wound paint on all Oak species trees.

3.10 DISPOSAL: Wood and debris shall become property of the Contractor and shall be removed from the site. Cost of disposal to be paid by Contractor.

3.11 MULCH:

A. Mulch base of all existing trees with 6" deep mulch layer to RPZ or dripline which ever one is larger. If existing trees are grouped, the entire area is to be mulched in between the trees.

3.12 CLEANUP:

A. Wood and debris shall become property of the Contractor and shall be removed from the site. Cost of disposal to be paid by Contractor.

END OF SECTION

SECTION 33 00 00 UTILITIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Reference Division 22 00 00 for building plumbing requirements.

1.2 SUMMARY

A. This Section includes all underground utility systems five (5) feet outside the proposed buildings. Systems include the following:
   1. Sanitary Sewerage.
   2. Water and Fire Lines.
   3. Gas Main.

B. Related Sections: The following Sections contain requirements that relate to this Section.
   1. Division 03 Section 30 00 'Structural Cast-in-Place Concrete' for cast-in-place concrete structures.

1.3 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Non-Pressure-Piping Pressure Ratings:
   1. At least equal to system test pressure.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
   1. Product data for the following:

B. Shop drawings for pre-cast concrete manholes and other structures. Include frames and covers.

C. Shop drawings for cast-in-place concrete or field-erected manholes and other structures. Include frames and covers.

D. Reports and calculations for design mixes for each class of cast-in-place concrete.

E. Shop drawings for cleanouts.

F. Coordination drawings showing manholes and other structures, pipe sizes, locations, and elevations. Include details of underground structures and connections. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures, invert elevations and pipe sizes at manholes, and rim elevations of structures.

G. Inspection and test reports specified in the "Quality Control" Article.

1.5 QUALITY ASSURANCE

A. Environmental Agency Compliance: Comply with regulations pertaining to sanitary sewerage potable water and gas piping systems.

B. Utility Compliance: Comply with regulations pertaining to sanitary sewerage systems. Include standards of water, gas and other utilities where appropriate.

C. Product Options: Drawings indicate sizes, profiles, connections, and dimensional requirements of system components and are based on specific Manufacturer types indicated. Other Manufacturers' products with equal performance characteristics may be considered. Refer to Section 01 60 00 Product Requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures in direct sunlight.

B. Do not store plastic pipe or fittings in direct sunlight.

C. Protect pipe, pipe fittings, and seals from dirt and damage.

D. Handle pre-cast concrete manholes and other structures according to Manufacturer's rigging instructions.

1.7 PROJECT CONDITIONS

A. Site Information: Verify that survey benchmark and intended elevations for the Work are as shown on the Drawings, research public utility records, and verify existing utility locations. All bidders will be required to visit the site prior to bidding to verify the actual job site conditions. Any conflicts with construction documents must be brought to the attention of the Project Engineer for instructions to bidders. Adjustments or removal of existing utilities such as vaults, meters, valves, telephone poles, power poles, overhead lines, hydrants, etc. that are necessary for the construction of this project will be considered as part of the Contract Bid and will not justify a change in Contract Price or additional cost to the Owner after the project is awarded.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate water and fire system connections with the local water purveyor.

B. Coordinate with other utility and earthwork.

C. Coordinate installation with all utility building Plumber Contractors.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

A. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A 74, service and extra-heavy classes, gray cast iron, for gasketed joints.
   1. Gaskets: ASTM C 564, rubber, compression type, thickness to match class of pipe.

B. Ductile-Iron Pipe for Water and Fire Mains: AWWA C151, Class 150 minimum, for push-on joints.
   1. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
   2. Pipe and Fitting Interior Coating: AWWA C104, asphaltic-material seal coat, minimum 1-mil (0.025-mm) thickness.
   3. Gaskets: AWWA C111, rubber.

C. Polyvinyl Chloride (PVC) Sanitary Sewer Pipe and Fittings: ASTM D 3034, SDR 26 (as noted on drawings), for solvent-cemented or gasketed joints.
   1. Primer: ASTM F 656.
   2. Solvent Cement: ASTM D 2564.
   3. Gaskets: ASTM F 477, elastomeric seal.

D. Polyvinyl Chloride (PVC) Pressure Pipe and Fittings: CLASS 150 pipe, AWWA C 900, for integral bell and spigot joints. Blue Brute or equal for underground water lines. Class 200 pipe, AWWA C900 for fire line, schedule 40 PVC for pipe sizes less than 4 inches.

E. Polyethylene Pipe (PE) Gas Distribution and Fittings: ASTM D 2513 -"Standard Specification for Thermoplastic Gas Pressure Pipe, tubing and Fittings." Manufactured by Phillips Disco Pipe, Inc., required equivalent.

2.2 SPECIAL PIPE COUPLINGS AND FITTINGS

A. Ductile-Iron, Flexible Expansion Joints: Compound fitting with a combination of flanged and mechanical-joint ends conforming to AWWA C110 or AWWA C153. Include 2 gasketed ball-joint sections and 1 or more gasketed sleeve sections, rated for 250-psig minimum working pressure and FDA-approved epoxy interior coating for offset and expansion indicated. Include polyethylene (PE) film encasement.

2.3 PIPE ENCASEMENT

A. Include AWWA C105, polyethylene film tube and sheet, 8-mil (0.2-mm) thickness for the following:
1. Cast-iron soil pipe and fittings.
2. Ductile-iron piping.
3. Pressure-type pipe couplings.
4. Ductile-iron, special pipe fittings.

2.4 MANHOLES

A. Pre-cast Concrete Manholes: ASTM C 478, pre-cast, reinforced concrete, of depth indicated, with provision for rubber gasket joints.
1. Ballast: Increase thickness of pre-cast concrete sections or add concrete to base section, as required to prevent floatation.
2. Base Section: Six (6) inch minimum thickness for floor slab and four (4) inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
3. Riser Sections: five (5) inch minimum thickness, forty eight (48) inch diameter, and lengths to provide depth indicated.
4. Top Section: Concentric cone or flat-slab-top type as indicated. Top of cone of size that matches grade rings.
5. Gaskets: ASTM C 443 (ASTM C 443M), rubber.
6. Grade Rings: Include two (2) or three (3) reinforced-concrete rings, of 6- to 9-inch total thickness, that match a twenty four (24) inch- diameter frame and cover.
7. Steps: Fiber glass, individual steps or ladder. Include a width that allows a worker to place both feet on one step and is designed to prevent lateral slippage off the step. Cast steps or anchor ladder into base, riser, and top section sidewalls at twelve (12) to sixteen (16) inch intervals. Steps will be included in all manholes and structures that are a minimum of five (5) feet deep, whether shown on Drawings or not.
8. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

B. Manhole Frames and Covers: ASTM A 536, Grade 60, heavy-duty ductile iron Include 32-inch (minimum) inside diameter by 6-inch riser with 4-inch minimum width flange, and 30-inch diameter cover. Include indented top design with lettering, equivalent to the following, cast into cover:

Sanitary Sewerage Piping Systems: SANITARY SEWER

Storm Sewerage Piping Systems: STORM SEWER

Provide manhole ring and cover with concrete ring encasement as per San Antonio Water System requirements.

C. Manhole Coating: All structures and non-structures shall be water tight and interior wall coated with a San Antonio Water System approved sewer structural coating.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Structures: Portland-cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cement ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland-cement design mix, 4000 psi minimum, with 0.45 maximum water-cement ratio.
1. Include channels and benches in sanitary sewerage manholes.
2. Manhole Channels: Concrete invert, formed to same width as connected piping, with height of the vertical sides to 3/4 of the pipe diameter. Form curved channels with smooth, uniform radius and slope.

2.6 PROTECTIVE COATINGS

A. General: Include factory- or field-applied protective coatings to structures and appurtenances according to the following:

B. Coating: 2- coat, coal-tar epoxy, 15-mil minimum thickness, except where otherwise indicated.
1. Manholes: On exterior surface.
2. Trench Plates and Covers: On exterior surface.
3. All exposed metal surfaces: On exterior surfaces.

2.7 CLEANOUTS

A. Description: ASME A112.36.2M, round, cast-iron housing with clamping device and round, secured, scoriated, cast-iron cover. Include cast-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
1. Secure with cast iron Box with Locking Cover.
2. Light Duty: In earth or grass, foot-traffic areas.
3. Medium Duty: In paved, foot-traffic areas.
4. Heavy Duty: In vehicle-traffic service areas.
5. Extra Heavy Duty: In roads.

B. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, service class, cast-iron soil pipe and fittings.

PART 3 - EXECUTION

3.1 IDENTIFICATION

A. Arrange for installation of color coded warning tapes directly over piping and at all above ground temporary markers.
1. Use detectable warning tape over nonferrous piping and over edges of underground structures (Reference Utility Drawings for color code sequence)

B. Refer to Part 2 of this Section for detailed Specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.

C. Pipe Sizes 4 to 6 Inches: Hub-and-spigot, service class, cast-iron soil pipe and fittings; compression-type gaskets; and gasketed joints.

3.2 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage, water and gas systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.

B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to Manufacturer's Recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

C. Use the manholes for changes in direction, except where fittings are indicated. Use fittings for branch connections, except where direct tap into existing sewer is indicated.

D. Use proper size increasers, reducers, and transition couplings, where different sizes or materials of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

E. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than that specified, where slope is not indicated.

F. Extend utility piping five (5) feet and cap five (5) feet from the new buildings of sizes and in locations indicated. Terminate piping as indicated on Drawings.

G. Install sewerage piping pitched down in direction of flow, at minimum slope of one (1) percent (1:50) and thirty six (36)-inch minimum cover, except where otherwise indicated.

3.3 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to the following:

B. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: With rubber compression gaskets according to CISPI "Cast Iron Soil Pipe and Fittings Handbook," Volume I. Use gaskets that match class of pipe and fittings.
   1. Install polyethylene film encasement over cast-iron soil pipe and fittings according to ASTM A 674 or AWWA C105.

C. Ductile-Iron Pipe with Ductile-Iron or Cast-Iron Fittings: With push-on-joint, rubber gaskets according to AWWA C600.
   1. Install polyethylene film encasement over ductile-iron pipe and ductile- and cast-iron fittings according to ASTM A 674 or AWWA C105.

D. Polyethylene (PE) Plastic Pipe and Fittings: As follows:
   1. Join pipe, tubing, and fittings with couplings for soiltight joints according to AASHTO "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4 "Joint Properties" and manufacturer's written instructions.
   2. Join pipe, tubing, and gasketed fittings with elastomeric seals for watertight joints according to ASTM D 2321 and Manufacturer's written instructions.
   3. Install according to ASTM D 2321 and manufacturer's written instructions.

E. Polyvinyl Chloride (PVC) Plastic Pipe and Fittings: As follows:
   1. Join solvent-cement-joint pipe and fittings with solvent cement according to ASTM D 2855 and ASTM F 402.
   2. Join pipe and gasketed fittings with elastomeric seals according to ASTM D 2321.
   3. Join profile sewer pipe and ribbed drain pipe and gasketed fittings with elastomeric seals according to ASTM D 2321 and Manufacturer's written instruction.
   4. Install according to ASTM D 2321.

F. Gas Pipe and Fittings: All Gas Piping shall be accurately cut to measurement established at the job by the Contractor, and shall be worked into place without springing or forcing. Proper provisions shall be made for expansion and contraction of all pipe lines.

G. All Gas Piping shall be properly supported to prevent undue strain or sagging. All polyethylene piping above ground shall be supported by hangers. Hangers spacing shall not exceed the following maximum distance between supports: Polyethylene Pipe 4'-0"

H. Before being placed in position, all pipe, fittings and equipment shall be cleaned carefully. All materials and equipment shall be maintained in a clean condition and upon completion of final tests and acceptance shall be left in a clean condition.

I. Unions shall be installed in piping where necessary for easy dismantling of the piping and apparatus.

J. Pipe fittings shall be free of fins and burrs prior to installation. No bushings will be allowed in any piping.

K. All piping shall be made up straight and true at proper grades.

3.4 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318, ACI 350R, where indicated.

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

B. Set cleanout frames and covers in earth in a cast-in-place concrete block, 18 by 18 by 6 inches deep or as shown on Drawings. Set with tops one (1) inch above surrounding earth grade.

C. Set cleanout frames and covers in concrete paving with tops flush with surface of paving.

3.6 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as the Work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
   1. Place plug in end of incomplete piping at end of day and whenever Work stops.
   2. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of the Project.
   1. Submit separate reports for each system inspection.
   2. Defects requiring correction include the following:
   3. Alignment: Less than full diameter of inside of pipe is visual between structures.
   4. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
   5. Crushed, broken, cracked, or otherwise damaged piping.
   6. Infiltration: Water leakage into piping.
   7. Exfiltration: Water leakage from or around piping.
   8. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
   9. Re-inspect and repeat procedure until results are satisfactory.

C. Test new piping systems and parts of existing systems that have been altered, extended, or repaired for leaks and defects in accordance to Section 22 05 13.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests, and their inspections by authorities having jurisdiction, with at least 24 hours' advance notice.
4. Submit separate reports for each test.
5. Where authorities having jurisdiction do not have published procedures, perform tests as follows:
   a) Sanitary Sewerage: Perform hydrostatic test.
   b) Close openings in system and fill with water.
   c) Purge air and refill with water.
   d) Disconnect water supply.
   e) Test and inspect joints for leaks.
   f) Leaks and loss in test pressure constitute defects that must be repaired.
   g) Replace leaking piping using new materials and repeat testing until leakage is within industry standard allowances.

END OF SECTION 330000

SECTION 33 10 00 WATER UTILITIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Section 33 00 00 - Utilities

1.2 DESCRIPTION OF WORK

A. Extent of exterior water system work is shown on drawings.

B. Exterior water system work includes, but is not limited to, the following:
1. Yard piping from public water main to within 5 feet of buildings and to private onsite fire hydrants.
2. Control valves and fittings.
3. Comply with requirements of applicable Division 31 00 00 sections for excavation and backfilling required in connection with exterior water system.
4. Private fire hydrants.
5. Excavation and backfilling for exterior fire protection system is specified in Mechanical General Provisions.
6. Comply with requirements of applicable Division 31 00 00 sections for excavation and backfilling required in connection with exterior fire water system.
7. Comply with requirements of applicable Division 03 00 00 sections for concrete work required in connection with exterior fire water system.

1.3 QUALITY ASSURANCE

A. Asbestos Free Material/Product: Prior to approval of the material/product to be used, the manufacturer/supplier shall furnish the Architect/Engineer with Certification that the material/product contains no asbestos. This certificate is mandatory before approval will be issued. Submittals furnished without the asbestos-free Certification will be returned to the Contractor with no action taken until such Certification is provided.

B. Manufacturers: Firms regularly engaged in manufacture of water system materials of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

C. Installer: A firm with at least 2 years of successful installation experience on exterior fire water and domestic water system projects similar to this project and registered with the State as a certified Site Utility Contractor.

PART 2- PRODUCTS

REFER TO SECTION 33 00 00 – UTILITY LINES, FOR PIPE MATERIALS

2.1 CONTROL VALVES

A. General: Provide valves and flow control devices which are approved by FM and listed by UL.

B. Minimum working pressure, 150 psi unless otherwise indicated.

C. Gate Valves: Standard shut-off valves with maximum working pressure cast into body, outside-screw-and-yoke type with non-rising stems complying with AWWA C 500 unless otherwise required by governing authorities.

2.2 WATER METER

A. General: Provide water meter box and related piping conforming to applicable AWWA standards.

B. Water Meter: Provided by contractor and installed by the SITE UTILITY CONTRACTOR. Provide roughing-in and bypass for meter in accordance with AWWA standards.

2.3 ANCHORAGES

A. General: Provide anchorage's for tees, plugs, caps, bends and hydrants in accordance with NFPA No.24.

1. After installation, apply a full coat of asphalt or other acceptable corrosion-retarding material to surfaces of rods and clamps.
2. Clamps, Straps and Washers: Steel, ANSI/ASTM A 506.
3. Rods: Steel, ANSI/ASTM A 575.
4. Rod Couplings: Malleable iron, and ANSI/ASTM A 197.
5. Bolts: Steel, ANSI/ASTM A 307.
6. Cast-Iron Washers: ANSI/ASTM A 126, Class A.
7. Thrust Blocks: 3000 psi concrete.

2.4 FIRE HYDRANTS

A. General: Provide fire hydrant assemblies by manufacturers approved by AWWA. All new fire hydrants located in school property will be painted RED.

2.5 PLASTIC UNDERGROUND WARNING TAPE

A. A polyethylene plastic tape, 4 inches wide by 4 mils. thick (min.). Tape shall be “safety precaution blue” in color for all plastic water piping (domestic and fire). Tape shall be laid 1’-0” below finish grade.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Install exterior water line in compliance with applicable provisions of NFPA NO. 24, SAWS Specifications and as herein specified.

B. PVC Pipe: Install PVC pipe, ductile iron pipe, ductile iron and cast iron fittings according to AWWA C600. Bury pipe to ensure a minimum cover of 4' below finished grade.

C. Copper Tube: Install with wrought copper, solder joint pressure fittings, and Sn95 Tin-Antimony solder in accordance with CDA “Copper Tube” handbook.

D. Control Valves: Install in accordance with manufacturer’s instructions.

E. Joint Adapters: Make joints between cast-iron pipe and other types of pipe with standard manufactured cast-iron adapters and fittings.

F. Interior Inspection: Inspect conduit to determine whether line displacement or other damage has occurred.

1. If the inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects to satisfaction of Architect/Engineer.

G. Cleaning Conduit; Clear interior of conduit of dirt and other superfluous material as work progresses.

1. Place plugs in end of uncompleted conduit at end of day or whenever work stops.
2. Flush lines to remove collected debris before connecting to other fire protection systems. Flush conduit at rates of flow recommended by NFPA No. 24 unless higher rates required by local authorities.
3. Sterilization: At completion of water service line installation, flush and sterilize in conformance with AWWA C 601, to the satisfaction of local authorities having jurisdiction.

3.2 TESTING

A. Perform hydrostatic testing of completed conduit lines in accordance with NFPA No. 24 unless more stringent test required by local authorities having jurisdiction.

B. Perform operational testing of hydrants and valves by opening and closing under water pressure to insure proper operation.

END OF SECTION 331000

SECTION 33 40 00 STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories.

B. Catch basins, paved area drainage, manhole access, site surface drainage, and surface grates including subsurface drainage lines.

1.2 RELATED SECTIONS

A. Section 31 23 16 - Excavation: Excavating subsoil for sewerage system piping.

B. Section 31 23 23.13 - Backfill: Backfilling over piping up to sub-grade elevation and underside of fill under paving.

C. Section 31 23 33 – Trenching and Backfilling: Trenching for Utility Lines.

D. Section 03 30 00 - Cast-in-Place Concrete: Concrete type for catch basin manhole and cleanout base pad construction.

1.3 REFERENCES

A. ANSI/ASTM A74 - Cast Iron Soil Pipe and Fittings.

B. ANSI/ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.

C. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

D. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

E. ANSI/ASTM D2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

F. ANSI/ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.

G. ANSI/ASTM D2774 - Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.

H. ANSI/ASTM D3033 - Type PSP Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

I. ANSI/ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable code for materials and installation of the Work of this Section.

1.5 SUBMITTALS

A. Submit Shop Drawings under provisions of Section 01 45 01 ‘Quality Control’.

B. Submit Shop Drawings indicating dimensions, layout of piping, gradient of slope between corners and intersections, locations and elevations of catch basins, manholes, cleanouts and grate inlets.

C. Submit Product Data under provisions of Section 01 45 01 ‘Quality Control’.

D. Submit Product Data indicating pipe, pipe accessories, lids, open grates, and steel frames.

E. Submit Manufacturer's Installation instructions under provisions of Section 01 45 01 ‘Quality Control’.

1.6 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01 70 00 ‘ Project Closeout’.

B. Accurately record location of pipe runs, connections, catch basins, manholes, cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 - PRODUCTS

2.1 SEWER PIPE MATERIALS

A. Cast Iron Pipe: ANSI/ASTM A74; extra heavy service type; inside nominal diameter as indicated on drawings, plain end joints.

B. Cast Iron Pipe Joint Device: ANSI A21.11, rubber gasket joint device.

C. Reinforced Concrete Pipe: ANSI/ASTM C76, Class III with Wall Type B, bar reinforcement, inside nominal diameter as shown on drawings bell and spigot end joints.

D. Reinforced Concrete Pipe Joint Device: ANSI/ASTM C443, rubber compression gasket joint.

E. Aluminized Steel Spiral Ribb Type 2 Pipe: ASTM A929; AASHTO M274

F. Poly Vinyl Chloride Pipe: ASTM D2729; ASTM D3033; ASTM D3034

2.2 PIPE ACCESSORIES

A. Fittings: Same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, cleanouts, reducers, traps, and other configurations required.

2.3 CATCH BASINS

A. Basin Lid and Frame: Cast iron construction as indicated on drawing details, hinged lid.

B. Shaft Construction and Concentric Cone Top Section: Reinforced pre-cast concrete pipe sections, lipped male/female dry joints; nominal shaft diameter of forty-eight (48) inches.

C. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00 ‘Structural Cast-In-Place Concrete’, leveled top surface to receive concrete shaft sections, sleeved to receive storm sewer pipe sections.

2.4 MANHOLES

A. Lid and Frame: Cast iron construction, lid design, nominal lid and frame diameter of thirty-two (32) inches.

B. Shaft Construction and Concentric Cone Top Section: Reinforced pre-cast concrete pipe sections, lipped male/female dry joints, cast steel ladder rungs into shaft sections at twelve (12) inches, nominal shaft diameter of forty-eight (48) inches.

C. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00 ‘Structural Cast-In-Place Concrete’, leveled top surface to receive concrete shaft sections, sleeved to receive sewer pipe sections.

2.5 FILL MATERIAL

A. Drainage Material: Type specified in Section 31 00 00 ‘Earthwork’.

B. Granular Embedment Material: Type specified in Section 31 00 00 ‘Earthwork’.

C. Controlled Low Strength Material (CLSM – Flowable Fill): concrete conforming with a 28 day unconfined compressive strength of 80 to 150 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut or excavation base is ready to receive work, and excavations, dimensions, and elevations are as indicated on shop drawings.

B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fill material of lean concrete.

B. Remove large stones or other hard matter that could damage drainage pipe or impede consistent backfilling or compaction.

3.3 INSTALLATION – PIPE

A. Install pipe, fittings, and accessories in accordance with ANSI/ASTM C12 and Manufacturer's Instructions. Seal joints watertight.

B. Place pipe on minimum eight (8) inch deep bed of coarse filter aggregate.

C. Lay pipe to slope gradients noted on layout drawings, with maximum variation from true slope of 1/8 inch in ten (10) feet.

D. Install coarse filter aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of twelve (12) inches.

E. Place filter fabric over leveled top surface of filter aggregate cover prior to subsequent backfilling operations. Geotextile fabric similar to Mirafi 140N, to reduce the infiltration and loss of fines from backfill material

F. Increase compaction of each successive lift. Refer to Section 31 23 23.13 ‘Backfilling’ for compaction requirements. Do not displace or damage pipe when compacting.

3.4 INSTALLATION - CATCH BASINS AND MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.5 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01 40 00 ‘Quality Requirements’.

B. Request inspection by Engineer and Contracting Officer prior to and immediately after placing filter aggregate cover over pipe.

3.6 PROTECTION

A. Protect finished installation under provisions of Section 01 45 01 ‘Quality Control’.

B. Protect pipe and filter aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION