CONTRACT DOCUMENTS

AND

SPECIFICATIONS

FOR

PROJECT NO. 147250 & SW-2020-01-06 TO7
IMPROVE OUR TULSA WOODWARD PARK IMPROVEMENTS

ATTENDANCE AT PRE-BID CONFERENCE IS MANDATORY

PREPARED BY:
Landplan Consultants
1110 W. 23rd Street
Tulsa, ok 74107
918-584-6464
Julie Graff

CITY OF TULSA

CITY EXPERIENCE
City Design Studio

JAMES WAGNER, DIRECTOR

Account Numbers: 2031F00003.StrmSewer.Flood.5618N.56183300-541101
2431F00004.StrmSewer.Flood.5600N.56003300-541101
147250.LandImp.405.4054111-5411101

Public Works Department
175 East 2nd Street, Suite 261
Tulsa, Oklahoma 74103
(918) 596-9637

07.01.23

CONTRACT DOCUMENTS

PROJECT NO. 147250 & SW-2020-01-06 TO7
IMPROVE OUR TULSA
WOODWARD PARK IMPROVEMENTS

ENGNEERING SERVICES DEPARTMENT

INDEX TO BIDDING DOCUMENTS	PAGE
NOTICE TO BIDDERS	NTB-1-2
INSTRUCTION TO BIDDERS	IB-1-6
RESOLUTION 18145 PROVIDING FOR THE EMPLOYMENT OF RESIDENTS OF THE METROPOLITAN STATISTICAL AREA	R-1-3
SBE UTILIZATION INSTRUCTIONS	UI-1-11
AFFIDAVIT FOR SBE UTILIZATION GOALS	SBE-1-5
RESOLUTION NO. 7404 AFFIDAVIT OF COMPLIANCE	RAC-1
AFFIDAVIT FOR 50% RESIDENT RESOLUTION	RRA-1
NONCOLLUSION AFFIDAVIT	NA-1
BUSINESS RELATIONSHIP AFFIDAVIT	BR-1
INTEREST AFFIDAVIT	IA-1
PROPOSAL	P-1-5
CERTIFICATE OF SECRETARY	CS-1
CONSENT OF MEMBERS	CM-1
SALES TAX EXEMPTION DOCUMENT	STED-1
EXTENSION OF TIME REQUEST	ETR-1
CONTRACT	C-1-4
PERFORMANCE BOND	PB-1-2
STATUTORY BOND	SB-1-2
MAINTENANCE BOND	MB-1-2
AFFIDAVIT FOR CONTRACT/CLAIM	AC-1
GENERAL CONDITIONS	GC 1-15
SPECIFICATIONS	
OKLAHOMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 2019 EDITION	
ORDINANCE #24616	1-19
CITY OF TULSA ENGINEERING SERVICES CONSTRUCTION SPECIFICATIONS – March 2022	
SPECIAL PROVISIONS	
SUPPLEMENTAL CONTRACT REQUIREMENTS	SCR-1
INSURANCE REQUIREMENTS	IR-1
SPECIAL PROVISIONS GENERAL	G-1-4
OWNER ALLOWANCE	OA-1
CITY OF TULSA PROJECT SECUTIRY	PS-1
UTILITY RELOCATION AND DESIGN ISSUES	URDI-1
TEHCNICAL SPEIFICATION	
PROJECT MANUAL	1-227

Published in the Tulsa World:
June 28, July 1, 2, 3, and 5, 2024.

NOTICE TO BIDDERS
SEALED BIDS FOR
PROJECT NO. 147250 & SW-2020-01-06

Notice is hereby given that pursuant to an order by the Mayor of the City of Tulsa, Oklahoma, sealed bids will be received in Room 260 of the Office of the City Clerk, City of Tulsa, 175 E. 2nd Street, Tulsa, Oklahoma 74103 until **8:30 a.m. the 9th day of August, 2024** for furnishing all tools, materials and labor and performing the work necessary to be done in the construction of the following:

PROJECT NO. 147250 & SW-2020-01-06 TO7
IMPROVE OUR TULSA WOODWARD PARK IMPROVEMENTS

The entire cost of the improvement shall be paid from Account No.
2031F00003.StrmSewer.Flood.5618N.56183300-541101
2431F00004.StrmSewer.Flood.5600N.56003300-541101
147250.LandImp.405.4054111-5411101

A **MANDATORY** Pre-Bid Conference is scheduled for **Tuesday, July 16, 2024 at 9:15 a.m.** and will be held through video conferencing with Microsoft Teams, invitation presented on the City of Tulsa's website at this link:
https://www.cityoftulsa.org/government/departments/engineering-services/construction-bids/

Attendance at the Pre-Bid Conference is MANDATORY. Bids will not be received from contractors who did not attend the Pre-Bid Conference.

Bids will be accepted by the City Clerk from the holders of valid pre-qualifications certificates from the City of Tulsa in one or more of the following classifications: **A or D.**

Drawings, specifications and contract documents for construction of said public improvements of the said project have been adopted by the Mayor of said City. Copies of same may be obtained at the Office of Contract Administration, 175 E. 2nd St. Ste. 261, for a non-refundable fee in the amount of **$50.00** made payable to the City of Tulsa by check or money order.

Contract requirements shall include compliance as required by law pertaining to the practice of non-discrimination in employment.

The overall aspirational Small Business Enterprise utilization goal for this project is **ten (10)** percent.

Attention is called to Resolution No. 18145 of August 23, 1988, requiring bidders to commit to the goal of employing on the project at least fifty percent bona fide residents of the City of Tulsa and/or MSA in each employment classification.

Attention is called to Resolution 7404 of November 8, 2006, requiring bidders, their subcontractors and their lower-tier subcontractors to hire only citizens of the United States.

The City of Tulsa itself is exempt from the payment of any sales or use taxes, and pursuant to Title 68 O.S. Section 1356(10), direct vendors to the City are also exempt from those taxes. A bidder may exclude from his bid appropriate sales taxes, which he will not have to pay while acting for and on behalf of the City of Tulsa.

A Certified or Cashier's Check or Bidders Surety Bond, in the sum of 5% of the amount of the bid will be required from each bidder to be retained as liquidated damages in the event the successful bidder fails, neglects or refuses to enter into said contract for the construction of said public improvements for said project and furnish the necessary bonds within thirty days from and after the date the award is made.

The bidder to whom a contract is awarded will be required to furnish public liability and workmen's compensation insurance; Performance, Statutory, and Maintenance bonds acceptable to the City of Tulsa, in conformity with the requirements of the proposed contract documents. The Performance, Statutory, and Maintenance bonds shall be for one hundred percent (100%) of the contract price.

All bids will be opened and considered by the Bid Committee of said City at a meeting of said Committee to be held in the City Council Room of City Hall in said City at 9:00 a.m. on the 9th day of August, 2024.

Dated at Tulsa, Oklahoma, this 28th day of June, 2024.

(SEAL)

Christina Chappell
City Clerk

INSTRUCTIONS TO BIDDERS

B-1. BIDS

Each bid Proposal shall be completed electronically on the electronic media provided, then printed, signed and submitted along with the electronic media and the complete bound copy of the contract documents. In the event of a discrepancy between the pricing on the electronic media and hard copy of a Proposal, the hard copy pricing will govern. If electronic media is not provided and the bid Proposal is manual, the bid Proposal shall be submitted in ink. The written words shall govern over the figures if there is a difference between the two. No alterations, additions, or erasures shall be made on the Proposal. Erroneous entries shall be lined out, initialed by the bidder, and the correct entry inserted. The unit price bid must cover all expense for furnishing the labor, materials, tools, equipment, and apparatus of every description to construct, erect, and furnish all work required by and in conformance with the Drawings and Specifications.

Each bid shall be enclosed in a sealed envelope addressed to the City of Tulsa, 175 E. 2nd Street, Room 260, City Hall, Tulsa, Oklahoma, identified on the outside with the words:

PROJECT NO. 147250 & SW-2020-01-06 TO7
IMPROVE OUR TULSA WOODWARD PARK IMPROVEMENTS

Pre-qualification Certificate Number _____,

And shall be filed with the City Clerk in Room 260, City Hall.

All addenda to the contract documents, properly signed by the bidder, shall accompany the bid when submitted.

B-2. BID SECURITY

Each bid shall be accompanied by a cashier's check, a certified check, or bidder's bond, in the amount of five percent (5%) of the total amount bid.

The bid security shall be made payable, without condition, to the City of Tulsa, Oklahoma. The bid security may be retained by and shall be forfeited to the City as liquidated damages if the bid is accepted, a contract based thereon is awarded, and the bidder fails to enter into a contract in the form prescribed, with legally responsible sureties, within thirty (30) days after such award is made by the City.

B-3 RETURN OF BID SECURITY

The bid security of each unsuccessful bidder will be returned when his bid is rejected. The bid security of the bidder to whom the contract is awarded will be returned when he executes a contract and files satisfactory bonds. The bid

security of the second lowest responsible bidder may be retained for a period of time not to exceed sixty (60) days pending the execution of the contract and bonds by the successful bidder.

B-4 WITHDRAWAL OF BIDS

No bidder may withdraw his bid for sixty (60) days after the date and hour set for the opening. A bidder may withdraw his bid any time prior to expiration of the period during which bids may be submitted by making a written request signed in the same manner and by the same person who signed the Proposal.

B-5 REJECTION OF BIDS

Bids received more than ninety-six (96) hours before the time set for opening bids, excluding Saturdays, Sundays, and holidays, as well as bids received after the time set for opening bids, will not be considered and will be returned unopened.

The City of Tulsa reserves the right to reject any and all bids when such rejection is in the best interest of the City of Tulsa. All bids are received subject to this stipulation and the City reserves the right to decide which bidder shall be deemed lowest responsible bidder.

A violation of any of the following provisions by the bidder shall be sufficient reason for rejecting his bid, or shall make any contract between the City of Tulsa and the Contractor that is based on his bid, null and void: divulging the information in said bid before the bids have been opened; submission of a bid which is incomplete, unbalanced, obscure, incorrect, or which has conditional clauses, additions, or irregularities of any kind not in the original proposal form, or which is not in compliance with the Instruction to Bidders and published Notice to Bidders, or which is made in collusion with another bidder. The City shall have the right to waive any immaterial defects or irregularities in any bid received.

B-6 DISQUALIFICATION OF BIDDERS

No contract will be awarded to any person or persons, firm, partnership, company, or corporation which is in arrears to the City upon any debt of contract, or in default as surety or otherwise upon any obligation to the City.

B-7 SIGNATURE OF BIDDERS

Each bid shall be properly signed with the full name of the company or individual submitting the bid, the bidder's address, and the name and title of all persons signing printed below their signature lines. Bids by partnerships shall be signed with the partnership name followed by the signature and title of one of the partners. Bids by corporations shall be signed with the name of the corporation followed by the signature and title of the president, vice president, chairman, or vice chairman of the Board of Directors with attestation by the corporate secretary or assistant corporate secretary. **Resolution must be dated no more than 30 days prior to date of signature of the contract/ bond etc.** Bids by

joint ventures shall be signed by each participant in the joint venture. Bids by limited liability companies shall be signed with the name of the limited liability company followed by the signature and title of the Manager or Managing Member. Bid by limited partnerships shall be signed with the name of the limited partnership followed by the signature of
the general partner. Note: The signature requirements listed above are for Oklahoma entities; entities organized in other states must follow the law of the state in which they are organized.

A bid by a person who affixes to his signature the word "President", "Manager", "General Partner", "Agent", or other title, without disclosing the name of the company for which he is signing, may be held to be the bid of the individual signing.

B-8 INTERPRETATION OF CONTRACT DOCUMENTS

If any person who contemplates submitting a bid is in doubt as to the true meaning of any part of the drawing, specifications, or other proposed contract documents, he may submit to the Engineer a written request for interpretation thereof. The person submitting the request shall be responsible for its prompt delivery. Interpretation of the proposed contract documents will be made only by addendum. A copy of each addendum will be mailed or delivered to each person obtaining a set of contract documents from the Engineer. The City will not be responsible for any other explanations or interpretations of the proposed contract documents.

B-9 LOCAL CONDITIONS AFFECTING WORK

Each bidder shall visit the site of the work and shall completely inform himself relative to construction hazards and procedure, labor, and all other conditions and factors, local and otherwise, which would affect prosecution and completion of the work and its cost. Such considerations shall include the arrangement and condition of existing structures and facilities, the procedure necessary for maintenance of uninterrupted operation of existing structures and facilities, the availability and cost for labor, and facilities for transportation, handling, and storage of materials and equipment. All such factors shall be properly investigated and considered in the preparation of the bid. There will be no subsequent financial adjustment for lack of such prior information.

B-10 TIME OF COMPLETION

The time of completion is an essential part of the contract and it will be necessary for each bidder to satisfy the City of his ability to complete the work within the allowable time set forth in the Bid Form. In this connection, attention is directed to the provisions of the General Conditions and Special Conditions relative to delays, extension of time, and liquidated damages.

B-11 QUALIFICATION OF BIDDERS

No bid will be received and filed by the City Clerk of the City of Tulsa unless the person submitting the bid has been pre-qualified as provided by ordinance, and is the holder of a current certificate of Pre-qualification in force and effect on the date such bid is to be submitted and filed.

B-12 TAXES AND PERMITS

Attention is directed to the requirements of the General Conditions regarding payment of taxes and obtaining permits. Contractor shall comply with all zoning ordinances of the City, as provided in the Tulsa Zoning Code, Title 42 Tulsa Revised Ordinances and conform with all zoning requirements established by the Tulsa Metropolitan Area Planning Commission and the Board of Adjustment. Contractor can call the Indian Nations Council of Governments (INCOG) at (918) 584-7526, to determine if any zoning requirements must be met.

B-13 OKLAHOMA LEGAL REQUIREMENTS

The Contractor must comply with the Oklahoma Scaffolding Law, 40 Oklahoma Statues, Sections 174 - 177, which cover erection and use of scaffolds, hoists, cranes, stays, ladders, supports, or other mechanical contrivances.

In accordance with Oklahoma Statutes, Title 68, Section 1701-1707, before commencing any work pursuant to this contract, any nonresident contractor shall give written notice by certified mail, return receipt requested, to the Oklahoma Tax Commission, the Oklahoma Employment Security Commission, the Workers Compensation Court, and the county assessor of each county in which work will be performed. The notices shall comply with the requirements set forth in said statute.

B-14 BONDS

The bidder to whom a contract is awarded will be required to furnish bonds as follows:

a. Performance Bond – A Performance Bond to the City in an amount equal to one hundred percent (100%) of the Contract price.

b. Statutory Bond – A Statutory Bond to the State of Oklahoma in an amount equal to one hundred percent (100%) of the contract price.

c. Maintenance Bond – A Maintenance Bond to the City in an amount equal to one hundred percent (100%) of the contract price.

The bonds shall be executed on the forms included in the contract documents by a surety company authorized to do business in the State of Oklahoma and acceptable as Surety to the City of Tulsa.

Accompanying the bonds shall be a "Power-of-Attorney" authorizing the attorney-in-fact to bind the Surety Company and certified to include the dates of the bonds.

B-15 BOUND COPY OF CONTRACT DOCUMENTS

The Bid Form or other pages shall not be removed from the bound copy of contract documents. The copy of contract documents filed with each bid shall be complete and shall include all items in the Table of Contents and all addenda.

B-16 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS

Each bidder agrees to comply with the terms of Title 5, Chapter 1, Section 111, of the Tulsa Revised Ordinances relating to Non-Discrimination.

B-17 BASIS FOR AWARD OF CONTRACT

The basis for award of a contract shall be the total base bid submitted by the lowest responsible bidder unless otherwise directed in the form of proposal. The City of Tulsa reserves the right to withhold the awarding of a contract for a reasonable period of time from the date of opening of bids. The awarding of a contract upon a successful bid shall give the bidder no right or action or claim against the City of Tulsa upon such contract until the same shall have been reduced to writing and duly signed by the contracting parties. The award of a contract will not be completed until the contract is duly executed and the necessary bonds and insurance approved.

B-18 TIME FOR AWARDING OF CONTRACT

The awarding of a contract to the lowest responsible bidder will be made within thirty (30) days after the opening of bids unless the City of Tulsa by formal recorded action and for good cause shown, provides for a reasonable extension to that period, which extension period shall not in any event exceed fifteen (15) days where only state or local funds are involved, or not to exceed ninety (90) days on any award of contract for the construction of public improvements where funds are utilized which are furnished by an agency of the federal government.

B-19 SAFETY AND HEALTH REGULATIONS

Bidders should note that they are subject to "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926 and that compliance, review and enforcement are the responsibility of the U.S. Department of Labor.

The Contractor is fully responsible for the safety of the work site and is expected to train their employees in all applicable safety issues. This should include but not be limited to: trench safety, confined space entry, head protection, etc. In accordance with construction contracts with the City, Authority, Board, or Commission, all applicable Labor and OSHA safety regulations must be followed.

Work sites must be monitored by the Contractor and safety provisions enforced. Contractors are asked to ensure that all employees are properly informed and trained in construction, work site safety.

B-20 VENDORS AND SUBCONTRACTOR IDENTIFICATION

Where Vendor and Subcontractor Identification Questionnaires are included in the bid documents, each bidder shall submit the Questionnaire directly to the Engineer no later than 5:00 p.m. on the first working day following the bid opening. Failure to submit the questionnaire may render the bid unresponsive and not eligible for award. The award of the Contract will be subject to the acceptability of the vendors and subcontractors listed. If an award is made, the vendors and subcontractors listed on the questionnaire shall be used on the project. No changes in the vendor and subcontractor list will be permitted unless prior consent is obtained from the Engineer.

B-21 U.S. ENVIRONMENTAL PROTECTION AGENCY NPDES REQUIREMENTS FOR STORMWATER DISCHARGES

The bidder's attention is directed to U.S. Environmental Protection Agency (EPA) NPDES requirements for stormwater discharges. The Contractor shall be responsible for filing a Notice of Intent and development and implementation of a Stormwater Pollution Prevention Plan (PPP).

B-22 AMERICANS WITH DISABILITIES ACT

The Contractor shall take the necessary actions to ensure its facilities are in compliance with the requirements of the Americans with Disabilities Act (ADA). It is understood that the program of the Contractor is not a program or activity of the City of Tulsa. The Contractor agrees that its program or activity will comply with the requirements of the ADA. Any costs of such compliance will be the responsibility of the Contractor. Under no circumstances will the Contractor conduct any activity, which it deems non-compliant with the ADA.

RESOLUTION NO. 18145

A RESOLUTION REQUIRING THE INCLUSION IN PLANS AND SPECIFICATIONS FOR PUBLIC IMPROVEMENT CONTRACTS OF PROVISIONS PROVIDING FOR THE EMPLOYMENT OF BONA FIDE RESIDENTS OF THE CITY OF TULSA; AND/OR THE MSA; ALSO PROVIDING THAT AT LEAST OF FIFTY PERCENT (50%) OF EACH CLASS OF EMPLOYEES USED ON A PROJECT BE BONA FIDE RESIDENTS OF THE CITY OF TULSA AND/OR THE MSA; THAT THE DIRECTOR OF THE DEPARTMENT OF HUMAN RIGHTS IS CHARGED WITH ENSURING THAT ALL BIDS FOR PUBLIC CONSTRUCTION CONTRACTS COMPLY WITH THIS RESOLUTION; AND DECLARING AN EMERGENCY.

WHEREAS, City of Tulsa, Oklahoma, desires to achieve a goal of full employment.

WHEREAS, it is necessary for the protection of the health, safety and welfare of all residents of the City of Tulsa, Oklahoma, to accomplish this goal.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF THE CITY OF TULSA, OKLAHOMA:

SECTION 1. The City of Tulsa is committed to the policy of achieving full employment of its citizens by encouraging the employment of bona fide Tulsa and MSA residents in public improvement contracts.

SECTION 2. Definitions. The definitions of certain terms used in this resolution are as follows:

a. "Bidding Documents" or "Bid" means the bid notice, plans and specifications, bidding form, bidding instructions, special provisions and all other written instruments prepared by or on behalf of an awarding public agency for use by prospective bidders on a public construction contract.

b. (i) "Bona Fide Residents" shall include only those persons who are either registered to vote in the City of Tulsa or who have resided within the city limits for at least six months, or who have purchased a permanent residence within the city limits or who have leased a residence for at least a six month term. Residency may be further determined by a valid Oklahoma driver's license, a current Oklahoma license tag, and a valid Oklahoma automobile inspection sticker. (ii) Bona fide residents of MSA shall include only those persons who are registered to vote in outlying MSA areas or who have resided within the outlying MSA area for at least six months, or who have purchased a permanent residence within the outlying MSA areas or who have leased a residence for at least a six month term. Residency may be further determined by a valid Oklahoma driver's license, a current Oklahoma license tag, and a valid Oklahoma automobile inspection sticker.

c. "Public Construction Contract" or "Contract" means any contract exceeding Seven Thousand Five Hundred Dollars ($7,500.00) in amount, awarded by the City of Tulsa for the purpose of making any public improvements or constructing any public building or making repairs to the same.

d. "Public Improvement" means any beneficial or valuable change or addition, betterment, enhancement or amelioration of or upon any real property, or interest therein, belonging to the City of Tulsa, intended to enhance its value, beauty or utility or to adapt it to new or further purposes. The term does not include the direct purchase of materials, equipment or supplies by the City of Tulsa.

CITY OF TULSA
FILED
AUG 23 1988
Office of City Auditor

e. "MSA". All of the land areas composed of Creek County, Osage County, Rogers County, Tulsa County and Wagoner County.

SECTION 3. Residency Requirements of Contractor's Employees. Every employee and/or agent of the City of Tulsa, Oklahoma, charged or involved with the preparation of plans and specifications for any public impvement funded in whole or in part with funds of the City of Tulsa, is hereby charged to include in said plans and specifications the following provisions which shall be binding upon the successful bidders:

a. Each bid shall be accompanied by a sworn statement that the bidder is committed to the goal of employing at least 50% bona fide residents of the City of Tulsa and/or the MSA in each classification as determined by the Oklahoma Commissioner of Labor.

b. The successful bidder will be responsible for having like requirements placed upon any subcontractor.

c. The successful bidder will submit to the Director or his designated representative of the Department of Human Rights any compliance reports involving the bidder and its subcontractors required by Title 31, Chapter 1, Section 9, of the Tulsa Revised Ordinances. The reports shall include information about the residence of each employee in each laboring and trade class applicable to any City project.

SECTION 4. Unresponsive Bids. The failure to submit the documents required by Section 3 shall render a bid unresponsive. Said documents must be submitted prior to the opening of the bids. The Director of the Department of Human Rights Section of City Development is charged with ensuring that all bids comply with Section 3 prior to the bid opening date.

SECTION 5. Duty of Employees and/or Agents of the City of Tulsa. Any employee and/or agent of the City of Tulsa who fails to include the goals for residency requirements found in Section 3 in the plans and specifications for any public improvement may be subject to disciplinary action, including dismissal.

SECTION 6. Severability. The invalidity of any section, subsection, provision or clause or portion of this chapter, or the invalidity of the application thereof to any person or circumstance shall not affect the validity of the remainder of this chapter or the validity of its application to other persons or circumstances.

SECTION 7. Effect Date. This resolution shall take effect as of July 1, 1988.

SECTION 8. Emergency Clause. That an emergency exists for the preservation of the public peace, health and safety, by reason whereof this resolution shall take effect immediately upon its passage, approval and publication.

PASSED, with the emergency clause ruled upon separately and approved this 23rd day of August, 1988.

APPROVED, this 23rd day of August, 1988.

Rodger Randle

Mayor

ATTEST: Philip W. Wood

City Auditor

APPROVED: Neal E. McNeil

City Attorney

PASSED, with the emergency clause ruled upon separately and approved this 23 day of August, 1988.

- APPROVED, this 23 day of August, 1988.

Mayor

ATTEST:

City Auditor

APPROVED:

City Attorney

CITY OF TULSA
FILED

AUG 23 1988

A.M. P.M.
Office of City Auditor

By

CITY OF TULSA, OKLAHOMA
SMALL BUSINESS ENTERPRISE (SBE) UTILIZATION INSTRUCTIONS
BID OPENING AND AWARD SYSTEM

02.21.22
POLICY STATEMENT

The City of Tulsa (hereinafter City) is committed to implementing the City of Tulsa Small Business Enterprise (SBE) Program of the City of Tulsa, hereinafter referred to as SBE Program. The stated objectives of the programs are:

- To ensure the employment of SBE(s) in the award and administration of City agreements and contracts;
- To create a level playing field on which SBE firms can compete fairly for City contracts;
- To ensure that only firms that fully meet the eligibility standards are permitted to participate as SBE participants;
- To help remove barriers to participation in City contracts;
- To assist in the development of SBE firms so that they may graduate from the SBE Program and ultimately compete successfully in the marketplace.

GOALS BY BUSINESS CATEGORY – SBE

There are seven (7) Business Categories for the City of Tulsa: Construction Contractors (Prime and Subcontractor), Architecture / Engineering (Consultant and Subconsultant), Professional Services, Other Services, and Goods and Supplies. A general description of each category follows:

Construction

- General building contractors engaged primarily in the construction of commercial buildings.
- Heavy construction such as airport runways, bridges, plants, grading and drainage, roadways, and other municipal infrastructure.
- Light maintenance construction services such as carpentry work; electrical work; installation of carpeting; air-conditioning repair, maintenance, and installation; plumbing; and renovation.
- Other related services such as water and sewer lines and maintenance, asbestos abatement, drainage, dredging, grading, hauling, landscaping (for large construction projects such as boulevards and highways), paving, roofing, and toxic waste clean-up.

Architecture and Engineering

- Licensed Architect
- Landscape Architect
- Professional Engineer
- Professional Land Surveyor
- Construction observation
- Other professional design / construction related services

Professional Services

- Financial Services
- Legal services
- Medical services
- Educational services
- Real Estate services
  Planning services.
- Other professional services

Other Services

- Janitorial and maintenance services
- Uniformed guard services
- Computer services
- Certain job shop services
- Graphics, photographic services
- Landscaping
- Other non-technical professional services

Good and Supplies

- Office goods
- Medical supplies
- Miscellaneous building materials
- Computers

The goals are to reflect resource availability and capability. The City of Tulsa's goal is to mitigate and close the disparity between the availability/capability versus actual utilization of SBE firms in Creek, Okmulgee, Osage, Pawnee, Rogers, Tulsa, and Wagoner counties in Oklahoma.

The City enters various agreements and contracts with the private sector for services, goods and supplies, and construction activities. The agreements or contracts may have a specific or primary deliverable associated with one of the Business Categories. However, supplementary efforts may exist to fulfill the agreement or contract. Therefore, the table below is provided to show goals for all Business Categories. Good faith efforts shall first be focused on the Business Category or Categories that relate directly to the deliverables. Additional good faith efforts shall be in supplementary efforts from other categories to assist in meeting the overall project goal.

The project goals will be monitored and periodically adjusted to address the disparity between the available / capable / willing SBE firms versus actual utilization of SBE firms. The ***overall project goal is 10%.***

SBE firms identified for utilization in an agreement or contract must be paid from the proceeds from that agreement or contract.

CITY OF TULSA, OKLAHOMA
SMALL BUSINESS ENTERPRISE (SBE) UTILIZATION INSTRUCTIONS
BID OPENING AND AWARD SYSTEM

Business Category	*SBE Goal (%)*
Construction (Prime Contractors)	10
Construction (Subcontractors)	10
Architecture / Engineering (Consultant)	10
Architecture / Engineering (Subconsultant)	10
Professional Services	10
Other Services	10
Goods and Supplies	10

BIDDER'S ACTIONS

For a:

A. GENERAL / PRIME CONTRACTOR Contract: When the City has established SBE contract goals (hereinafter referred to as "goals"), the City will award a contract only to a bidder who makes good faith efforts to meet the goals.

B. CONSTRUCTION MANAGEMENT AT-RISK (CMAR) Contract: When the City has established SBE contract goals (hereinafter referred to as "goals"), the City will recommend award to the Construction Management (CM) firm the bidder who makes good faith efforts to meet the goals. **However, Bidder(s) who are SBE(s) are not required to solicit other SBE firms but are encouraged.**

The following summary outlines the procedures

Summary:

1. RECORD OF SOLICITATION FOR SBE form:
   These forms MUST be submitted with the bid documents. These documents establish the initial good faith, outreach efforts. In the event the bidder submitted the lowest bid, the SBE firms identified on these forms submitted with the bid are the only SBE firms that will be considered for establishing the bidder's projected utilization percentages for consideration of the award of bid.

2. LETTER OF INTENT TO CONTRACT WITH SBE form:
   The bidder that submits the apparent lowest bid will be notified by City staff no later than the Monday following bid opening. The apparent low bidder MUST submit these forms and the associated attachments by close of business on Thursday following bid opening. Only SBE firms documented on the RECORD(s) OF SOLICITATION FOR SBE forms submitted with the bid will be considered for establishing the bidder's projected utilization percentages for consideration of the award of bid. If Letters of Intent are not submitted, the projected utilization will be 0% and the apparent lowest bidder is subject to being deemed non-responsive.

3. ADMINISTRATIVE RECONSIDERATION:
   If the City determines that a bidder failed to meet the requirements above, City staff will contact the bidder by phone to define the issue and clarify any miscommunications and/or inadvertent actions. If issue was not due to miscommunication and/or inadvertent actions, the bidder will be notified per the Administrative Reconsideration process defined below. If the apparent low bidder is deemed non- responsive, City staff will notify the next lowest bidder to submit their LETTERS OF INTENT TO CONTRACT WITH SBE by close of business of the 6th day following notification or may exercise its right to reject any and all bids.

4. CITY OF TULSA SBE UTILIZATION form:
   This form is completed by the contractor (successful bidder) and submitted as part of the contract to perform the project. This form documents the "projected" utilization for the project. At the end of the project, this form is submitted with the final pay request documenting the "actual" utilization. The "actual" utilization must meet or exceed the "projected" utilization. Any change in the "projected" utilization must be documented, submitted to the City on the CHANGE REQUEST FOR SBE PARTICIPATION form, and approved by the City. Approval of the change must occur at the time of the change. If the change is a reduction and not submitted and approved per the instructions, the amount will be deducted from the contractor's final pay request.

5. CHANGE REQUEST FOR SBE PARTICIPATION form:
   This form documents any change to the "projected" utilization for the project. Change in utilization includes reduction, substitution, and/or increase. Utilization shall be checked with the submission of partial pay requests, but not longer than 30 day intervals throughout the project. The contractor's acknowledgement that they have verified changes in his/her utilization is required as part of partial pay request documents. Reductions in utilization not approved prior to the final pay request will result in pay reduction to the contractor. If, at the completion of the project, the contractor has failed to meet the SBE contract goals, does not have an approved change request, and has not demonstrated good faith efforts to meet the contract goal, the contractor will be assessed liquidated damages for the difference between the contract goal and the actual SBE participation achieved.

Record of Solicitation

All bidders shall, ***with the submissions of their bids***, show their RECORD(s) OF SOLICITATION FOR SBE that demonstrates the good faith outreach effort to meet or exceed the SBE goals established for the project.

If bidders cannot meet the established SBE goals, the bidders shall document and submit with their bid proposal, justification stating why they could not meet the established SBE goals. To demonstrate good faith efforts to meet the SBE goals, the bidders shall document their efforts to obtain SBE participation. City will review and determine that the information is complete, accurate and adequately documents the bidder's good faith efforts before committing to the award of the contract to the bidder. In the event that the City awards a contract to a bidder who cannot meet the established SBE goals,

the findings of the City's review shall be in written form and shall be incorporated into and become part of the contract documents.

If the bidder to whom City proposes to award the contract is able to demonstrate good faith efforts, City may accept the bidder's proposed goal. Acceptance by the City of the bidder's proposed goal does not release the bidder from its contractual obligation to continue to make efforts throughout the duration of the project to utilize SBE firms on the project.

All bidders shall submit with their bid the completed and signed RECORD OF SOLICITATION FOR SBE form.

Letter of Intent

The bidder must submit to the Engineering Contract Coordinator written confirmation from the SBE firms on the form LETTER OF INTENT TO CONTRACT WITH SBE that it is participating in the contract as provided in the contractor's bid commitment. This may be submitted with the bid, but not later than the City's close of business of the Thursday following the bid opening. The signed forms will define the contractor's final proposed utilization and will be the basis of a final evaluation. If inadequate utilization is proposed, the bid shall be considered non-responsive.

The SBE firms submitted on the LETTER OF INTENT TO CONTRACT WITH SBE forms shall be considered binding and changes of committed SBE firms may only be made after the contract is fully executed, and may only be changed through the submission, review and approval of form CHANGE REQUEST FOR SBE PARTICIPATION.

Failure to make the written assurance (City form LETTER OF INTENT TO CONTRACT WITH SBE), which includes the names of the SBE firms to be used, the work they will perform, and the price for the work, or failure to demonstrate good faith efforts that is deemed acceptable to the City to meet or exceed the SBE goals, shall render a bid non-responsive.

It is the contractor's responsibility to submit the information necessary for the City to ascertain compliance with the good faith efforts requirement. Extra cost involved in finding and utilizing SBE firms shall not be deemed adequate reason for the bidder's failure to meet the project SBE goals unless such costs are grossly excessive.

In instances where a successful bidder's SBE commitment exceeds the actual SBE contract goals, the submitted goals of the bidder become the contractual obligation.

In instances where a successful bidder's SBE commitment is below the SBE contract goals, the submitted utilization goals become the contractual obligation.

Good Faith Efforts

The steps taken by the bidder to obtain SBE participation shall be documented in writing and shall include, but are not limited to, the following good faith efforts:

A. Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) in the interest of all certified SBE firms capable to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the SBE firms to respond to the solicitation. The bidder must determine with certainty if the SBE firms are interested by taking appropriate steps to follow-up on the initial solicitation.

B. Selecting portions of the work to be performed by SBE firms in order to increase the likelihood that the SBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate SBE participation, even when the contractor might otherwise prefer to perform these work items with its own forces.

C. Providing interested SBE firms with adequate information about the plans, specifications and requirements of the contract in a timely manner to assist them in responding to a solicitation.

D. Negotiating in good faith with interested SBE firms:

(1) It is the bidder's responsibility to make a portion of the work available to SBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available SBE subcontractors and suppliers, to facilitate SBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of SBE firms that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for SBE firms to perform the work. RECORD OF SOLICITATION FOR SBE form will be submitted.

(2) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including available SBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using SBE firms is not sufficient justification for a bidder's failure to meet the contract SBE goals, as long as such costs are reasonable. Also, the ability or desire of a contractor to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Contractors are not, however, required to accept higher quotes from SBE firms to fulfill the SBE contract requirements if the price difference is excessive or unreasonable. Documentation of quotes shall be submitted to the City with the bid as part of the bidder's record of solicitation.

E. Thoroughly analyzing the capabilities of SBE firms before determining a firm's qualification for a project. The following shall not be legitimate causes for the rejection or non-solicitation of SBE quotes in the efforts of the contractor to meet the project goal: (1) the subcontractor's standing, unrelated to job performance, within the industry; (2) membership in specific groups or organizations; or, (3) association with certain political and/or social organizations.

Administrative Reconsideration

If City determines that a bidder fails to meet the requirements stated above, the bidder will be provided an opportunity for administrative reconsideration. City staff will contact the bidder by phone to define the issue and clarify any miscommunications or inadvertent actions. If issue was not due to miscommunication and/or inadvertent actions, the following process will be followed:

1. The bidder will be notified by fax/email within ten working days following the bid opening.

2. The bidder will have 2 working days from time of notification to schedule a meeting for the purpose of administrative reconsideration with a City of Tulsa Attorney. Reconsideration meetings will generally be held within 7 days of notification of a bidder being determined non-responsive.

   As part of this administrative reconsideration, the bidder will have the opportunity to meet in person with a City of Tulsa Attorney to present arguments concerning whether it met the goal or made adequate good faith efforts to do so. Submittal of additional information documenting solicitation, which was due with the original bid submission, will not be accepted or considered.

3. The decision on reconsideration will be made by a City of Tulsa Attorney who did not take part in the original determination that the bidder failed to meet the goal or make adequate good faith efforts to do so.

4. No awards will be made until all administrative reconsiderations as outlined herein are complete. A City of Tulsa Attorney will provide a written decision on reconsideration to the bidder. This decision will explain the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. The determination is copied to the Contract Administrator, City Engineer, and the Director of Human Rights.

CONTRACTOR ACTIONS AFTER AWARD OF THE CONTRACT:

Counting SBE Participation Toward the Goal

When a SBE participates in a contract, only the value of the work actually performed by the SBE is counted toward the contract goal.

The entire amount of that portion of a contract that is performed by the SBE firm's own forces is counted, including the cost of supplies and materials obtained by the SBE for the work on the contract, including supplies purchased or equipment leased by the SBE (except supplies and equipment the SBE purchases or leases from their Prime Contractor).

When a SBE performs as a participant in a joint venture, the portion of the total dollar value of the contract equal to the clearly defined portion of the work that the SBE performs with its own forces may be counted toward the goal.

Only expenditures to a SBE contractor who performs a commercially useful function may be counted toward a SBE goal.

Commercially Useful Function

A SBE performs a commercially useful function when it is responsible for the execution of the work of its contract and is carrying out its responsibilities by actually performing, managing and supervising the work involved. The SBE must be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself.

To determine whether a SBE is performing a commercially useful function, City will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid is commensurate with the work it is actually performing and the SBE credit claimed, and other relevant factors.

A SBE does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction through which funds are passed in order to obtain the appearance of SBE participation. In determining whether a SBE is acting as a pass-through, City will examine similar transactions, particularly those in which SBE firms do not participate.

Manufacturers and Material Suppliers

If the materials or supplies are obtained from a certified SBE manufacturer, 100 percent of the cost of the materials or supplies will be counted toward the SBE goals. A manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials required under the contract as described by the specifications.

If the materials or supplies are purchased from a certified SBE regular dealer, 100 percent of the cost of the materials or supplies will be counted toward the SBE goals. A regular dealer is a firm that owns, operates or maintains a store, warehouse, or other establishment in which the materials, supplies, articles, or equipment described by the specification and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.

To be a regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating or maintaining a place of business as provided for in the above paragraph if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad-hoc or contract-by-contract basis.

In order for a firm to qualify as a SBE supplier of metal and/or concrete pipe, the firm must also fabricate the pipe. Metal or concrete pipe is specialty pipe which is project specific and is inspected

during the manufacturing process. This arrangement provides for no warehousing of metal or concrete pipe and essentially requires the manufacturer to be the supplier. Merely ordering pipe from the fabricator and in turn selling it to contractors is not consistent with normal industry practice. Contractors normally purchase pipe directly from the manufacturer, thus eliminating the middleman. Supplying metal or concrete pipe is viewed as brokering and is considered inconsistent with SBE program requirements.

Change Request for SBE Participation

Substitution or replacement of a SBE firms will only be permitted or allowed after award and execution of the City contract.

A contractor may not terminate for convenience a SBE listed in their contract (or an approved substitute SBE firm) and then perform the work of the terminated subcontract with its own forces or those of an affiliate, without City's prior written consent.

When a SBE is terminated, or fails to complete the work of the contract for any reason, the contractor must make good faith efforts to find another SBE to substitute for the original SBE. These good faith efforts shall be directed at finding another SBE to perform at least the same amount of work (not necessarily the same work) under the contract as the SBE that was terminated, to the extent needed to meet the SBE goals established in the contract.

When the contractor obtains a substitute SBE, the contractor shall provide the Engineering Contract Coordinator with copies of the CHANGE REQUEST FOR SBE PARTICIPATION form and supporting documentation.

If the contractor is unable to replace the SBE with another SBE, then the contractor must provide City with evidence in writing that they have made a good faith effort. The contractor must submit to the Engineering Contract Coordinator a CHANGE REQUEST FOR SBE PARTICIPATION form along with documentation to support they have made a good faith effort. City may adjust the goal as appropriate.

In the case where a contractor cannot meet the SBE goals of a contract, he or she should request a change of that portion of the SBE goal, which cannot be met. The request will be subject to the following:

- A written request for change will be initiated by the contractor at the time he or she reasonably knows that despite good faith efforts the contract goal cannot be achieved. The request will be included on the CHANGE REQUEST FOR SBE PARTICIPATION form and will contain written document all good faith efforts made to meet the goal as well as the reason for the change.

- The request for change, CHANGE REQUEST FOR SBE PARTICIPATION form, will be submitted for review to the Engineering Contract Coordinator. The City will make the decision on the approval or denial of the change request and inform the contractor.

- If, at the completion of the project, the contractor has failed to meet the SBE contract goals, does not have an approved change request, and has not demonstrated good faith efforts to meet the contract goal, the contractor will be assessed liquidated damages for the difference between the contract goal and the actual SBE participation achieved. The City shall deduct the liquidated damages from the final payment. In the event insufficient earnings remain for the reduction of liquidated damages, the City may claim against the contractor's bond, suspend the contractor under performance suspension, withhold further proposals, suspend prequalification and/or other remedies available under the law.

- In those instances when the goal is not met due to a change in quantity, which occurs through no fault of the contractor, but due to City and/or changed site conditions, a change request will be recommended by Field Engineering at the time the change becomes known, but not later than the next progressive payment application from the contractor which covers the work identified for the SBE firm. The change request will include the statement of quantity change(s). The contractor shall endeavor, with good faith efforts, to mitigate underruns by utilizing other SBE firms.

Change in utilization includes reduction, substitution, and/or increase. Utilization shall be checked with the submission of each partial pay request, but not longer than 30 day intervals throughout the project. The contractor's acknowledgement that they have verified changes in his/her utilization is required as part of partial pay request documents. Reductions in utilization not approved prior to the final pay request, will result in pay reduction to the contractor.

If a contractor fails to comply with this section, appropriate administrative remedies may be taken including, but not limited to:

- No additional progressive payments may be processed
- Refusal to issue proposals
- Liquidated damages
- Suspension of work on the project
- Suspension of prequalification
- Termination of the contract

Prompt Payments

To ensure that contractors' obligations under City contracts are met, the contractor shall endeavor to pay all subcontractors for satisfactory performance of their contracts no later than fifteen (15) calendar days after receipt of each progressive payment from City. The contractor must further endeavor to make prompt release of retainage held to the SBE within thirty days after the work is satisfactorily completed, whether the contractor's work is complete or not. The term "satisfactorily completed" is defined as when; 1) City finds the work completed in accordance with the Plans and Specifications; 2) any required paperwork, including material certification, payrolls, etc., have been received and approved by City; 3) Field Engineering has determined the final quantities on the subcontractor's portion of the work; and 4) Contractor has received progressive payments from City which includes subcontractors' work.

CITY OF TULSA, OKLAHOMA
SMALL BUSINESS ENTERPRISE (SBE) UTILIZATION INSTRUCTIONS
BID OPENING AND AWARD SYSTEM

In an effort to accelerate payments to subcontractors, the City may pay the Contractor for acceptable material stockpiled or delivered to the project, at other approved or designated locations, or at a plant site required for Contractor's operations as approved by the City. This is governed by Oklahoma Department of Transportation Standard Specifications for Highway Construction 2009 or latest edition.

Contractor shall endeavor to include invoices from SBE for materials on hand, partially completed work, or complete work on the earliest partial payment request submitted to the City. It is incumbent on the SBE to submit invoices to the Contractor in a timely manner.

Failure to comply with the prompt payment and return of retainage provisions of the contract may result in sanctions under the contract, as listed below:

- Refusal to issue proposals
- Liquidated damages
- Suspension of work on the project
- No additional progressive payments may be processed
- Suspension of prequalification

Any delay or postponement of payment among the parties may take place only for good cause, with City written approval. The explanation from the contractor must be made in writing to the City.

Record Keeping Requirements

The contractor shall keep such records as are necessary to determine compliance with the SBE contract obligations. The records kept by the contractor will indicate:

1. The name(s) of SBE firms or other subcontractors, the type of work being performed, and payment for work, services and business.

2. Documentation of correspondence, verbal contracts, telephone calls, etc., to obtain services of SBE firms on the project.

Upon request, the contractor shall submit all subcontracts, purchase orders, contracts, agreements, and financial transactions, including canceled checks, executed with SBE firms with the reference to records referred to in this provision, in such form, manner, content prescribed by City.

The contractor should list all SBE firms in the contract and summarize total amounts paid to SBE firms and the project goal amount for each SBE firm.

Reciprocity

The City will grant reciprocity of membership in the SBE program to certified Oklahoma Department of Transportation Disadvantaged Business Enterprises which are located in the Tulsa Metropolitan Statistical Area.

(Must be submitted with Bid)

CITY OF TULSA
BIDDER'S AFFIDAVIT FOR
SMALL BUSINESS ENTERPRISE (SBE) UTILIZATION GOALS

STATE OF)
) ss:
COUNTY OF)

_____, of lawful age, being first duly sworn, says that s(he) is the agent authorized by the bidder to submit the attached bid. Affiant further states that the bidder agrees to fully comply with the City of Tulsa's Resolution requiring that a good faith effort be made to utilize small business enterprises as subcontractors.

Affiant further states that s(he) will document on pages SBE-2BID, -3BID, -4BID, and -5BID for public record, his/her good faith efforts in solicitation.

Affiant further states that s(he) is responsible for having like requirements placed upon any subcontractor of said bidder.

Affiant further states that s(he) has read and agrees to the current CITY OF TULSA, OKLAHOMA SMALL BUSINESS ENTERPRISE (SBE) UTILIZATION INSTRUCTIONS FOR BID OPENING AND AWARD SYSTEMS.

_____
BIDDER (Company Name)

_____
SIGNED

_____
TITLE

SUBSCRIBED and SWORN to before me this _____ day of _____, 20_____.

_____
NOTARY PUBLIC

MY COMMISSION EXPIRES:

_____

CITY OF TULSA

RECORD OF SOLICITATION FOR SMALL BUSINESS ENTERPRISE (SBE)

(MUST BE SUBMITTED WITH BID)

- Project Name:
- Project Number:
- Prime Contractor:
- Prime Contractor Representative:

Consultants, Subcontractors, Service, Regular Dealers, Material Suppliers, & Fabricators:

- Contact Date(s):
- Name of Company:
- Address (Street, City, County, State):
- City of Tulsa SBE: ☐ Yes ☐ No
- City of Tulsa SBE Certificate Number:
- Other SBE Certificate Number(s):
- Company Contact Person:
- Phone No.: Email:
- Description of Work:
- Contract Documents provided to and/or reviewed by Company: ☐ Yes ☐ No
- Will City of Tulsa SBE be utilized? ☐ Yes ☐ No
- If Yes, Estimated Agreement Amount: $
- If No, description of reasons why agreement could not be reached for City of Tulsa SBE to perform work:

CITY OF TULSA

LETTER OF INTENT
TO CONTRACT WITH SMALL BUSINESS ENTERPRISE (SBE)

(Must be submitted by close of business on Thursday following bid opening)

Public Works Department, Attn: Contracts Coordinator
CITY OF TULSA
2317 South Jackson, N-103
Tulsa, Oklahoma 74107
Ph.: 918.596.9637
Fax: 918.596.1299

Project Name: _____

Project Number: _____

Submittal Date: _____

_____

Prime Contractor

HEREBY, intends to subcontract items of work generally described as

_____

to:

_____

SMALL BUSINESS ENTERPRISE

Total amount of participation by City of Tulsa SBE: $ _____

(City of Tulsa SBE, quote must be attached)

City of Tulsa SBE: ☐ Yes ☐ No
City of Tulsa SBE Certificate Number: _____
Other SBE Certificate Number(s):

_____

_____

SMALL BUSINESS ENTERPRISE		**PRIME CONTRACTOR**	
Signature:	_____	Signature:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

Signatures of Authorized representatives of the Prime Contractor and the City of Tulsa SBE firm above represent the written commitment by the Prime Contractor to subcontract with the City of Tulsa SBE firm and a written commitment by the City of Tulsa SBE firm to subcontract for work as described in the attached quote.

This form, along with the City of Tulsa SBE firm's quote must be submitted to the City with the executed Contract documents. If this form is not received, the proposed utilization will NOT be counted as part of the Prime Contractor's agreement. This may cause the agreement to be considered non-compliant and be rejected by the City of Tulsa.

CITY OF TULSA

CHANGE REQUEST
FOR SMALL BUSINESS ENTERPRISE (SBE) PARTICIPATION

Project Name: _____

Project Number: _____

Prime Contractor: _____

CHANGE: From / To (fill in both sides) **OR** **ADD:** To (fill in this side only)

FROM:

Name: _____

City of Tulsa SBE: ☐ Yes ☐ No
City of Tulsa SBE Certificate Number: _____
Other SBE Certificate Number(s):

_____

TO:

Name: _____

City of Tulsa SBE: ☐ Yes ☐ No
City of Tulsa SBE Certificate Number: _____
Other SBE Certificate Number(s):

_____

Change in service to be performed: _____

_____

_____

Change in amount of participation by City of Tulsa SBE: $ _____

Reason for Change: _____

_____

_____

NOTE: Attach a copy of the Letter of Intent for the original City of Tulsa SBE and a new Letter of Intent for the proposed City of Tulsa SBE.

PRIME CONTRACTOR

Signature: _____

Date: _____

Title: _____

SBE SUBCONTRACTOR

Signature: _____

Date: _____

Title: _____

Approved / Disapproved: _____ Date: _____
Public Works Design Engineering Manager
(Planning, Design, or Field)

Approved / Disapproved: _____ Date: _____
Public Works Contracts Coordinator

Distribution: Tulsa Authority for Economic Opportunity
Public Works Design/Public Works Department (Planning, Design, or Field)

CITY OF TULSA
SMALL BUSINESS ENTERPRISE (SBE) UTILIZATION

Project No.			**Contractor**
Project Name			

Name	Business Category	Projected Dollars	Actual Dollars

Projected Contract % _____ **Actual Contract %** _____ **Total** _____ _____

PROJECTED:

_____
Contractor Representative

_____
Date

ACTUAL (Update and Submit with Final Payment):

_____
Contractor Representative

_____
Date

NOTE: REFER TO UTILIZATION INSTRUCTIONS

SBE – 5BID

(Must be submitted at time of Bid)
CITY OF TULSA
RESOLUTION NO. 7404
AFFIDAVIT OF COMPLIANCE

_____, of lawful age, being first duly sworn, states that s(he) is the authorized agent of the Company set forth below.

Affiant further states that the Company, in compliance with City of Tulsa Resolution No. 7404, shall not hire or knowingly allow any of its subcontractors or lower tier subcontractors to hire anyone who is not a United States citizen or legal immigrant or anyone who does not have legal status as a temporary worker to perform work on any project which is the subject of a contract between the Company and the City of Tulsa.

Affiant further states that the Company shall not fail to comply with and shall not knowingly allow any of its subcontractors or lower tier subcontractors to fail to comply with all applicable laws including, but not limited to, labor, employment and taxation laws, in the performance of any work on any project which is the subject of a contract between the Company and the City of Tulsa.

Affiant further states that the Company shall make available to the City of Tulsa, at the City's request, sufficient information and/or affirmations to allow the City to confirm Company's compliance with Resolution No. 7404 relating to the performance of any contract between the Company and the City of Tulsa.

Company: _____

Signed: _____

_____
Title

SUBSCRIBED and SWORN to before me, this _____ day of _____, 20__.

_____
NOTARY PUBLIC

MY COMMISSION EXPIRES:

_____

COMMISSION NO.:

_____

(Must be submitted at time of Bid)
CITY OF TULSA
50% RESIDENT RESOLUTION
AFFIDAVIT FOR BID

STATE OF)
) ss:
COUNTY OF)

_____, of lawful age, being first duly sworn, states that s(he) is the agent authorized by the bidder to submit the attached bid. Affiant further states that the bidder, in compliance with City of Tulsa Resolution No. 18145, is committed to the goal of employing at least 50% bona fide residents of the City of Tulsa and/or the Metropolitan Statistical Area (composed of Creek, Okmulgee, Osage, Pawnee, Rogers, Tulsa, and Wagoner counties).

Affiant further states that bidder is responsible for having like requirements placed upon any of its subcontractors.

_____ _____

BIDDER (Company Name) **SIGNED**

_____
Title

SUBSCRIBED and SWORN to before me this ____ day of _____, 20____.

_____
NOTARY PUBLIC

MY COMISSION EXPIRES:

_____

COMMISSION NO.:

_____

02/01/19

(Must be submitted at time of bid)

NON-COLLUSION AFFIDAVIT

STATE OF)
) ss:
COUNTY OF)

_____ , of lawful age, being first duly sworn, says that:

1. I am the duly authorized agent of the bidder submitting the competitive bid associated with this sworn statement for the purpose of certifying facts pertaining to the existence of collusion among bidders and between bidders and municipal officers or employees, as well as facts pertaining to the giving or offering of things of value to governmental personnel in return for special consideration in the letting of any contract pursuant to the bid;

2. I am fully aware of the facts and circumstances surrounding the making of the bid and have been personally and directly involved in the proceedings leading to the submission of such bid;

3. Neither the bidder nor anyone subject to the bidder's direction or control has been a party:
   a. to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding;
   b. to any collusion with any municipal official or employee as to quantity, quality or price in the prospective contract, or as to any other terms of such prospective contract; nor
   c. in any discussions between bidders and any municipal official concerning exchange of money or other things of value for special consideration in the letting of a contract.

4. If awarded the contract, neither the bidder nor anyone subject to the bidder's direction or control has paid, given or donated or agreed to pay, give or donate to any officer or employee of the City of Tulsa or of any public trust where the City of Tulsa is a beneficiary, any money or other thing of value, either directly or indirectly, in procuring the contract for which the bid is submitted.

_____ _____

BIDDER (Company Name) Signed

_____

Title

SUBSCRIBED and SWORN to before me this _____ day of _____, 20___.

_____

NOTARY PUBLIC

MY COMMISSION EXPIRES:

_____ , ___ .

COMMISSION NO.:

_____

(Must be submitted at time of bid)

BUSINESS RELATIONSHIP AFFIDAVIT

STATE OF)
) ss:
COUNTY OF)

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

_____

_____

_____

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

_____

_____

_____

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

_____

_____

_____

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

Signed: _____

_____
BIDDER (Company Name)

_____
Title:

SUBSCRIBED and SWORN to before me this _____ day of _____, 20__.

_____
NOTARY PUBLIC

MY COMMISSION EXPIRES:

_____, _____

COMMISSION NO.:

_____

(Must be submitted at time of bid)

INTEREST AFFIDAVIT

STATE OF _____)
)ss.
COUNTY OF _____)

I, _____, of lawful age, being first duly sworn, state that I am the agent authorized by Contractor, Engineer, Architect or provider of professional service ["Services Provider"] to submit the attached Agreement. Affiant further states that no officer or employee of the City of Tulsa either directly or indirectly owns a five percent (5%) interest or more in the Services Provider's business or such a percentage that constitutes a controlling interest. Affiant further states that the following officers and/or employees of the City of Tulsa own an interest in the Services Provider's business which is less than a controlling interest, either direct or indirect.

_____

_____

_____

By_____
Signature

Title_____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
Notary Public

My Commission Expires:_____

Notary Commission Number:_____

County & State Where Notarized:_____

The Affidavit must be signed by an authorized agent and notarized.

ELECTRONIC BID PROPOSAL INSTRUCTIONS - EXCEL SPREADSHEET
[Woodward Park Improvements]
PROJECT NO. [147250]

Please read the following instructions carefully.

1. After opening this file re-save it as your company's name.
2. Open the BID FORM Sheet from the tabs below.
3. Input the unit price of the appropriate pay item in the Data Input cells.
4. Review all data input and check calculations to ensure accuracy of Bid.
5. Print 1hardcopy of the "PROPOSAL" tab, BID FORM and the "SIGNATURE PAGE" tab.
6. Complete and sign the "Signature Page" document.
7. Submit hardcopy and electronic disk with Contract Documents and Specifications for Bid opening date.

AGREEMENT FOR USING ELECTRONIC BID PROPOSAL

By and Between: **[Landplan Consultants Inc.]**, (ARCHITECT/ENGINEER) and RECIPIENT. The enclosed electronic media is provided pursuant to your request and is for your limited use in connection with your submittal of Bid Proposal for **Project No. [147250].** In no event shall the information be used for any other purpose or be released to third parties without the written consent of the ARCHITECT/ENGINEER. In the event of a discrepancy between the hard copy and this electronic media at delivery or in the future, the hard copy shall govern. ARCHITECT/ENGINEER hereby disclaims any and all liability for the consequences from use of the electronic media and makes no warranty or guarantee of accuracy. RECIPIENT shall assume full responsibility for the uses and consequences of the electronic media. It is agreed that ARCHITECT/ENGINEER has and retains ownership of the electronic media. ARCHITECT/ENGINEER does not warrant or guarantee that the electronic data is compatible with RECIPIENT'S computer hardware or software, and ARCHITECT/ENGINEER'S responsibility for the electronic media is limited to replacement of defective media for a period of thirty (30) days after delivery to RECIPIENT. By opening and using this FILE, You AGREE to these TERMS AND CONDITIONS.

PROPOSAL
[Woodward Park Improvements]
PROJECT NO. [147250]

TO: HONORABLE MAYOR
CITY OF TULSA, OKLAHOMA

THE UNDERSIGNED BIDDER, having carefully examined the drawings, specifications, and other Contract Documents of the above project presently on file in the City Clerk, City of Tulsa Oklahoma:

CERTIFIES THAT he has inspected the site of the proposed work and has full knowledge of the extent and character of the work involved, construction difficulties that may be encountered, and materials necessary for construction, class and type of excavation, and all other factors affecting or which may be affected by the specified work; and

CERTIFIES THAT he has not entered into collusion with any other bidder or prospective bidder relative to the project and/or bid: and

HEREBY PROPOSES: to enter into a contract to provide all necessary labor, materials, equipment and tools to completely construct and finish all the work required by the Contract Documents hereto attached and other documents referred to therein: to complete said work within **365** calendar days after the work order is issued; and to accept in full payment therefore the amount set forth below for all work actually performed as computed by the Engineer as set forth in the Contract.

Basis of Award

IT SHOULD BE NOTED THAT THE LOWEST RESPONSIBLE BID SHALL BE DETERMINED BY THE TOTAL BASE BID PLUS ADDITIVE ALTERNATES NO. 1 thru 7. THE ITEMS IN ADDITIVE ALTERNATES NO. 1 thru 7 MAY OR MAY NOT BE INCLUDED IN THE CONTRACT AWARD AT THE SOLE DISCRETION OF THE CITY OF TULSA. ANY PROPOSAL SUBMITTED WITH THE ADDITIVE ALTERNATES 1 thru 7 INCOMPLETE SHALL BE CONSIDERED NON-RESPONSIVE.

PROPOSAL
[Woodward Park Improvements]
PROJECT NO. [147250]

BID ITEM	SPEC NO.	DESCRIPTION	UNIT	QTY	DATA INPUT UNIT PRICE	TOTAL EACH ITEM
		BASE BID:				
001		POND 1 RECONSTRUCTION	SYSTEM	1		$ -
002		CREEK RELOCATION	SYSTEM	1		$ -
003		SOLID SLAB SODDING				$ -
		SOLID SLAB SODDING (AREA OF PIPE INSTALLATION)	SY	5015		$ -
		SOLID SLAB SODDING (ALL OTHER AREAS)	SY	10661		$ -
004		MANHOLE ADJUST TO GRADE	EA	2		$ -
005		IRRIGATION SYSTEM	SYSTEM	1		$ -
006		REMOVAL & STOCKPILE FOR REUSE OF LIMESTONE BOULDERS	TON	241		$ -
007		REMOVAL & STOCKPILE FOR REUSE OF SANDSTONE BOULDERS	TON	610		$ -
008		PLACEMENT OF SANDSTONE BOULDERS	LOT	1		$ -
009		REMOVAL OF TREE (6"-12" DIAMETER)	EA	39		$ -
010		REMOVAL OF TREE (12"-33" DIAMETER)	EA	12		$ -
011		REINSTALL BENCH ON GROTTO TERRACED SLOPE	EA	1		$ -
012		LIMESTONE RETAINING WALL WITH GRAVEL/DRAIN AND ASSOCIATED STABILIZATION OF LIMESTONE WALKWAY	SYSTEM	1		$ -
013		LANDSCAPE PLANTING	SYSTEM	1		$ -
014		LIMESTONE POND WALL	SYSTEM	1		$ -
015		LIMESTONE SLAB STAIRCASE AT NORTH END OF POND 4	SF	567		$ -
016		SEDIMENT REMOVAL, MUCK OUT PONDS, EXCAVATION & RE-SHAPE PONDS, HAUL OFF, & DEWATERING	SYSTEM	1		$ -
017		POND CLAY LINER	CY	1940		$ -
018		STORM SEWER OUTLET CONTROL BOX 3x3	LS	1		$ -
019		CLASS 'A' CONCRETE SIDEWALK (6" THICK)	LS	1		$ -
020		CLASS 'A' CONCRETE FLUME BETWEEN POND 2 AND POND 3	SYSTEM	1		$ -
021		CLASS 'A' CONCRETE WEIR POND 3 / 4	SYSTEM	1		$ -
022		RECIRCULATION SYSTEM INSTALLATION	SYSTEM	1		$ -
023		4" DEPTH SOFT SURFACE PATH	SYSTEM	1		$ -
024		SWALES AND DRAINAGE SYSTEM	SYSTEM	1		$ -
025		OWNERS ALLOWANCE	ALLOW	100000	$1.00	$ 100,000.00
026		GENERAL CONDITIONS	LOT	1		$ -
027	202(A)	UNCLASSIFIED EXCAVATION	CY	141		$ -
028	303(A)	AGGREGATE BASE TYPE A	CY	390		$ -
029	310(B)	SUBGRADE, METHOD B	SY	530		$ -
030	325	SEPARATOR FABRIC	SY	614		$ -
031	509(A)	CLASS AA CONCRETE	CY	144		$ -
032	511(A)	REINFORCING STEEL	LB	31,680		$ -
033	609(B)	COMBINED CURB AND GUTTER (6" BARRIER-INTEGRAL)	LF	127		$ -
034	610(A)	CONCRETE SIDEWALK (6")	SY	53		$ -
035	610(A)	STAMPED CONCRETE SIDEWALK (4")	SY	30		$ -
036	613(A)	30" R.C. PIPE CLASS III (RCP) W/ OMNIFLEX GASKET, COMPLET	LF	8		$ -
037	613(A)	42" R.C. PIPE CLASS III (RCP) W/ OMNIFLEX GASKET, COMPLE	LF	8		$ -
038	613(A)	48" R.C. PIPE CLASS III (RCP) W/ OMNIFLEX GASKET, COMPLET	LF	16		$ -
039	613(A)	90" R.C. PIPE CLASS III (RCP) W/ OMNIFLEX GASKET, COMPLE	LF	418		$ -
040	619(B)	REMOVAL OF SIDEWALK	SY	53		$ -
041	619(B)	REMOVAL OF STAMPED CONCRETE SIDEWALK	SY	30		$ -
042	619(B)	REMOVAL OF MANHOLES	EA	1		$ -
043	619(B)	REMOVAL OF EXISTING PIPE	LF	32		$ -
044	619(B)	REMOVAL OF EXISTING 90" PIPE	LF	512		$ -
045	619(B)	REMOVAL OF CURB AND GUTTER	LF	127		$ -
046	641	MOBILIZATION	EA	1		$ -
047	642	CONSTRUCTION STAKING	EA	1		$ -
048	880(J)	CONSTRUCTION TRAFFIC CONTROL	EA	1		$ -
049	SPECIAL	TYPE I PCC PATCH	CY	97		$ -
050	SPECIAL	POINT REPAIR	EA	3		$ -
051	(SP) COT 643	CONTRACTOR'S QUALITY CONTROL	LSUM	1		$ -
052	(SP) COT 754	FRAME AND LID FOR JUNCTION BOX	EA	5		$ -
		TOTAL BASE BID				$ 100,000.00

BID ITEM	SPEC NO.	DESCRIPTION	UNIT	QTY	DATA INPUT UNIT PRICE	TOTAL EACH ITEM
		ADD ALTERNATE #1 - GROTTO IMPROVEMENTS / REPAIRS				
053		GROTTO IMPROVEMENTS / REPAIRS	SYSTEM	1		$ -
		TOTAL ADD ALTERNATE #1				$ -
		ADD ALTERNATE #2 - HAMMOCK VILLAGE				
054		HAMMOCK VILLAGE (REQUIRES ACCEPTANCE OF ADD ALT #3)	SYSTEM	1		$ -
		TOTAL ADD ALTERNATE #2				$ -
		ADD ALTERNATE #3 - EXISTING PLANTING BEDS IN HILLTOP GARDEN				
055		CLEAN UP OF EXISTING PLANTING BEDS (SEE EXISTING PLANTING CLEAN-UP ADD ALT #3 SHEET FOR LOCATIONS)	LOT	1		$ -
		TOTAL ADD ALTERNATE #3				$ -
		ADD ALTERNATE #4 - EXISTING PLANTING BEDS				
056		PLANTING FOR EXISTING HILLSIDE GARDEN PLANTING BEDS (SEE "PLANTING PLANS (11)-(16) FOR LOCATIONS & PLANTING SCHEDULE (02) FOR QUANTITIES)	LOT	1		$ -
		TOTAL ADD ALTERNATE #4				$ -
		ADD ALTERNATE #5 - IRRIGATION 4" WATER METER & BACKFLOW				
057		IRRIGATION WATER SERVICE CHANGE TO (1) 4" WATER METER & 4" BACKFLOW PREVENTER. COST GIVEN SHOULD BE FOR ADDITIONAL COST FOR UPGRADE ABOVE AND BEYOND THE BASE BID 2-2" METERS AND BACKFLOWS AND ALL THAT IS REQUIRED TO PERMIT AND INSTALL THEM.	LOT	1		$ -
		TOTAL ADD ALTERNATE #5				$ -
		ADD ALTERNATE #6 - IRRIGATION				
058		4" HDPE BUTT-FUSION WELDED FOR ALL IRRIGATION MAINLINE. COST GIVEN SHOULD BE FOR ADDITIONAL COST FOR UPGRADE ABOVE AND BEYOND THE BASE BID MAINLINE MATERIALS AND INSTALLATION COST.	LOT	1		$ -
		TOTAL ADD ALTERNATE #1				$ -
		ADD ALTERNATE #7 - 2 PRESSURE REGULATORS				
059		ADD TWO PRESSURE REGULATORS TO IRRIGATION SYSTEM IF THE STATIC PRESSURE EXCEEDS 80 PSI AS CONFIRMED DURING DESIGN.	EA	2		$ -
		TOTAL ADD ALTERNATE #7				$ -
		TOTAL BASE BID plus ALTERNATES 1 thru 7				$ 100,000.00

BASE BID (ITEMS 1 thru 26)	$ 100,000.00
ADD ALT #1	$ -
ADD ALT #2	$ -
ADD ALT #3	$ -
ADD ALT #4	$ -
ADD ALT #5	$ -
ADD ALT #6	$ -
ADD ALT #7	$ -
TOTAL (BASE BID + ADD ALTERNATES 1 thru 7)	$ 100,000.00

Enclosed is a ( ) Bidder's Surety Bond, ( ) Certified Check, ( ) Cashier's Check for

_____ Dollars ($_____)
Words Figures

which the City of Tulsa may retain or recover as liquidated damages in the event that the undersigned fails to enter into contract for the work covered by this proposal, provided the Contract is awarded to the undersigned within thirty (30) days, from the date fixed for opening of bids and the undersigned fails to execute said Contract and furnish the required bonds and other requirements as called for in these Contract Documents within thirty (30) days after award of Contract.

Dated at Tulsa, Oklahoma, this _____ day of _____, 20_____.

Respectfully submitted,

_____
(Complete legal name of company)

_____
(State of Organization)

By:

_____
Title:
Printed Name:

ATTEST:

_____
Title: Corporate Secretary
Printed Name:

(SEAL)

Address:_____
_____
_____
_____
_____

Telephone Number: _____

Fax Number: _____

By signing above the bidder acknowledges receipt of the following Addenda (give number and date of each):

_____
_____

This form is made available for example purposes only and is not intended to be legal advice nor intended to be relied upon in lieu of consultation with an attorney.

Certificate of Secretary

The undersigned _____ (Assistant) Secretary of _____, a _____ corporation, (the "Corporation") hereby certifies that the following is a true and correct copy of a Resolution duly adopted by the Board of Directors of the Corporation on the _____ day of _____, 20___.

> RESOLVED, that _____ is authorized to execute and enter into bids, contracts, bonds, affidavits and any ancillary documents, on behalf of the Corporation.

The undersigned further certifies that this Resolution is in full force and effect as of the date of this Certificate and has not been amended, modified, revoked or rescinded.

IN WITNESS WHEREOF, I have executed this Certificate this ___ day of _____, 20__.

_____
(Signature)

_____
Printed Name

_____
(Assistant) Secretary

SAMPLE

[SAMPLE CONSENT OF MEMBERS]

[NAME OF COMPANY], LLC

Consent of Members

The undersigned, being all of the Members of [Name of Company], LLC, an Oklahoma Limited Liability Company, hereby authorize, consent to, approve and ratify the execution by _____ on behalf of [Name of Company], LLC of bid proposals, contracts, affidavits and related documents in connection with [Name of Project] of the City of Tulsa.

DATED, this ___ day of _____, 20__.

EXAMPLE

_____

Name printed: _____

_____

Name Printed: _____

[ADD ADDITIONAL LINES FOR ADDITIONAL MEMBERS]

Disclaimer Statement: This form is made available for example purposes only and is not intended to be legal advice nor intended to be relied upon in lieu of consultation with an attorney."

CITY OF TULSA

PUBLIC WORKS
Engineering

DATE:
Month Day, Year

{Company Name}
(Address)
{City, State Zip}

RE: City of Tulsa Project No. {number and Title}

TO WHOM IT MAY CONCERN:

Please be advised that the City of Tulsa, Oklahoma, a municipal corporation, has contracted for the construction of a public improvement project as referenced above, and that pursuant to Title 68 § Section 1356 (10), sales on tangible personal property or services to be wholly consumed in the performance of such projects are exempt from Oklahoma and City of Tulsa Sales Tax when:

> "...Any person making purchases on behalf of such subdivision or agency of the state shall certify, in writing, on the copy of the invoice or sales ticket to be retained by the vendor that the purchases are made for and on behalf of such subdivision or agency of this state and set out the name of such public subdivision or agency."

This letter of authorization expires **{Date.}**

A photostatic copy of this letter may be considered as the original.

CITY OF TULSA

Paul D. Zachary, P.E.
Deputy Director

cc: Ryan McKaskle

HAS:JR:kt

1836 × 1898

TUL × USA

EXTENSION OF TIME REQUEST

(to be submitted with eack partial payment application)

DATE: _____

CONTRACTOR: _____

ADDRESS: _____

_____

CONTRACT NO.: _____

PROJECT NO.: _____

DESCRIPTION: _____

ARE THERE ANY CHANGES TO YOUR SBE UTILIZATION? _____ YES _____ NO

IF YES, GIVE REASON AND ATTACH CHANGE REQUEST FORM (SBE-4): _____

_____

EXTENSION OF CONTRACT TIME REQUIRED: _____ YES _____ NO

TOTAL OF EXTENSION TIME REQUESTED: _____

IF YES GIVE REASON: _____

_____

_____

_____

SIGNATURE - CONTRACTOR

_____

CONSULTING ENGINEER OR DEPARTMENT OF PUBLIC WORKS STAFF RECOMMENDATIONS

APPROVED: _____ REJECTED: _____

REASON: _____

_____

_____

_____

SIGNATURE

_____

DATE

ACTION WILL BE TAKEN WITHIN 30 DAYS FROM RECEIPT OF REQUEST

ETR-1

CONTRACT FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS TULSA, OKLAHOMA

THIS CONTRACT made and entered into the _____ day of_____, 2024, by and between___an (list state)_____ (Corporation or Limited Liability Company) of _____ , Oklahoma, hereinafter called the "CONTRACTOR", and the CITY OF TULSA - TULSA, OKLAHOMA, a Municipal Corporation, herein called the "CITY."

WITNESSETH:

WHEREAS, the City has caused to be prepared the necessary Drawings, Specifications, and other Contract Documents for the public improvements herein described, and has invited bids for the construction thereof in accordance with the terms of this Contract, all of which is hereby designated as:

PROJECT NO. 147250 & SW-2020-01-06 TO7 IMPROVE OUR TULSA WOODWARD PARK IMPROVEMENTS

WHEREAS, the Contractor, in response to the Advertisement, has submitted to the City, in the manner and at the time specified, a sealed bid in accordance with the terms of this Contract; and,

WHEREAS, the City, in the manner prescribed by law, has publicly opened, examined, and canvassed the bids submitted, and has determined the above named Contractor to be the lowest responsible bidder for the work and has duly awarded to the said Contractor therefore, for the sum or sums named in the Contractor's bid, a copy of the Bid Form being attached to and made a part of this Contract;

NOW, THEREFORE, in consideration of the compensation to be paid to the Contractor and of the mutual agreements and covenants herein contained, the parties to this Contract have agreed and hereby agree, as follows:

ARTICLE I. That the Contractor shall (a) furnish all tools, equipment, supplies, superintendent, transportation, and other construction accessories, services, and facilities; (b) furnish all materials, supplies, and equipment specified and required to be incorporated in and form a permanent part of the completed work; (c) provide and perform all necessary labor; and (d) in a good, substantial, and workmanlike manner and in accordance with the requirements, stipulations, provisions, and conditions of the Contract as defined in the attached General Provisions, sometimes referred to as General Conditions in the Contract Documents, said documents forming the Contract and being as fully a part thereof as if repeated verbatim herein, perform, execute, construct, and complete all work included in and covered by the City's official award of this Contract to the said Contractor, such award being based on the acceptance by the City of the Contractor's bid, or part thereof, as follows:

PROJECT NO. 147250 & SW-2020-01-06 TO7 IMPROVE OUR TULSA WOODWARD PARK IMPROVEMENTS

ARTICLE II. That the City shall pay to the Contractor for performance of the work embraced in this Contract, and the Contractor will accept as full compensation therefor, the sum (subject to adjustment as provided by the Contract) of _____ AND /100 Dollars ($_____) for all work covered by and included in the Contract award and designated in the foregoing Article I; payments therefore to be made in cash or its equivalent, in the manner provided in the General Provisions.

ARTICLE III. That the Contractor shall start work within ten (10) days following the date stipulated in a written order from the City to proceed with the work to be performed hereunder, and shall complete the work within the number of consecutive calendar days after the authorized starting date, as stipulated below:

All Work Completed: **365** calendar days

ARTICLE IV. The sworn, notarized statement below shall be signed and notarized before this Contract will become effective.

ARTICLE V. Prior to submitting a final payment request, the Contractor shall furnish a lien waiver certifying that all subcontractors and suppliers have been paid.

IN WITNESS WHEREOF, the parties have hereto set their hands and seals,

this _____ day of _____, 2024.

CITY OF TULSA, OKLAHOMA
a municipal corporation

By:_____ ATTEST: (S E A L)

_____Date:_____ _____Date:_____
Mayor City Clerk

APPROVED: APPROVED:

_____Date:_____ _____Date:_____
City Attorney Director

_____
CONTRACTOR

By:_____

Printed Name _____

_____ Date:_____ _____ Date:_____
Title Title

ATTEST:

_____
Corporate Secretary

(S E A L)

AFFIDAVIT

STATE OF _____)
)ss
COUNTY OF _____)

_____, of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by the Contractor to submit the above Contract to the CITY OF TULSA, Tulsa, Oklahoma.

_____
Signature

Subscribed and sworn to before me this _____ day of _____, 2024.

_____
NOTARY PUBLIC

My Commission Expires:

_____, ____.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned, _____, (hereinafter called the Contractor"), duly authorized by law to do business as a construction contractor in the State of Oklahoma, and _____ (hereinafter called the "Surety"), a corporation organized under the laws of the State of _____, and authorized to transact business in the State of Oklahoma, as Surety, are hereby held and firmly bound unto the City of Tulsa, Tulsa, Oklahoma (hereinafter called the "City"), in the penal sum of

_____

_____

($0.00). lawful money of the United States, for the payment of which, well and truly to be made unto the said City, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents, as follows:

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT, WHEREAS, the Contractor has on the _____ day of _____, _____, entered into a written contract with the City of Tulsa, Tulsa, Oklahoma, for furnishing all materials, labor, tools, equipment, and transportation necessary for:

PROJECT NO. 147250 & SW-2020-01-06 TO7
IMPROVE OUR TULSA WOODWARD PARK IMPROVEMENTS

NOW, THEREFORE, if said Contractor shall well and truly perform and complete said project in accordance with said Contract, Advertisement for Bids, General Conditions, Instructions to Bidders, Bid Form, Plans and Specifications, and related documents, shall comply with all the requirements of the laws of the State of Oklahoma; shall pay as they become due all just claims for work or labor performed and materials furnished in connection with said contract, and shall defend, indemnify and save harmless said City against any and all liens, encumbrances, damages, claims, demands, expenses, costs and charges of every kind, including patent infringement claims except as otherwise provided in said specifications and other contract documents, arising out of or in relation to the performance of said work and the provisions of said Contract, then these presents shall be void; otherwise, they shall remain in full force and effect.

This obligation is made for the use of said City and also for the use and benefit of all persons who may perform work or labor, or furnish any material in the execution of said Contract, and may be sued on thereby in the name of the City.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder, or the specifications accompanying same, shall in any way affect its obligation on this bond; and it does hereby waive notice of any such change, extension of time, alteration or addition of the terms of the Contract, or to the work or to the specifications.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its attorney-in-fact, duly authorized so to do, the day and year first above written.

_____
CONTRACTOR (Principal)

BY: ATTEST: (S E A L)

_____Date:_____ _____Date:_____
Title: Title:

_____Date:_____ _____Date:_____
Attorney In Fact ** Surety (S E A L)

**This date shall match the notarized certificate on the Power-of-Attorney

(Accompany this Bond with Power Of Attorney)

APPROVED AS TO FORM:

_____ Date:_____
City Attorney

_____ Date:_____
City Clerk

STATUTORY BOND

WHEREAS, the undersigned _____
has entered into a certain contract dated the _____ day of _____, ____, designated as **Project No. 147250 & SW-2020-01-06 TO7** for the construction of certain public improvements Consisting of **Improve Our Tulsa Woodward Park Improvements** to be situated and constructed on and through the property described in said Contract, including all of the work mentioned and described in said Contract, and to be performed by the undersigned strictly and punctually in accordance with the terms, conditions, drawings and specifications thereof, on file in the office of the office of the City Clerk.

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS: That _____, as Principal, and _____
_____
_____, a Corporation organized under the laws of the State of _____, and authorized to transact business in the State of Oklahoma, as Surety, are held and firmly bound unto the State of Oklahoma in the penal sum of
_____
_____
____($0.00), lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our successors, and assigns, jointly and severally firmly by these presents.

NOW, THEREFORE, if the said Principal shall fail or neglect to pay all indebtedness incurred by Principal or sub-contractors of said principal who perform work in the performance of such contract, for labor and materials and repairs to and parts for equipment used and consumed in the performance of said contract within thirty (30) days after the same becomes due and payable, the person, firm or corporation entitled thereto may sue and recover on this bond the amount so due and unpaid.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder, or the specifications accompanying the same, shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the specifications.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its attorney-in-fact, duly authorized so to do, the day and year first above written.

_____
CONTRACTOR (Principal)

BY: ATTEST: (S E A L)

_____Date:_____ _____Date:_____
Title: Title:

_____Date:_____ _____Date:_____
Attorney-In-Fact ** Surety (S E A L)

**This date shall match the date of the notarized certificate on the Power-of- Attorney.

(Accompany this Bond with Power-Of-Attorney)

APPROVED AS TO FORM:

_____ Date:_____
City Attorney

_____ Date:_____
City Clerk

06/13/06

MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____, as Principal, and _____, a corporation organized under the laws of the State of _____ and authorized to transact business in the State of Oklahoma, as Surety, are held and firmly bound unto the City of Tulsa in the Penal sum of _____

_____

Dollars (full amount of Contract) ($_____) in lawful money of the United States of America for the payment of which, well and truly to be made, we bind ourselves and each of us, our heirs executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written contract with the City of Tulsa, Oklahoma dated_____,_____, for

Project No. 147250 & SW-2020-01-06 TO7
Improve Our Tulsa Woodward Park Improvements

all in compliance with the drawings and specifications therefore, made a part of said Contract and on file in the office of the City Clerk, Tulsa, Oklahoma.

NOW, THEREFORE, if said Principal shall pay or cause to be paid to the City of Tulsa, Oklahoma, all damage, loss, and expense which may result by reason of defective materials and/or workmanship in connection with said work, occurring within a period of one (1) year for all projects, from and after acceptance of said project by the City of Tulsa, Oklahoma; and if Principal shall pay or cause to be paid all labor and materials, including the prime contractor and all subcontractors; and if principal shall save and hold the City of Tulsa, Oklahoma, harmless from all damages, loss, and expense occasioned by or resulting from any failure whatsoever of said Principal, then this obligation shall be null and void, otherwise to be and remain in full force and effect.

It is further expressly agreed and understood by the parties hereto that no changes or alterations in said Contract and no deviations from the plan or mode of procedure herein fixed shall have the effect of releasing the sureties, or any of them, from the obligation of this Bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its attorney-in-fact, duly authorized so to do, the day and year first above written.

_____
CONTRACTOR (Principal)

BY: ATTEST: (S E A L)

_____Date:_____ _____Date: _____
Title: Title:

_____Date:_____ _____Date: _____
Attorney-In-Fact ** Surety (S E A L)

** This date shall match the date of the notarized certificate on the Power of Attorney

(Accompany this Bond with Power-Of-Attorney)

APPROVED AS TO FORM:

_____ Date:_____
City Attorney

_____ Date:_____
City Clerk

AFFIDAVIT OF CLAIMANT

STATE OF _____

COUNTY OF _____

The undersigned, of lawful age, being first duly sworn, on oath says that this contract is true and correct. Affiant further states that the work, services or materials will be completed or supplied in accordance with the contract, plans, specifications, orders or requests furnished the affiant. Affiant further states that (s)he has made no payment directly or indirectly of money or any other thing of value to any elected official, officer or employee of the City of Tulsa or any public trust of which the City is a beneficiary to obtain or procure the contract or purchase order.

By: _____
Signature

Name: _____

Company: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20____.

_____
Notary Public

My Commission Expires: _____

Notary Commission Number: _____

GENERAL

CONDITIONS

GENERAL CONDITIONS OF CONTRACT

GC-1. SCOPE:
The Contract stipulations, which follow, are general in scope and may refer to conditions that will not be encountered in the performance of the work included in this Contract, and which are not applicable thereto. Any requirements, provisions, or other stipulations of these General Conditions, which pertain to a nonexistent condition, and are not applicable to the work to be performed hereunder, shall have no meaning in the Contract.

The specifications and drawings are intended to supplement, but not necessarily duplicate each other. Together they constitute one (1) complete set of specifications and drawings, so that any work exhibited in the one and not in the other shall be executed just as if it had been set forth in both, in order that the work shall be completed according to the complete design or designs as decided and determined by the Engineer.

Should anything be omitted from the specifications and drawings which is necessary to a clear understanding of the work, or should it appear various instructions are in conflict, then the Contractor shall request written clarification from the Engineer before proceeding with the construction affected by such omissions or discrepancies.

GC-2. CONTRACT DOCUMENTS :
It is understood and agreed that the Notice to Bidders, Instructions to Bidders, Proposal, Contract, Statutory Bond, Performance Bond, Maintenance Bond, Power of Attorney, Certificates of Insurance, General Conditions, Specifications, Drawings, Addenda, and duly authorized Change Orders, together with any and all supplementary drawings furnished by the Engineer as and when required to make clear and to define in greater detail the intent of the contract, drawings, and specifications, other drawings, specifications, and engineering data furnished by the Contractor (when accepted by the Engineer), and instructions furnished by manufacturers of equipment for the installation thereof, are each and all included in this Contract, and the work shall be done in full compliance and accord therewith.

GC-3. DEFINITIONS:
Any word, phrase, or other expression defined in this paragraph and used in these Contract Documents shall have the meaning herein given:

1. "Contract" or "Contract Documents" shall include all of the documents and drawings mentioned in Paragraph GC-2.

2. "City" shall mean the City of Tulsa, Tulsa County, Oklahoma.

3. "Contractor" shall mean the entity named and designated in the Contract who has entered into this Contract to perform the work covered thereby, and its, his, or their duly authorized agents and other legal representatives.

4. "Engineer" shall mean the Director of Engineering Services, or the Architect or Engineers who have been designated, appointed, or employed by the City for this project, or their duly authorized agents; such agents acting within the scope of the particular duties entrusted to them in each case.

5. "Inspector" shall mean the engineering or technical inspector or inspectors duly authorized by the Engineer, limited in each case to the particular duties entrusted to him or them.

6. "Surety" shall mean any entity that executes, as surety, the Contractor's performance bond, maintenance bond, and statutory bond securing the performance of this Contract.

7. "Drawings" shall mean and include all drawings prepared by the City as a basis for proposals; all drawings submitted by the successful bidder with his proposal and by the Contractor to the City, when and as accepted by the Engineer, and all drawings submitted by the City to the Contractor during the progress of the work as provided herein.

8. "Subcontractor" shall mean a person, firm or corporation to whom any portion of this work has been sublet by the Contractor.

9. "Work" shall mean the task to be performed, necessary for the fulfillment of this Contract.

10. "Unit Price" shall mean the cost per specified unit of measurement of work and/or material.

11. "Lump Sum" shall mean the price of an item of work including all things necessary to complete the item as shown on the drawings and specifications. Such an item is not measured in units but is defined by description.

GC-4. MODIFICATIONS AND ALTERATIONS:

In executing the Contract, the Contractor agrees that the City shall have the right to make such modifications, changes, and alterations as the City may see fit, in the extent, or plan of the Work agreed to be done or any part thereof, or in the materials to be used therein, either before or after the beginning of construction thereof, without affecting the validity of the Contract or the liability of the Sureties upon the performance of this Contract or the Statutory Bond.

Where any modification, change, or alteration increases the quantity of Work to be performed and is within the scope of a fair interpretation thereof, such increase shall be paid for according to the quantity of work actually done, either at Unit Prices included in the Contract, or in the absence of such unit, as extra Work. Modifications and alterations, which reduce the quantity of Work to be done, shall not constitute a claim for damages or for anticipated profits on Work involved in such reduction.

The Engineer shall determine, on an equitable basis, the amount of credit due the City for Work not performed as a result of modifications or alterations authorized hereunder; where the value of the omitted Work is not fixed by Unit Prices in the Contract; allowance to the Contractor for any actual loss incurred in connection with the purchase, delivery, and subsequent disposal of materials and equipment required for use on the Work as actually built; and any other adjustment of the Contract amount where the method to be used in making such adjustment is not clearly defined in the Contract Documents. In this respect, such determination shall be final and binding only when approved by the Director of Public Works.

GC-5. DRAWINGS TO BE FURNISHED BY CONTRACTOR:

The Contractor shall furnish all shop, fabrication, assembly, foundation, and other drawings required by the specifications; drawings of equipment and devices, offered by the Contractor for review by the Engineer, shall be in sufficient detail to show adequately the construction and operation thereof; drawings of essential details of any change in design or construction proposed for consideration of the Engineer, by the Contractor in lieu of the design or arrangement required by the Contract or any item of extra work thereunder. The Contractor shall submit to the Engineer, the required number, of each copy of such drawing for the Engineer's review. After review by the Engineer, all such drawings shall become a part of the Contract Documents and the work or equipment shown thereby shall be in conformity therewith unless otherwise required by the City.

The Engineer's check and acceptance of drawings submitted by the Contractor will be for, and will cover, only general conformity to the plans and specifications and will not constitute a blanket acceptance of all dimensions, quantities, and details of the material or equipment shown; nor shall such acceptance relieve the Contractor of his responsibility for errors contained in such drawings.

GC-6. CONTRACTOR'S BUSINESS ADDRESS:

The business address of the Contractor given in the bid or proposal upon which this Contract is founded is hereby designated as the place to which all notices, letters, and other communications to the Contractor may be mailed or delivered. The delivery at the above named address or depositing in any mailbox regularly maintained by the Post Office, of any notice, letter, or other communication to the Contractor, shall be deemed sufficient service thereof upon the Contractor and the date of said service shall be the date of such delivery or mailing. Such address may be changed at any time by a written instrument, executed by the Contractor and delivered to the Engineer. Nothing contained herein shall be deemed to preclude or render inoperative the service of any notice, letter, or communication upon the Contractor personally.

GC-7. CONTRACTOR'S RISK AND RESPONSIBILITY:
The performance of the Contract and the Work is at the risk of the Contractor until the final acceptance thereof and payment therefor. The Contractor shall take all responsibility of the Work, and shall bear all losses resulting because of the amount or character of the Work, or because the nature of the land in or on which the Work is done is different from what is assumed or expected, or on account of the weather, floods, fire, windstorm, or other actions of the elements, or any cause or causes, whatsoever, for which the City is not responsible. If the Work or any part or parts thereof is destroyed or damaged from any of the aforesaid causes, the Contractor, at his own cost or expense, shall restore the same or remedy the damage.

The Contractor shall, in a good and workmanlike manner, perform all Work and furnish all supplies and materials, machinery, equipment, facilities, and means, except as otherwise expressly specified, necessary or proper to perform and complete all Work required by the Contract within the time herein specified, in accordance with the provisions of these Contract Documents and Drawings of the Work covered by this Contract, and any and all supplemental Drawings. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of the Contract, and shall complete the entire Work to the satisfaction of the Engineer and of the City.

GC-8. ASSIGNMENT AND SUBLETTING OF CONTRACT:
The Contractor shall give his personal attention to the fulfillment of this Contract, and shall not let, assign or transfer it or his right, title, or interest in any part thereof, by attorney or otherwise, or sublet any part of the Work to any other person without the prior consent of the City in writing.

Should any Subcontractor fail to perform his work in a satisfactory manner the Contractor upon notice from the City shall immediately terminate his subcontract. The Contractor shall be fully responsible to the City for the acts and omissions of his Subcontractor, and of persons either directly or indirectly employed by his Subcontractor. Nothing contained in these Contract Documents shall create any contractual relation between any Subcontractor and the City.

GC-9. CONTRACTOR'S REPRESENTATIVES:
The Contractor shall designate a person on the Work site to represent him when absent from the Work site.

GC-10. CONTRACTOR AND HIS EMPLOYEES:
The Contractor shall employ competent foremen, experienced mechanics, and others skilled in the Work in this Contract; and shall promptly discharge any and all incompetent or otherwise unsatisfactory employees. Contractor's employees directly employed to perform the Work shall not be paid less than the prevailing minimum wage scale.

Necessary sanitary conveniences for the use of employees on the job site, properly secluded from public observation, shall be provided and maintained by the Contractor. The construction and location of the facility and disposal of the contents shall comply with all laws of the City and State, relating to health and sanitation regulations.

GC-11. CONTRACTOR'S RIGHT OF PROTEST:
If the Contractor considers any work demanded of him to be outside the requirements of the

Contract, or considers any record or ruling of the Engineers to be unfair, he shall, immediately upon such Work being demanded or such record or ruling being made, ask for written instructions or decisions, whereupon he shall proceed without delay to perform the Work or to conform to the record or ruling; and within ten (10) days after the date of receipt of written instructions or decision, he shall file a written protest with the Engineer, stating clearly and in detail the basis of his objections. Except for such protests and objections made of record in the manner herein specified and within the time stated, the records, rulings, or decisions of the Engineer shall be final and conclusive.

GC-12. INSURANCE AND BONDS:

The CONTRACTOR (and any subcontractors) shall carry and keep in force during this Contract, policies of insurance issued by an insurer authorized to transact business in Oklahoma in minimum amounts as set forth below or as required by the laws of the State of Oklahoma. The Contractor shall also furnish an Owner's Protective Policy in the same amounts naming the City of Tulsa as the assured, issued by the same insurance company as the Contractor's liability coverage and indemnifying the City of Tulsa against any and all actions, claims, judgments or demands arising from injuries of any kind and character sustained by any person or persons because of work performed by the Contractor.

General Liability Insurance with a bodily injury and property damage combined single limit of not less than $1,000,000.00 for each occurrence.

Employer's Liability and Workmen's Compensation in the amounts as required by law.

The Contractor shall provide proof of such coverage:

(a) By providing Certificate(s) of Insurance prior to the execution of this contract; and
(b) By submitting updated Certificate(s) of Insurance with each and every subsequent request for payment. The Certificate(s) should show that the policies are current and should be dated within 30 days of the payment request.

The Contractor shall not cause any required insurance policy to be cancelled or permit it to lapse. If the Contractor cancels, allows to lapse, fails to renew or in any way fails to keep any required insurance policy in effect, the City will suspend all progress and/or final payments for the project until the required insurance is obtained. Further, a Contractor who fails to keep required insurance policies in effect may be deemed by the City to be in breach of contract, ineligible to bid on future projects, and/or ineligible to engage in any new contracts.

The Contractor shall execute and furnish a Statutory Bond for the protection of laborers, mechanics, and material men in a sum equal to one hundred percent (100%) of the contract price.

The Contractor shall execute and furnish a Performance Bond in a sum equal to one hundred percent (100%) of the contract price.

The Contractor shall execute and furnish a Maintenance Bond in a sum equal to one hundred percent (100%) of the contract price.

Prior to doing blasting, the Contractor shall furnish a Certificate of Insurance, which shall certify that any damage caused by blasting is within the coverage of the Contractor's liability insurance to the full limits thereof.

All bonds and insurance must be executed by a company licensed to do business in the

State of Oklahoma and must be acceptable to the City.

GC-13. TIME FOR COMPLETION:
The Work shall commence within ten (10) days from and after the date of a written work order from the City. The Contractor agrees that the Work shall be performed regularly, diligently, and uninterruptedly at a uniform rate of progress so as to ensure completion within the number of days after the day on which the work order is issued. If the Contractor fails to complete all Work within the time specified, then the Contractor agrees to pay the City, not as a penalty, but as liquidated damages for breach of contract, the Sum of **Two Thousand Five Hundred Dollars ($2,500.00)** for each and every calendar day beyond the date on which the work was to be completed. The said amount is fixed and agreed upon because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the City would sustain in such event. It is expressly understood and agreed that the said time for completion of the work described herein is a reasonable time for the completion of same.

The Contractor shall commence work within twenty-four (24) hours of traffic control devices being established at the project location. If the Contractor fails to commence work within twenty-four (24) hours of traffic control devices being established at the project location, then the Contractor agrees to pay the City, not as a penalty, but as liquidated damages the sum of **One Thousand Dollars ($1,000.00)** per lane for each day of failure to commence work after the specified time set forth. The amount is fixed and agreed upon because of the impracticability and extreme difficulty of fixing and ascertaining the actual damage the City would sustain in such event.

Within 14 days after Bid Opening and prior to Award of Bid the successful Contractor will be required to furnish the Engineer with a progress schedule, in a format approved by the Engineer, setting forth in detail the procedure he proposes to follow, and giving the dates on which, he expects to start and to complete separate portions of the Work. If at any time, in the opinion of the Engineer, proper progress is not being maintained, such changes shall be made in the schedule of operations, which will satisfy the Engineer that the Work will be completed within the period stated in the Proposal. Monthly progress meetings will be conducted to maintain coordination between all project entities.

The Contractor will be required to provide a full-time, onsite English-speaking superintendent for this Work for direct contact with City and coordination of Subcontractors. A working foreman is not acceptable as a project superintendent. The superintendent shall be required to be present at the Work site whenever the Contractor or Subcontractors are performing Work. The superintendent shall be a representative of the Contractor with the authority to make decisions. If the Contractor fails to provide a non-working superintendent on a day when Work is being performed, the Contractor agrees to pay the City, not as a penalty, but as liquidated damages for such breach of contract, the sum of **One Thousand Dollars ($1,000.00)** for each and every calendar day it fails to provide a non-working superintendent at the Work site. This amount is fixed and agreed upon because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the City would sustain in such an event.

It is further agreed that time is of the essence as to each and every portion of this Contract and the specifications wherein a definite and certain time is fixed for the performance of any act whatsoever; and where under the Contract an allowance of additional time for completion of any Work is made, the new time fixed by such extension shall be of the essence of this Contract.

Failure to complete the Work within the specified time, as set forth in the Contract, may be grounds for disqualification for future consideration for contracts with the City of Tulsa.

Final acceptance of the Work is defined as the completion of the Work and the Contractor moving off the project site. No defined or additional Work is needed.

Contract Evaluation forms will be compiled by City staff upon completion of Work to provide a record of the Contractor's performance for use in subsequent projects.

GC-14. EXTENSIONS OF TIME:
Should the Contractor be delayed in the final completion of the Work by any act or neglect of the City or Engineer, or any employee of either, or strikes, injunctions, fire, or other causes outside of and beyond the control of the Contractor and which, in the opinion of the Engineer, could have been neither anticipated nor avoided, then an extension of time sufficient to compensate for the delay, as determined by the Engineer, shall be granted by the City, provided, however, that the Contractor shall give the City and the Engineer notice in writing of the cause of each delay on the "Extension of Time Request" form enclosed in these documents, and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the Work.

The Contractor shall submit the "Extension of Time Request" form with each partial payment application. Failure to submit the Extension of Time Request with a partial payment application shall constitute a complete waiver of any claim for time extension for the period covered by the partial payment.

Extensions of time will not be granted for delays caused by unsuitable ground conditions, inadequate construction force, or the failure of the Contractor to place orders for the equipment or materials a sufficient time in advance to ensure delivery when needed. Any extension of time granted by the City shall not release the Contractor and Surety herein from the payment of liquidated damages as provided in the General Conditions of this Contract, for a period of time not included in the original Contract or the time extension, as herein provided.

In no event shall the City be liable or responsible to the Contractor, Surety, or any person for or on account of any stoppage or delay of Work herein provided for by injunction or any other kind of legal, equitable proceedings, or from or by or on account of any delay from any other cause whatsoever.

GC-15. ENGINEER'S POWERS AND DUTIES:
The Engineer will provide general administration of the Contract, including performance of the functions hereinafter described.

The Engineer will be the City's representative during construction and until final payment. The Engineer will have authority to act on behalf of the City to the extent provided herein unless otherwise modified by written instrument, which will be shown to the Contractor. The Engineer will advise and consult with the City, and all of the City's instructions to the Contractor shall be issued through the Engineer. Nothing contained in the Contract documents shall create any contractual relationship between the Engineer and the Contractor.

The Engineer shall at all times have access to the Work as provided elsewhere herein. The Engineer will make periodic visits to the Work site to familiarize himself generally with the progress and quality of the Work and to determine in general whether the Work is proceeding in accordance with the Contract. On the basis of his on-site observations as Engineer, he will keep the City informed of the progress of the Work and will endeavor to guard the City against defects and deficiencies in the Work caused by the Contractor. The Engineer will not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work and will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract. Based on such observations and the Contractor's applications for payment, the Engineer will determine the amounts owing to the Contractor and will issue certificates for payment in amounts as provided elsewhere herein.

The Engineer may provide one or more full-time project representatives to assist the Engineer in carrying out his responsibilities at the Work site. The duties, responsibilities and limitations of authority of the Engineer as the City's representative during construction as set forth herein will not be modified or extended without written consent of the City, the Contractor and the Engineer.

The Engineer will not be responsible for the acts or omissions of the Contractor, any

Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.

The Engineer shall decide the meaning and intent of any portion of the specifications, and of any plans or Drawings, where the same are found to be obscure or be in dispute; he shall have the right to correct any errors or omissions therein when such corrections are necessary to further the intent of said specifications, plans or Drawings; the action of such correction shall be effective from the date that the Engineer gives due notice thereof.

Any differences or conflicts, which may arise between the Contractor and other contractors with the City in regard to their work, shall be adjusted as determined by the Engineer.

Neither the Engineer's authority to act under this article or elsewhere in the Contract nor any decision made by the Engineer in good faith either to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor, any manufacturer, fabricator, supplier or distributor, or any of their agents or employees or any other person performing any of the Work.

Whenever in the Contract the terms "as ordered", "as directed", "as required", "as allowed", or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper", or "satisfactory" or adjectives of like effect or import are used, to describe requirements, direction, review or judgement of the Engineer as to the Work, it is intended that such requirement, direction, review, or judgement will be solely to evaluate the Work for compliance with the Contract (unless there is a specific statement indicating otherwise). The use of any such term or adjective never indicates that the Engineer shall have authority to supervise or direct performance of the Work or authority to undertake responsibility contrary to the provisions of this General Condition.

GC-16. CITY'S RIGHT OF INSPECTION:
The City shall appoint or employ such engineers or inspectors as the City may deem proper to inspect the materials furnished and the work performed, and to determine whether said materials are furnished and work is performed in accordance with the Drawings and specifications therefor. The Contractor shall furnish all reasonable aid and assistance required by the Engineer, or by the Inspectors, for the proper inspection and examination of the Work and all parts thereof, even to the extent of uncovering or taking out portions of finished Work. Should the Work thus exposed or examined prove satisfactory, the uncovering or removing and the replacing of the covering or the making good of the parts removed shall be paid for by the City; however, should the Work exposed or examined prove unsatisfactory, the uncovering, taking out, replacing, and making good shall be at the expense of the Contractor.

Such inspection shall not relieve the Contractor of any obligation to perform said Work strictly in accordance with the Drawings and specifications or any modifications thereto as herein provided; and the Work not so constructed shall be removed and made good by the Contractor at his own expense; and free of all expense to the City, whenever so ordered by the Engineer, without reference to any previous oversight or error in inspection.

GC-17. SUSPENSION OF WORK ON NOTICE:
The Contractor shall delay or suspend the progress of the Work or any part thereof whenever he shall be so required by written order of the City or Engineer, and for such period of time as it or he shall require. Any such order of the City or Engineer shall not modify or invalidate in any way the provisions of this Contract.

GC-18. QUALITY OF WORKMANSHIP:
All workmanship shall be the best possible, both as to material and labor that could be demanded by these Contract Documents or if no specific description is given, it is understood that the best quality is required.

GC-19. SATURDAY, SUNDAY, HOLIDAY, AND NIGHT WORK:

No work shall be done between the hours of 6:00 p.m. and 8:00 a.m., nor on Saturday, Sunday, or legal holidays without the written approval or permission of the Engineer in each case, except such work as may be necessary for the proper care, maintenance, and protection of work already done, or of equipment, or in the case of an emergency.

GC-20. LAWS AND ORDINANCES:
The Contractor shall keep himself fully informed of all existing and current regulations of the City, county, state and national laws which in any way limit or control the actions or operations of those engaged upon the Work, or affecting the materials supplied to or by them. The Contractor shall at all times observe and comply with all applicable ordinances, laws, and regulations; and shall protect and indemnify the City and the City's employees and agents against any claims or liability arising from or based on any violations of the same.

The contractor certifies that it and all of its Subcontractors to be used in the performance of the Contract are in compliance with 25 O.S. Sec. 1313 and participate in the Status Verification System. The Status Verification System is defined in 25 O. S. Sec. 1312 and includes but is not limited to the free Employee Verification Program (E-Verify) available at **www.dhs.gov/E-Verify**.

The Contractor shall take the necessary actions to ensure its facilities are in compliance with the requirements of the Americans with Disabilities Act (ADA). It is understood that the program of the Contractor is not a program or activity of the City. The Contractor agrees that its program or activity will comply with the requirements of the ADA. Any costs of such compliance will be the responsibility of the Contractor. Under no circumstances will Contractor conduct any activity which it deems to not be in compliance with the ADA.

GC-21. TAXES AND PERMITS:
Unless otherwise specified in these Contract Documents, the Contractor shall pay all sales, use, and other taxes that are lawfully assessed against the City or Contractor in connection with the Work included in this Contract and shall obtain all licenses, permits, and inspections required for the Work. Contractor shall comply with all zoning ordinances of the City, as provided in the Tulsa Zoning Code, Title 42 Tulsa Revised Ordinances and conform with all zoning requirements established by the Tulsa Metropolitan Area Planning Commission and the Board of Adjustment. Contractor can call the Indian Nations Council of Governments (INCOG) at (918) 584-7526, to determine if any zoning requirements must be met.

GC-22. PROTECTION OF PROPERTY:
The protection of City, state, and government monuments, street signs, and other City property is of prime importance, and if the same be damaged, destroyed, or removed, they shall be repaired, replaced, or paid for by the Contractor.

Work occurring within secured facilities will require the Contractor to obtain City of Tulsa issued ID badges for all employees and subcontractors requiring facility gate access. The Contractor will be responsible for all coordination with City Security as necessary to process background checks and issue badges. The City of Tulsa has the right to deny access to any individual based on evaluation of background check.

GC-23. PATENT RIGHTS:
All fees for any patented invention, article, or arrangement that is based upon, or in any manner connected with the construction, erection, or maintenance of the Work or any part thereof embraced in the Contract and these specifications, shall be included in the price stipulated in the Contract for said Work. The Contractor shall protect and hold harmless the City against any and all demands of such fees or claims.

GC-24. DEFENSE OF SUITS:

In case any action at law or suit in equity is brought against the City or any employer, officer, or agent thereof, for or on account of the failure, omission or neglect of the Contractor to do and perform any of the covenants, acts, matters, or things required by this Contract to be done or performed, or for injury or damage caused by negligence or willful act of the Contractor or his Subcontractors or his or their agents, or in connection with any claim or claims based on the lawful demands of Subcontractors, workmen, material men, or suppliers of machinery and parts thereof, equipment, power tools, and supplies incurred in the fulfillment of this Contract, the Contractor shall indemnify and save harmless the City and it's employees, officers, and agents, and the Engineer and any employees, officers and agents thereof, of and from all losses, damages, costs, expenses, judgements, or decrees whatsoever arising out of such action or suit that may be brought without requiring said parties to give any notice thereof.

The City may suspend payments of any sum due or to become due for work done on this Contract until such claims, suits, actions, or proceedings are final and liability has been determined. The amount of such damages or liability shall be deducted from sums due or to become due on this Contract. The City will retain the sums mentioned above until the Contractor furnishes evidence that satisfactory settlement has been made. Any action taken by the City shall not excuse the Contractor for failure to perform this Contract or bar the City from legal action to recover from the Contractor the amount of damages or liability suffered in excess of the amount retained.

The Contractor shall furnish the City with satisfactory evidence upon demand that all persons who have done work on the Contract or furnished materials for the Contract have been paid in full. If such evidence is not furnished, the amount necessary to pay the lawful claims may be retained until such evidence is furnished, or if such evidence is not furnished, the City may apply any sums retained to valid claims and charge the amounts disbursed, including the costs of any action that may be necessary to prove or disprove the claims against the Contractor.

GC-25. REMOVAL OF CONDEMNED MATERIALS AND STRUCTURES:
The Contractor shall remove from the site of the Work, without delay, all rejected and condemned materials or structures of any kind brought to or incorporated in the Work, and upon his failure to do so, or to make satisfactory progress in so doing, within forty-eight (48) hours after the service of a written notice from the Engineer ordering such removal, the condemned material or structures may be removed by the City and the cost of such removal be taken out of the money that may be due or may become due the Contractor by virtue of this Contract. No such rejected or condemned material shall again be offered for use by the Contractor under this or any other Contract under this project.

GC-26. EXTRA WORK:
If a modification increases the amount of the Work, and the added Work or any part thereof is of a type and character which can properly and fairly be classified under one or more Unit Price items of the Bid Form, then the added Work or part thereof shall be paid for according to the amount actually done and at the applicable Unit Price. Otherwise, such work shall be paid for as hereafter provided.

Claims for extra work will not be paid unless the City authorized the work covered by such claims in writing. The Contractor shall not have the right to take action in court to recover for extra work unless the claim is based upon a written order from the City. Payments for extra Work will be based on agreed lump sums or on agreed Unit Prices whenever the City and the Contractor agree upon such prices before the extra Work is started.

For the purpose of determining whether proposed extra work will be authorized, or for determining the payment method for extra work, the Contractor shall submit to the Engineer, upon request, a detailed cost estimate for proposed extra work. The estimate shall show itemized quantities and charges for all elements of direct cost. The cost shall include only those extra costs for labor and materials expended in direct performance of the extra work and may include:

(a) **Labor**. For all labor and foremen in direct charge of the specific operations, the Contractor shall receive the rate of wage (or scale) agreed upon in writing before beginning work for each and every hour that said labor and foremen are actually

engaged in such work. An amount equal to fifteen (15) percent of the sum of the above items will also be paid the Contractor.

(b) **Bond, Insurance, and Tax**. For property damage, liability, and workmen's compensation insurance premiums, unemployment insurance contributions and social security taxes on the force account work, the Contractor shall receive the actual cost, to which cost no percentage will be added. The Contractor shall furnish satisfactory evidence of the rate or rates paid for such bond, insurance, and tax.

(c) **Materials**. For materials accepted by the Engineer and used, the Contractor shall receive the actual cost of such materials delivered on the Work site, including transportation charges paid by him (exclusive of machinery rentals as hereinafter set forth), to which cost ten (10) percent will be added.

(d) **Equipment**. For any machinery or special equipment (other than small tools), including fuel, lubricants and transportation costs, the use of which has been authorized by the Engineer, the Contractor shall receive the rental rates agreed upon in writing before such work is begun for the actual time that such equipment is in operations on the Work, as provided in the ODOT Subsection 109.04 (b3), to which rental sum no percentage will be added.

(e) **Miscellaneous**. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

The form on which field cost records are kept, the construction methods and the type and quantity of equipment used shall be submitted to the Engineer for approval.

Construction equipment which the Contractor has on the Work site and which is of a type and size suitable for use in performing the extra Work shall be used. The hourly rental charges for equipment, including all insurance, taxes, fuel, and operating costs, shall not exceed twelve (12) percent of the latest applicable Associated Equipment Distributors published monthly rental rates and shall apply to only the actual time the equipment is used in performing the extra Work.

When extra Work requires the use of equipment which the Contractor does not have on the Work site, the Contractor shall obtain the approval of the Engineer before renting or otherwise acquiring additional equipment. The rental charges for the additional equipment shall not exceed the latest applicable Associated Equipment Distributors published rental rates.

The Contractor shall file with the Engineer, certified lists in duplicate, of any equipment and the schedule of pay rates for common and semi-skilled labor and operators of various classes which are intended to be used in performing the Work covered by this Contract. These rates shall be subject to the review of the Engineer. This information will be used by the Engineer for computation of extra work as mentioned above; however, if the Contractor fails to file these lists with the Engineer prior to starting any Work covered by this Contract, then the Engineer's computation shall be based on average wages and rates paid on City work.

GC-27. PAYMENT FOR CONTRACTOR'S PLANT AND MISCELLANEOUS TEMPORARY WORK: For providing plant, tools, and equipment, and for furnishing, erecting, maintaining, and removing scaffolding and construction plant, construction roads, camps, sanitary conveniences, temporary water supply, trestles, dewatering and other temporary works, the Contractor shall receive no direct payment, but compensation for them shall be considered as having been included in the prices stipulated for the appropriate items.

GC-28. BASIS OF PAYMENT FOR ITEMS OF WORK:
The Contractor shall be paid for all Work performed under the Contract based on the Engineer's computations of as-built quantities and the Contractor's Unit Price or Lump Sum bid per item. This

payment shall be full compensation for furnishing all supplies, materials, tools, equipment, transportation, and labor required to do the Work; for all loss or damage, because of the nature of the work, the action of the elements or any unforeseen obstruction or difficulty which may be encountered in the performance of the Work, and for which payment is not specifically provided; for all expense incurred by or because of any suspension or discontinuance of all or any part of the Work; and for faithfully completing the Contract according to the Drawings and specifications and requirements of the Engineer.

GC-29. PAYMENTS:
(1) Partial: If the work is progressing in good and workmanlike manner and if the Contractor is faithfully carrying out the terms of this Contract, approximate estimates of the work done shall be made by the Engineers between the first and fifteenth of each calendar month, including labor actually performed and supplies or materials actually used or incorporated in the Work, and an allowance will be made for acceptable materials satisfactorily delivered, stored and secured on the site of the Work in such amount as can be incorporated in the Work within a reasonable time. The City shall have a lien as owner on any materials stored on the site of the Work.

Each partial estimate for payment shall contain or have attached an affidavit in the form found in this book of specifications, as required by law.

The Contractor shall submit with each partial pay estimate a complete list of vendors and suppliers with itemized purchases and invoices from each vendor. Each list shall contain the name of the contractor or Subcontractor ordering the materials or supplies, and the specific use or placement of each of the materials purchased by the City of Tulsa for this project in accordance with Article IIB of the Contract. At the direction of the Contractor, the City of Tulsa will withhold retainage in the amount of 5% on materials and supplies to be purchased under the terms of this Contract.

Each month that work is performed for which payment is due, the Contractor shall submit to the Engineer an application for such payment, provided said payment is not less than $1,000.00, and, if required, receipts or other vouchers from Subcontractors showing his payments to them shall be submitted.

Each estimate shall be of the approximate value of all work performed and materials in place or delivered to the Work site, determined as aforesaid from the beginning of this contract to the date fixed for the current estimate, from which shall be deducted five percent (5%) or a lesser amount approved by the City, and, in addition thereto, all previous payments and all other sums withheld under the foregoing provisions of this Contract, the remainder to become due and payable; after the estimate has been reviewed and signed by the Engineer the City shall pay the estimate in the regular manner in the amount determined as due unless it shall be known by the City that there is good reason under the terms of this Contract for withholding same.

When the Contractor has completed Work constituting more than fifty percent (50%) of the total Contract amount, the retainage will continue at two and one-half percent (2.5%) for the balance of the remaining work; provided, however, that the City or its duly authorized representative has determined that satisfactory progress is being made and upon approval by the Surety.

The Contractor may withdraw any part or the whole of the amount which has been retained from partial payment to the Contractor pursuant to the terms of Contract, upon depositing with or delivery to the City:

(1) United States Treasury Bonds, United States Treasury Notes, United States Treasury bills, or

(2) General Obligation Bonds of the State of Oklahoma, or

(3) Certificates of Deposit from a state or national bank having its principal office in the State of Oklahoma.

No retained amount shall be withdrawn which would represent an amount in excess of the market value of the securities at the time of deposit or of the par value of such securities, whichever is lower.

All partial estimates are subject to correction in the final estimate.

(2) Final Payment:
When this contract, in the opinion of the Engineer, shall be completely performed on the part of the Contractor, the Engineer shall proceed with all reasonable diligence to measure up the Work and shall make out the final estimate for the same, and shall, except for cause herein specified, give to the Contractor, within thirty (30) days after receiving said certificate, an order on the City for the balance found to be due, excepting therefrom such sum or sums as may be lawfully retained under any of the provisions of the Contract; PROVIDED, that nothing herein contained shall be construed to affect the rights of the City hereby reserved to reject the whole or any portion of the aforesaid Work should the said estimate and certificate be found or known to be inconsistent with the terms of this Contract or otherwise improperly given; PROVIDED, that if, in case after the work hereunder has been accepted and final payment made, it shall be discovered that any part of the Contract has not been fully performed or has been done in an improper or faulty manner, the Contractor shall immediately remedy such defect, or, in case of neglect to do so within a reasonable time after notice thereof, shall be liable for and shall pay to the City the cost of remedying such defect or a sum equal to the damages sustained thereby, as the City shall elect, and the acceptance of and final payment for the Work shall be no bar to suit on any bond against any principal or principals, or Surety or Sureties, or both, given for the due performance of the Contract, or for the recovery of such cost or the equivalent of such damage.

The City will pay to the Contractor interest at the rate of three-fourths percent (3/4%) per month on the final payment due the Contractor. For lump sum contracts, the interest shall commence thirty (30) days after the Work under the Contract has been completed and accepted and all required material certifications and other documentation required by the Contract have been furnished the City by the Contractor and shall run until the date when the final payment or estimate is tendered to the Contractor. For contracts bid by Unit Prices, the interest will commence sixty (60) days after the above conditions are satisfied. When contract quantities or the final payment amount is in dispute, the interest-bearing period will be suspended until the conclusion and settlement of the dispute.

GC-30. CONTRACTOR REIMBURSEMENT FOR SURETY BOND:
For contracts of $1,000,000.00 or more, the Contractor may receive reimbursement for the cost of the surety bonds after issuance of a work order. To receive reimbursement, the Contractor shall submit a standard partial payment form and affidavit, and a copy of the surety bond invoice. The final partial pay estimate will be reduced by the amount paid for surety bond reimbursement.

GC-31. RELEASE OF LIABILITY AND ACCEPTANCE:
The acceptance by the Contractor of the final payment shall operate as, and shall be a release to the City and every employee, officer and agent thereof, from all claims and liability to the Contractor for anything done or furnished for or relating to the Work, or for any act or neglect of the City or of any person relating to or affecting the Work, and, following such acceptance, no person, firm, or corporation other than the signer of this Contract as Contractor, will have any interest hereunder, and no claim shall be made or be valid, and neither the City nor any employees, officers, or agents thereof shall be liable or be held to pay any money, except as herein provided.

It shall be the duty of the Engineer to determine when the Work is completed and the Contract fulfilled, and to recommend its acceptance by the City. The Work herein specified to be performed shall not be considered finally accepted until the City has accepted all the Work.

GC-32. RIGHT OF CITY TO TERMINATE CONTRACT:
If the Work to be done under this Contract shall be abandoned by the Contractor, or if this Contract shall be assigned by him otherwise than as herein provided, or if the Contractor should be adjudged

bankrupt, or if a general assignment of his assets be made for the benefit of his creditors, or if a receiver should be appointed for the Contractor or any of his property; or if at any time the Engineer shall certify in writing to the City that the performance of the Work under this Contract is being unnecessarily delayed, or that the Contractor is executing the same in bad faith or otherwise not in accordance with the terms of the Contract; or if the work be not substantially completed within the time named for its completion, or within the time to which such completion date may be extended, then the City may serve written notice upon the Contractor and his Surety of said City's intention to terminate this Contract, and unless within five (5) days after service of such notice upon the Contractor, a satisfactory arrangement is made for the continuance of the Contract, this Contract shall cease and terminate. In the event of such termination, the City shall immediately serve notice upon the Surety and Contractor, and the Surety shall have the right to take over and complete the Work, provided, however, that if the Surety does not commence performance thereof within fifteen (15) days from the date of said notice of termination, the City may take over the Work and perform same to completion, by Contract or otherwise, for the account and at the expense of the Contractor, and the Contractor and his Surety shall be liable to the City for any and all excess cost sustained by the City by reason of such performance and completion. In such event the City may take possession of and utilize in completing the Work, all such materials, equipment, tools, and plants as may be on the site of the Work and necessary therefor. The Contractor shall not receive any other payment under the Contract until said Work is wholly finished, at which time, if the unpaid balance of the amount to be paid under the Contract shall exceed the expense incurred by the City in finishing the Work as aforesaid, the amount of the excess shall be paid to the Contractor, but if such expense shall exceed the unpaid balance, the Contractor shall pay the difference to the City.

GC-33. ADMINISTRATIVE COSTS AND FEES:
Cash Improvements - In the event the improvements are to be paid for in cash, the costs and fees for publication, engineering, filing, recording, abstracting, acquisition of easements, flushings, and pipe testing, shall be paid by the City unless otherwise provided for in these Contract Documents.

Assessment Improvements: In the event the improvements are to be paid for by the issuance of special assessment bonds, the costs and fees for publication, engineering, filing, recording, abstracting, acquisition of easements, flushing, pipe testing, and other authorized costs shall be added to the contract price and paid for in the same manner as the other Work included in this Contract. The Contractor shall pay the City the amount of said charges before the execution and delivery of the special assessment bonds or other payments. If the Contractor fails, neglects, or refuses to pay said charges within thirty (30) days after the bonds are ready for delivery, he shall pay the City interest at the rate of seven percent (7%) per annum and shall be liable for same in a civil suit. The Contractor shall pay the pipe testing fees directly to the testing laboratory.

GC-34. PAYMENT OR ACCEPTANCE NOT A WAIVER BY CITY:
Neither acceptance by the City or the Engineer or any employee of either nor any order by City for the payment of money, or the payment thereof, nor any taking of possession by City, nor the granting of any extension of time, shall operate as a waiver of any rights or powers of the City hereunder, and in the event that after the Work hereunder has been accepted and final payment made, it should be discovered that any part of this Contract has not been fully performed, or has been done in a faulty or improper manner, the Contractor shall immediately remedy such defect, or in the event of neglect to do so within a reasonable time after notice thereof, shall be liable for and shall pay to City the cost of remedying such defect, or a sum equal to the damage caused thereby, as City may elect. The acceptance of the Work or final payment therefor shall be no bar to suit against the Contractor or Surety, or both.

GC-35. CONTRACTOR'S OBLIGATION AFTER ACCEPTANCE:
Contractor further agrees, without cost other than is specially provided for in this Contract, at any and all times during one (1) year next following the completion and final acceptance of the Work embraced in this Contract, without notice from City, to repair or rework any work that fails to function properly due to defective material or workmanship and to indemnify, save harmless and defend the City from any and all suits and actions of every description brought against City for, or on account of injuries or damages alleged to have been received or sustained by any party or parties by reasons

of, or arising out of the failure of Contractor to repair or rework any work where such failures have occurred, which said injuries or damages are alleged to have been received or incurred within one (1) year from the final acceptance of the Work hereunder, and to pay any and all judgements that might be rendered against City in any suits and actions, together with such expenses or attorney fees expended or incurred by City in the defense thereof, and Contractor hereby expressly waives any notice that might by law be required to be given to them by City of any defect, break, settling, or failure or of any other condition that might be the cause of injury or damage to any person on account of which a claim or suit might be made or filed against City, or a judgement taken for damages against City. It is expressly agreed that the acceptance of the Work by City shall constitute no bar against any person injured or damaged by the failure of the Contractor to perform all of his covenants and agreements hereunder from maintaining an action against the Contractor, or against City from enforcing its rights against the Contractor hereunder.

GC-36. NOTICES:
Any notices or other communications hereunder may be given to Contractor at the address listed in the Proposal, to the Surety at the office of the Attorney-in-Fact signing the bond or at Surety's home office address on file with the Insurance Commissioner of the State of Oklahoma, and to City in care of the Deputy Director of Public Works, or at such other place as may be designated in writing. The delivery to such address, or depositing in any mailbox regularly maintained by the Post Office, of any notice, letter, or other communication to the Contractor, shall be deemed sufficient service thereof, and the date of said service shall be the date of such delivery or mailing.

GC-37. RELATION TO OTHER CONTRACTORS:
Nothing herein contained and nothing marked upon the Drawings shall be interpreted as giving the Contractor exclusive occupancy of the territory or right-of-way provided. The City and its employees, officers, and agents for any just purpose, and other contractors of the City for any purpose required by their respective contracts, may enter upon or cross this territory or occupy portions of it or take materials therefrom as directed or permitted. When two or more contracts are being executed at one time on the same or adjacent land in such manner that the work on one contract may interfere with the work on another, the Engineers shall decide which contractor shall cease work and which shall continue, or whether the work on both contracts shall progress at the same time and in what manner. When the territory of one contract is the necessary or convenient means of access for the transportation or movement of men, machines, or appliances for the execution of another contract, such privilege of access or any other reasonable privilege may be granted by the Engineers to the contractor desiring it, to the extent, amount, in the manner and at the time permitted. Any decision regarding the method or time of conducting the work or the use of the territory shall not be made the basis of claims for delay or damage except as otherwise stipulated. The Contractor shall not cause any unnecessary hindrance or delay to any other contractors on the premises, and shall bear all damages done to the work of such other contractors by him or by his employees.

GC-38. PARTIAL OCCUPANCY AND USE:
The City, upon advance written notification to the Contractor, shall have the right to occupy and use any completed or partially completed portions of the Work site when such occupancy and use are in the City's best interest, notwithstanding completion of the entire project.

Such partial occupancy and use shall be upon the following terms:

a. The Engineer shall make an inspection of the portion or portions of the Work concerned, and report to the City his findings as to the acceptability and completeness of the Work. The Engineer's report shall include a list of items to be completed or corrected before final payment.

b. The City, upon acceptance of the Engineer's report, shall give written notice to the Contractor of the City's intention to occupy and use said portions of the Work site. The

City's notice shall include a copy of the Engineer's report, shall clearly identify the portions of the Work site to be occupied and used, and shall establish the date of said occupancy and use.

c. From the date thus established, the City shall assume all responsibilities for operation, maintenance, and the furnishing of water, gas, and electrical power for the portions of the Work site thus occupied and used. The City shall have the right to exclude the Contractor from those portions of the Work site but shall provide the Contractor reasonable access to complete or correct necessary items of Work.

d. The one-year guarantee required by the General Conditions shall not begin until completion and final acceptance of the entire project, except as to any items of mechanical or electrical equipment such as pumps, blowers, process equipment, instrumentation, controls, metering equipment, heating, and ventilating equipment and similar items having movable or operable components, and any of which are thus used by the City. For said equipment, the one-year warranty shall start from the date established in the written notice from the City.

e. Occupancy or use of any space in the Work site shall not constitute acceptance of Work not performed in accordance with the Contract, nor relieve the Contractor of liability to perform any Work required by the Contract but not completed at the time of said occupancy and use.

f. The Contractor shall not be held responsible for normal wear and tear or damage resulting from said occupancy, except to the extent that such damage is covered by the one-year guarantee.

g. The partial occupancy and use of any portions of the Work site by the City shall not constitute grounds for claims by the Contractor for release of any amounts retained from payments under the provisions of the Contract. The retained amounts will not be due until completion of the entire project for final acceptance and final payment, as set forth in the General Conditions.

SPECIFICATIONS

(Published in the Tulsa World

June 13, 2021)

Ordinance No. 24616

AN ORDINANCE AMENDING TITLE 11, TULSA REVISED ORDINANCES, ENTITLED "PUBLIC WORKS DEPARTMENT" BY AMENDING CHAPTER 10, ENTITLED "STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION" BY AMENDING SECTION 1000 AND SECTION 1001; PROVIDING FOR SEVERABILITY; REPEALING ALL ORDINANCES OR PARTS OF ORDINANCES IN CONFLICT HEREWITH AND ESTABLISHING AN EFFECTIVE DATE.

BE IT ORDAINED BY THE CITY OF TULSA:

Section 1. Amendment of Title 11, Chapter 10. *That Title 11, Chapter 10, Tulsa Revised Ordinances, entitled "Standard Specifications for Highway Construction" be and the same is hereby amended and shall recite in its entirety as follows:*

"CHAPTER 10. STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION

Section 1000. Adoption of State Standard Specifications.
Section 1001. Additions, Revisions, Deletions and Exceptions.

SECTION 1000. ADOPTION OF STATE STANDARD SPECIFICATIONS.

That certain document, a bound copy and electronic copy of which has been filed in the Office of the City Clerk of the City of Tulsa, being marked and designated as Standard Specifications for Highway Construction, 2019 Edition, as published by the Oklahoma Department of Transportation, is hereby adopted as the standard specifications for public improvement projects for the City of Tulsa with the additions, revisions, deletions and exceptions as set forth in SECTION 1001 of this chapter.

SECTION 1001. ADDITIONS, REVISIONS, DELETIONS AND EXCEPTIONS.

1001.A. The following definitions, listed as numbered in the 2019 Edition of the Standard Specifications for Highway Construction, are hereby revised and amended for all sections of this chapter as follows:

101.03. Abbreviations and Acronyms. In Table 101:1, add the following abbreviations and expressions:

- ADA - American with Disabilities Act, excluding Chapter 500
- ADA – Adjusted Daily Average, when used in Chapter 500
- ADAAG - American with Disability Act Accessibility Guidelines
- COT - City of Tulsa

JS

- PROWAG – Public Rights-of-Way Accessibility Guidelines

101.05. Definitions. Add the following subsections:

- "**101.05.CY. City of Tulsa (COT).** The City of Tulsa, Oklahoma, a municipal corporation acting by and through its duly authorized officers and agents."
- "**101.05.CZ. Non-Collusive Bidding Certificate.** Replace all references to 'Non-Collusive Bidding Certificate' with 'Non-Collusion Affidavit'."
- "**101.05.DA. Qualified Products List (QPL).** All references to 'ODOT Traffic Engineering Division Qualified Products List (QPL)' or 'QPL' shall mean 'the City of Tulsa, Traffic Engineering Division Approved Products List'."
- "**101.05.DB. State Construction Engineer.** The City Engineer of the City of Tulsa or authorized designee."

101.05.A. Acceptance Date. Delete section.

101.05.V. Commission. Replace definition with "The City of Tulsa, Oklahoma, a municipal corporation acting by and through its duly authorized officers and agents."

101.05.Y. Contract. Replace definition with "The written agreement between the City of Tulsa and the Contractor setting forth obligations of the parties thereunder, including, but not limited to, the performance of the work, the furnishing of labor and materials, and the basis of payment.

The Contract includes the Notice to Bidders, Proposal, Contract Form, all Contract Bonds, Specifications, Special Specifications, Special Provisions, all Plans, Work Orders and Change Orders that are required to complete the construction of the work in an acceptable manner, including authorized extensions."

101.05.AG. Department. Replace definition with "The City of Tulsa, Oklahoma, a municipal corporation acting by and through its duly authorized officers and agents."

101.05.AI. Director. Replace definition with "The Director of the Engineering Services Department or the Director of any successor department which has the responsibility for general engineering services for the City of Tulsa."

101.05.AL. Engineer. Replace definition with "The City Engineer of the City of Tulsa or authorized designee."

101.05.AO. FAST Guide. Replace definition and all references to "FAST Guide" with "City of Tulsa Acceptance Sampling/Testing Standard Specifications."

101.05. AT. Holiday. Replace definition with "Days declared to be holidays for regular Civil Service employees of the City of Tulsa."

101.05.AV. Inspector. Replace definition with "The City of Tulsa's authorized representative assigned to inspect the work."

101.05.BF. Materials Division. Replace definition with "The Director of the Engineering Services Department or the Director of any successor department which has the responsibility for general engineering services for the City of Tulsa."

101.05.BG. Materials Engineer. Replace definition with "The City Engineer of the City of Tulsa or authorized designee."

101.05.CC. Right-of-Way. Replace definition with "Right-of-Way or ROW shall mean the surface, the airspace above ground, and the area below the surface of any public street, highway, parkway, lane, path, alley, sidewalk, boulevard, drive, bridge, tunnel, stormwater drainage system, easement, park, or similar property in which the City of Tulsa now or hereafter holds a property interest and/or a maintenance responsibility which, consistent with the purposes for which it was granted or dedicated, may be used to install, operate and maintain facilities."

101.05.CD.(16). Sidewalk/Bicycle Path. Add the following sentence to the existing definition: "Refer to the Revised Ordinances of the City of Tulsa, Title 37 – Tulsa Traffic Code, Chapter 1 and Chapter 10 for definition of bicycle."

101.05.CH. State. Replace definition with "The City of Tulsa, Oklahoma, a municipal corporation acting by and through its duly authorized officers and agents."

101.05.CS. Traffic Engineering Division. Replace definition with "The City of Tulsa Traffic Engineering Division or any successor division which has the responsibility for traffic engineering services for the City of Tulsa."

1001.B. City of Tulsa exceptions and amendments to the following provisions, listed as numbered in the 2019 Edition of the Standard Specifications for Highway Construction, are hereby revised, amended and described as follows:

102.01. Pre-Qualification. Delete text of section, and replace with "The City of Tulsa requires General / Prime Contractors to be Prequalified according to Title 11, Chapter 11 of the Revised Ordinances of the City of Tulsa."

102.04. Refusal of Proposals. At the end of the bulleted list, add the following bulleted list item: "The bidder has failed to comply with Small Business Enterprise requirements of a previous City of Tulsa contract."

102.06. Examination of Plans, Specifications, Special Provisions, and the Work Site. Replace the fourth paragraph with "The City of Tulsa may have boring logs and subsurface reports used in determining design criteria. Bidders may request to inspect these documents, relevant to the currently advertised project, by contacting the Contract Administrator at the following address during normal business hours:

City of Tulsa
Engineering Services Department

55

2317 S Jackson Ave
Tulsa, OK 74107"

102.08. Nonresponsive Proposals. At the end of the bulleted list, add the following bulleted statement: "The bidder does not properly comply with Small Business Enterprise requirements in accordance with the Proposal Forms."

102.10. Delivery of Proposal. Delete text of section, and replace with the following:

"Each bid Proposal shall be completed electronically on the electronic media provided, then printed, signed and submitted along with the electronic media and the complete bound copy of the contract documents or as instructed in the Notice to Bidders. In the event of a discrepancy between the pricing on the electronic media and the hard copy of a Proposal, the hard copy pricing will govern. If an electronic media is not provided, and the bid Proposal is manual, the bid Proposal shall be submitted in ink. The written words shall govern over the figures. Erroneous entries shall be lined out, initialed by the bidder, and the correct entry inserted. The unit price bid must cover all expense for furnishing the labor, materials, tools, equipment, and apparatus of every description to construct, erect, and furnish all work required by and in conformance with the Plans and Specifications.

Each bid shall be enclosed in a sealed envelope addressed to

City Clerk's Office
The City of Tulsa
One Technology Center
175 E. 2nd Street, Suite 260
Tulsa, Oklahoma 74103

or as otherwise instructed in the Notice to Bidders, and identified on the outside with the words:

'PROJECT NO. _____,

Pre-qualification Certificate Number _____.'

All addenda to the contract documents shall accompany the bid when submitted.

Any bid received more than ninety-six (96) hours excluding Saturdays, Sundays and holidays before the time set for the opening of bids, or any bid received after the time set for opening of bids, shall be considered "non-responsive" and shall be returned unopened to the bidder."

102.13. Public Opening of Proposals. Delete text of section, and replace with "Proposals shall be publicly opened and read on the date and at the hour and place set forth in the advertisement and Notice to Bidders in the manner established by the City of Tulsa."

102.16. Non-Collusive Bidding Certification.

- Replace the Non-Collusion Bidding Certification form with the following City of Tulsa Non-Collusion Affidavit form:

JS

NON-COLLUSION AFFIDAVIT

STATE OF)
) ss:
COUNTY OF)

_____, of lawful age, being first duly sworn, says that:

1. I am the duly authorized agent of the bidder submitting the competitive bid associated with this sworn statement for the purpose of certifying facts pertaining to the existence of collusion among bidders and between bidders and municipal officers or employees, as well as facts pertaining to the giving or offering of things of value to governmental personnel in return for special consideration in the letting of any contract pursuant to the bid;

2. I am fully aware of the facts and circumstances surrounding the making of the bid and have been personally and directly involved in the proceedings leading to the submission of such bid;

3. Neither the bidder nor anyone subject to the bidder's direction or control has been a party:
   a. to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding;
   b. to any collusion with any municipal official or employee as to quantity, quality or price in the prospective contract, or as to any other terms of such prospective contract; nor
   c in any discussions between bidders and any municipal official concerning exchange of money or other things of value for special consideration in the letting of a contract

4. If awarded the contract, neither the bidder nor anyone subject to the bidder's direction or control has paid, given or donated or agreed to pay, give or donate to any officer or employee of the City of Tulsa or of any public trust where the City of Tulsa is a beneficiary, any money or other thing of value, either directly or indirectly, in procuring the contract for which the bid is submitted

_____ _____
BIDDER (Company Name) Signed

_____
Title

SUBSCRIBED and SWORN to before me this _____ day of _____, 20___

_____
NOTARY PUBLIC

MY COMMISSION EXPIRES:

_____, ___
COMMISSION NO.:

_____

- In the fourth paragraph, revise the phrase proceeding the bulleted list to recite, "The following do not constitute collusion within the scope of the Non-Collusion Affidavit:"

103.07. Execution of Contract. Revise the first paragraph as follows:

- Revise the first sentence to recite "The Contract shall be signed in black or blue ink by the individual, all members/partners of a general partnership or joint venture, a general partner of a limited partnership, a duly authorized officer of the corporation, or a duly authorized manager, managing member or authorized officer of the limited liability company, to whom the Contract was awarded.
- In the last sentence delete "The Department will execute the Contract", and replace with "The Department will endeavor to execute the Contract, in proper form.".

103.08. Approval of Contract. Delete text of section, and replace with "The Contract shall not be binding upon the City of Tulsa until it has been executed and approved in the manner set forth in the Tulsa City Charter."

104.01. Purpose of Contract. After the first two (2) sentences, delete the rest of the section.

104.07. Maintenance of Traffic. Revise the first sentence to recite "Keep all roads, sidewalks, and bicycle paths open to all traffic as shown on the plans."

105.17. Project Completion and Acceptance. At the beginning of the section add, "This section does not apply to Infrastructure Development Projects (IPDs). For IDPs, refer to Title 35 of the Revised Ordinances of the City of Tulsa."

105.17.B. Project Completion. In the first sentence of the last paragraph, replace "The Resident Engineer will" with "The Resident Engineer may".

105.17.C. Final Acceptance. Delete text of section, and replace with " Final Acceptance is the date on which the Request for Action (RFA) for final payment has been signed by the Mayor of the City of Tulsa."

106.01.A. Material Acceptance. At the end of this section, add the following paragraph: "For conflicts among ODOT Standard Specifications, ODOT Standard Materials Test Methods, and City of Tulsa Acceptance Sampling/Testing Standard Specifications, the City of Tulsa Acceptance Sampling/Testing Standard Specifications shall take precedence."

106.01.B. Buy America. Delete Section.

106.04.D. Distribution of Certifications. Delete text of section, and replace with "The Contractor shall submit certifications to the Engineer with another copy mailed to:

Field Engineering
City of Tulsa
Engineering Services Department
2317 S Jackson Ave
Tulsa, OK 74107"

106.05. Plant Inspection. In this section, replace all references to "Oklahoma City" with "Tulsa."

106.11. Guarantees and Warranties. In the first paragraph replace "six months" with "twelve months" and "six-month" with "twelve-month".

107.01. Laws, Rules, and Regulations to be Observed. At the end of this section add the following:

"The contractor shall certify that it and all of its Subcontractors to be used in the performance of the Contract are in compliance with 25 O.S. Sec. 1313 and participate in the Status Verification System. The Status Verification System is defined in 25 O.S. Sec. 1312 and

includes but is not limited to the free Employee Verification Program (E-Verify) available at www.dhs.gov/E-Verify.

The Contractor shall take the necessary actions to ensure its facilities are in compliance with the requirements of the Americans With Disabilities Act (ADA). It is understood that the Contractor's internal ADA program is not a program or activity of the City of Tulsa. The Contractor agrees that its program or activity will comply with the requirements of the ADA. Any costs of such compliance will be the responsibility of the Contractor. Under no circumstances will Contractor conduct any activity which is not in compliance with the ADA."

107.06. Barriers, Barricades, and Warning Signs. Before the first paragraph, add "In this section, the term "traffic" includes vehicular, pedestrian and bicycle traffic."

107.14. No Waiver of Legal Rights. Delete section.

107.19. Regulated Floodways. At the end of the section, add "The Contractor shall also follow the requirements of Title 11A of the Revised Ordinances of the City of Tulsa."

107.20. Stormwater Management. After the first sentence, add "The Contractor shall also follow the requirements of Title 11A of the Revised Ordinances of the City of Tulsa."

108.01. Subletting of Contract. Delete the last sentence of the first paragraph.

108.02. Notice to Proceed and Preconstruction Conference. Delete the first sentence in the second paragraph, and replace with "After the Contractor and Resident Engineer hold a preconstruction conference, the Contractor shall receive a Notice to Proceed before the start of construction."

108.07.B.(1) Extensions for Adverse Weather. After the first sentence in the second paragraph, add "Extensions of Contract Time will not be granted if conditions exist such that the Contractor could work at least 4 hours."

108.07.B.(3). Winter Time Suspension. Delete section.

108.08. Incentive/Disincentive for Early/Late Completion. Delete section.

108.09. Failure to Complete on Time.

- In the first sentence, delete "in accordance with Table 108:1, 'Schedule of Liquidated Damages.'"
- Delete Table 108:1.

109.04.B.(3). Equipment.

- In first paragraph, delete the last two sentences, and replace with the following:

  "The Department will determine the maximum allowable rate as listed in the most current edition of the *Heavy Construction Costs with RSMeans data*, published by The Gordian

Group. The Department will calculate the hourly rental rate in accordance with the following equation:

$$H = [(M \times R) / 176] + O$$

Where

H = Hourly rental rate,
M = Monthly rental rate,
R = City cost index / 100, and
O = Hourly operating cost.

- In the second paragraph, delete the last two sentences.

109.04.B.(4)(f). Employee Fringe Benefits. Delete text of section, and replace with "The City of Tulsa will not pay for the additional costs of employee fringe benefits incurred by the Contractor for labor during the period the disputed work was in progress."

109.06. Progress Payments. Revise the first sentence of the second paragraph to recite "The Resident Engineer will make monthly progressive estimates."

109.08. Final Payment. Delete last paragraph, and replace with "If the Contractor does not sign and return the Final Estimate within 90 days of receipt, the Engineer may start action to administratively close the project."

109.10.A. Recoverable Costs. Delete section.

201.04.A. Clearing. Delete the fourth sentence of the first paragraph, and replace with "Remove branches that overhang the roadway to at least 20 ft [6 m] above the road surface and at least 35 ft [11 m] above the road surface at traffic signals."

201.06. Basis of Payment. In this section, delete all references to "Lump Sum", and replace with "Square Yard [Square Meter]".

202.04. Construction Methods. In the second paragraph delete, "If the contract requires ground disturbance greater than one acre total."

202.04.D.(2). Mandatory Sources Designated on the Plans. Delete sentence, and replace with "If the Plans show the source of selective subgrade topping, excavate the material at the specified source, haul to the specified location, and place."

202.05.A. Unclassified Excavation. Delete the second sentence of the first paragraph.

209.04. Construction Methods. At the end of the second paragraph, add the following: "Clean inlet and outlet channels within the right-of-way."

JS

220.04.C. Contractor Responsibilities for SWPPP. In the first sentence of the second paragraph, replace "recommended" with "required".

220.04.H.(3). Earthwork Operations. Delete first paragraph, and replace with "Protect excavation or embankment slopes as construction progresses with placement of temporary (e.g. seeding, mulching, soil retention blankets, or other approved soil stability), or permanent (e.g. seeding, sprigging, or sodding) erosion control measures. Obtain approval from the Resident Engineer in the preconstruction schedule for any increase or decrease in the amount of the area exposed by construction operations. No exposed area shall remain unprotected without being stabilized. Install temporary or permanent erosion or sediment control measures on excavation or embankment slopes as work progresses in vertical increments of not more than 10 ft [3 m] unless otherwise directed by the Resident Engineer."

220.05. Method of Measurement. In the bulleted list, delete the sixth bulleted item.

221.01. Description. In the last sentence, replace "OOPDES" with "OPDES".

221.02. D. Temporary Sediment Filter. Revise the first sentence to recite "Provide fiber log for Type I-A and I-B sediment filter in accordance with Subsection 221.02.H, 'Temporary Fiber Log.' Provide material for Type I-C sediment filter in accordance with Subsection 221.02.C, 'Temporary Silt Fence.'"

228.02. Materials. For the first item listed in the table, delete "Nylon".

230.01. Description. Delete "Bermuda".

230.02. Materials. Delete all references to "Bermuda" from this section.

231.04.C.(1). Planting Seasons and Weather Restrictions. In the first sentence of the second paragraph, replace "suspend" with "Suspend".

317.04.A. Mix Design and Proportioning. In the bulleted list, insert "•" before "Compressive strength at 7 days".

317.04.F. Acceptance.

- Delete the first paragraph.
- At the end of the second paragraph add "Failure to reach strength between 600 psi [4,150 kPa] and 2,000 psi [13,800 kPa] will result in rejection of the work."

317.06. Basis of Payment. Delete the third and fourth paragraphs and Table 317:1. Replace with the following: "ODOT Acceptance and Strength Pay Factors shall not be used. Failure to meet criteria in Subsection 317.04.F will result in rejection of the work."

401.04.A.(1). Surface Elevation and Smoothness. Delete paragraph, and replace with "Refer to the City of Tulsa Standard Specifications for Pavement and Bridge Deck Smoothness."

403.04.A.(2). Seasonal Limitations. Delete paragraph and Table 403:1, and replace with "The Department will evaluate claims for extension of Contract Time in accordance with Subsection 108.07, when temperature and weather limitations in Table 403:2 are not met."

405.04.G. Spreading and Finishing. In the last paragraph, replace "ODOT Bridge Division" with "Department".

406.04.F. Weather and Seasonal Limitations. Delete the second paragraph.

410.04.E. Aggregate Application Rate. Delete the third and fourth sentences, and replace with "The Contractor shall overlay the deficient area at no additional cost to the Department."

410.05. Method of Measurement. Delete text of section, and replace with "The Resident Engineer will measure completed Micro Surfacing by the square yard [square meter]."

410.06. Basis of Payment. Delete all Pay Items and Pay Units in the table and replace with the following Pay Item and Pay Unit: "MICRO SURFACING, Square Yard [Square Meter]".

411.03.C. Pavers. After the first paragraph add the following paragraph and Table 411.03.C:1. "Pavers shall be capable of placing a minimum paving width in one (1) lift as shown in Table 411.03.C:1. Longitudinal joints in the surface layer shall correspond with the locations indicated in Table 411.03.C:1."

Table 411.03.C:1
Minimum Paving Widths

Roadway Classification	Minimum Paving Width	Location of Longitudinal Joints
Arterials	one (1) full lane width	At edges of traffic lanes
Non-Arterials	one-half (½) road width	At centerline of road
Trails and bike lanes	full width of trail/bike lane	At edges of trail/bike lane

411.03.F. Material Transfer Vehicle.

- In the fourth paragraph, replace "Bridge Division" with "Department".
- In the seventh paragraph, replace "500 ton [450 metric ton]" with "100 ton [90 metric ton]".

411.04. Construction Methods. At the beginning of this section, add the following:

"Prior to paving operations, submit a paving plan indicating the sequence of paving passes, pass widths, pass thicknesses, and requested temporary street closures.

The contractor shall not drive empty or loaded trucks or equipment across newly paved areas for the construction period."

411.04.D. Control Strip Requirements.

- Delete the first paragraph.
- In the second paragraph, replace "500 ton [450 metric ton]" with "100 ton [90 metric ton]".
- Delete the last paragraph, and replace with "If the initial asphalt control strip produces failing results, make adjustments to production and placement procedures, and repeat the

JS

test process for a second control strip. If required, create additional asphalt control strips on the shoulder until an acceptable mixture is produced."

411.04.I. Spreading and Finishing.

- After the second sentence in the fourth paragraph, add "Once paving begins the Contractor should have sufficient trucks available to deliver asphalt materials in a continuous operation."
- After the fourth paragraph, add the following paragraph: "A leveling or "wedge" course may be required to establish the required cross-slope for the finished overlay. Adequate transitions to side streets and driveways must be provided. Paving shall extend to the returns of all side streets. Special consideration should be given to prevent ponding at side street intersections."

411.04.J.(1). General.

- Delete the second paragraph, and replace with the following:

  "Ensure longitudinal joints in the surface layer correspond with locations indicated in Table 411.03.C:1.

  Transverse joints shall be kept to a minimum. At a minimum, each lane shall be continuously laid without cold joints either from intersection to intersection or a length of 500 ft."

- Delete the last sentence in the last paragraph.

411.04.K.(2). Acceptance. Delete the second sentence in the third paragraph.

411.04.K.(2).(a). Layers At Least 1½ in [38 mm] Thick.

- In the second paragraph, delete the first sentence, and replace with "Asphalt density tests for each lot will be performed at random sample locations."
- Delete Table 411:2 and the last paragraph in the section, and replace with the following:

  "ODOT Pay Adjustments for Lot Density shall not be used. Failure of any sample within the lot to reach density within 92.0 to 97.0 percent of the Maximum Theoretical Density will result in rejection of the entire lot. The Contractor shall remove and replace unacceptable lots at no additional cost to the Department."

411.04.K.(2).(b). Layers Less Than 1½ in [40mm] Thick. In the second paragraph, replace "500 yd^2 [500 m^2]" with "400 yd^2 [330 m^2]".

411.04.N.(2).(a). Basis of Acceptance and Payment.

- In the first paragraph,
  - In the first sentence, delete "and payment";
  - After the first sentence, add the following: "The Resident Engineer may also consider other characteristics, including but not limited to, pavement smoothness."

J5

- In the second paragraph, delete the second through the last sentence.
- Delete the fifth through the last paragraph, and replace with "ODOT pay factors for density, asphalt cement content, and air voids shall not be used. Failure to reach density of 92.0 to 97.0 percent of the Maximum Theoretical Density, asphalt cement content of +/- 0.40 of job mix formula, air voids greater than 1.5 deviation from target, or specified thickness of asphalt will result in rejection of the entire lot. The Contractor shall remove and replace unacceptable lots at no additional cost to the Department.

411.04.N.(2).(b). Resident Engineer's Acceptance Procedures. Delete the second paragraph, the bulleted list, and Table 411:4; replace with "The Resident Engineer may perform varying amounts of sampling and testing per lot in accordance with the City of Tulsa Acceptance Sampling/Testing Standard Specifications."

411.06.B.(2). Asphalt Binder Price Adjustment (ABPA). Delete the last paragraph, and replace with "ODOT will establish the Monthly Asphalt Binder Price Index each month and post the information to the ODOT website at http://www.okladot.state.ok.us/contractadmin/pdfs/binder-index.pdf."

414.02. Materials.

- Delete "Fly Ash" from Table.
- At the end of the section, add the following:

  "Fly Ash is not allowed in any concrete mixture unless otherwise specified in the Plans or Special Provisions."

414.03.B. Placing and Finishing Equipment. After the first sentence, add the following: "If paving is not performed by a slip form paver, a hand vibrator shall be required."

414.04.R. Acceptance of Pavement. Delete text of section, and replace with the following: "ODOT pay factors shall not be used. Failure to reach the gradation specified, air content of 4.5% to 7.5%, or target strength of the mix design will result in rejection of the entire lot. Failure to provide pavement thickness equal to or greater than what is specified will result in rejection of the entire lot."

414.04.R.(a). Engineer's Acceptance Procedures. Delete text of section and Table 414:2. Replace with "Refer to City of Tulsa Acceptance Sampling/Testing Standard Specifications."

414.06. Basis of Payment. Delete the last sentence in this section.

509.06. Basis of Payment.

- Delete the second through the fifth paragraph and Table 509:7. Replace with the following: "ODOT pay factors for strength and air content shall not be used. Failure to reach the specified strength or the target air content within a deviation of 1.5% will result in rejection of the work. Check any outlying concrete cylinder breaks and air entrainment tests in accordance with ASTM E 178 Table 1, Upper 10% Significance Level."

55

- In the sixth paragraph, revise the first sentence to recite "If the concrete is rejected by the Engineer, the Contractor may elect to core the represented concrete at no additional cost to the Department."

515.04.C. Sampling and Testing of Bridge Decks and Approaches. Delete the first paragraph and bulleted list. Replace with "Refer to City of Tulsa Acceptance Sampling/Testing Standard Specifications for lot size."

515.04.D.(2). Bridge Decks and Approach Slab Surfaces.

- In the first paragraph, delete the third sentence.
- Delete sections (a), (b) and (c).
- Add the following:

  "The percentage of absorption (using test results from OHD L39 shall be less than or equal to 1.0. The depth of penetration (using test results from OHD L 40) shall be greater than or equal to 0.15 inches. If absorption and penetration requirements are not met, reapply penetrating water repellent at no additional cost to the Department until requirements are met."

516.02.C. Casings.

- In the first sentence of the third paragraph, add the word "licensed" after "Registered Professional Engineer".
- In the fourth paragraph, delete the second sentence, and replace with "Use permanent interior casings in accordance with ASTM A760 and AASHTO M36."

516.04.C.(7). Concrete Acceptance. Delete the second and third sentence. Replace with the following: "ODOT pay factors for concrete strength shall not be used. Failure to reach the specified strength will result in rejection of the work."

610.04.F. Tactile Warning Device. Delete text of section, and replace with the following:

"Install tactile warning devices in accordance with the manufacturer's specifications and the City of Tulsa Standard Drawings. Tactile Warning Devices shall consist of Cast-In-Place Tactile Panels in accordance with 733.1, "Tactile Warning Device Material".

Tactile panels shall be cast into the wet concrete. Surface applied products shall not be allowed. The panels shall extend the full width of the ramp or landing area and shall extend a minimum of two (2) feet in the direction of pedestrian travel. Panels shall be placed perpendicular to the direction of travel unless specifically noted otherwise or approved by the Engineer prior to installation.

All construction shall meet current ADAAG and PROWAG Guidelines."

611.01. Description. In the first sentence, delete ", brick masonry,".

611.02.A. General.

- Delete "Clay Brick" and "Concrete Brick" from the table of materials.

- In the second paragraph, delete "brick masonry or".

611.04.B. Clay Brick or Concrete Brick. Delete section.

615. Sanitary Sewer Pipe Conduits. Delete section.

616. Water Pipe and Fittings. Delete section.

623. Guardrail and End Treatments. Revise the section title to recite "Guardrail, End Treatments, and Impact Attenuators".

623.01. Description.

- In bulleted list, add the item, "Guardrail Impact Attenuators".
- In the last sentence of the last paragraph, after "Ensure the GETs", add "and Guardrail Impact Attenuators".

623.04. Construction Methods. Add the following subsection:

"**623.04 H. Guardrail Impact Attenuators**

Ensure experienced workers fabricate and install guardrail impact attenuators as shown on the Plans.

Construct guardrail impact attenuators with certified, crash tested hardware. Ensure NCHRP 350 TL-3 certification for substituted hardware and that the product appears on the Traffic Engineering Division's Qualified Product List (QPL). Obtain the Resident Engineer's approval of substitutions before installation."

623.06. Basis of Payment. Add Pay Item "(J) Guardrail Impact Attenuator" with a Pay Unit of "Each".

624.01. Description. In the bulleted list, add the bulleted item, "Fence, Other (Like Kind),".

624.02. Materials. In the table, add the Material, "Fence, Other (Like Kind)" with Section or Subsection of "732.10".

624.06. Basis of Payment. Add Pay Item, "(H) Fence, Other (Like Kind)" with a Pay Unit of "Linear Foot [Meter]".

642.06. Basis of Payment. In the table, for both Pay Items, delete the Pay Unit of "Lump Sum", and replace with "Each".

701.01.B. Cement Substitution. Delete text of section, Table 701:2, and Table 701:3. Replace with "Cement substitutions shall not be used in concrete mixtures."

701.19.A. General. Controlled Low-Strength Material (CLSM). In the first sentence, delete "fly ash,".

JS

701.19.B. Mix Design. In the table, delete the Material, "Fly Ash".

702.01.A. General. In the second paragraph

- Delete the first sentence, and
- In the last sentence, delete "PCC from one source (power plant) and".

702.01.B. Requirements for Portland Cement Concrete Use. Delete section.

702.02. Slag Cement. Delete section.

702.03. Cement Kiln Dust. Delete section.

702.04. Silica Fume. Delete section.

708.04. Composition of Mixtures. In Table 708:6, under "Other Mixture Requirements", add a row as follows:

	S2	S3	S4	S5 / RIL	S6
Asphalt Cement (for Non-Arterial pavements only) % of mix mass		≥ 5.0	≥ 6.0	≥ 6.0 / NA	

711.06.D.(1). Acrylic Emulsion Polymer. In the second sentence, after "44 percent by", delete "weight [mass]", and replace with "total weight of the acrylic emulsion polymer."

719.04.A. Description. In the second sentence, after "Type III" add ", Type IV, or Type IX".

719.05.C. Material and Application. In the first sentence, delete "baking screen enamel or".

719.05.E. Tests. In the first sentence revise "Ensure screening enamel, stencil pastes, and process inks" to recite "Ensure stencil pastes and process inks".

726.02. Flexible Conduits. In Table 726:3, under Nonmetallic conduits—culverts, for Corrugated Polypropylene Pipe, delete the requirement for "AASHTO M330", and replace with "COT 215".

732. Materials for Guardrail, Guide Posts, Bridge Rail, Miscellaneous Railing, and Fences. Add the following subsection:

"**732.10 Fence, Other (Like Kind)**
Provide fence, other (like kind), in accordance with contract documents."

733. Miscellaneous Materials. Add the following subsection:

"**733.1 Tactile Warning Device Material**

JS

Provide cast-in-place tactile panels to be embedded into wet concrete. Surface applied products are not allowed. The panels shall meet the size and spacing requirements shown in the plans or the City of Tulsa Standard Drawings.

The tactile panels shall be composed of cast iron or vitrified polymer composite material. The color of the tactile panels shall comply with ADAAG and PROWAG color contrast requirements. Vitrified polymer composite panels shall be yellow and conform to Federal Color No. 33538. The color shall be homogeneous throughout the product. Any variations in color shall be approved by the Engineer prior to installation.

Tactile panels shall meet current ADAAG and PROWAG Guidelines."

735.01. Sodding and Sprigging Materials. Within subsections A, B and C, delete the word "Bermuda".

735.01.B.(1). Solid Slab Sod. At the end of the first paragraph add "Nylon mesh shall not be allowed in solid slab sod."

740.01. Materials.

- Delete the first three paragraphs.
- In fourth paragraph, delete "aluminum sheet material". Replace with "louvered aluminum backplates".
- At the end of the fifth paragraph, add "Retroreflective sheeting shall be 2 inches wide and attached to the front perimeter of the backplate. Retroreflective sheeting shall be fluorescent yellow."

740.02. Finish. After "Ensure the backplate is" add "flat".

801.01. Description. Delete the second paragraph. Replace with the following:

"The contractor shall obtain the necessary permits for electrical inspection on all signal and lighting work. Electrical inspections shall include all electrical equipment, enclosures, devices, cables, conductors and raceways as defined by the NEC. High or low voltage shall be installed, maintained, connected or removed by a State of Oklahoma licensed Electrical contractor. All work shall meet the requirements of the NEC. The City of Tulsa shall reserve the right to define workmanlike manner. Proof of license shall be carried on person at all times and be available to City of Tulsa personnel upon request per Title 158- Construction Industries Board Chapter -40 Subchapter 11-2(a)(9). The Contractor shall contact City of Tulsa Traffic Operations to obtain the address needed to obtain the permit."

801.04.A. General. Replace all references to "60-cycle" with "60 hertz".

802. Electrical Conduit. Delete section.

803. Pull Boxes and Ground Boxes. Delete section.

804. Concrete Footings. Delete section.

JS

805. Removal of Traffic Items. Delete section.

806. Poles and Mast Arms. Delete section.

807.02. Materials. In the second sentence of the second paragraph, replace "plastic" with "hardened, tamper-proof".

807.06. Basis of Payment. In the last paragraph, replace "plastic" with "hardened, tamper-proof".

809. Luminaires. Delete section.

810. Power Supplies. Delete section.

811. Electrical Conductors Highway Lighting. Delete section.

813.02. Materials. In the first two sentences of the first paragraph, after "(2) hardcopies" add "and one (1) electronic (pdf) copy".

813.02.A. Structural Design.

- In the second sentence of the first paragraph, delete "corrosion-resistant (stainless or galvanized steel, or aluminum)". Replace with "galvanized steel".
- In the eighth paragraph, after "Provide the following luminaire ring suspensions as required by the Contract:", add "(Only top latching systems are allowed.)".

813.04. Construction Methods. In the first paragraph, delete the third sentence and replace with "Submit to the Resident Engineer one (1) electronic (pdf) copy and at least five (5) hardcopies per project or one (1) copy per device."

825. Traffic Signal Controller Assembly. Delete section.

827. Solid-State Flashing Controller. Delete section.

828. Vehicle Loop Detector and Loop Detector Wire. Delete section.

830. Pedestrian Push Button. Delete section.

831. Traffic Signal Heads. Delete section.

832. Optically Programmed Adjustable Traffic Signal Heads. Delete section.

833. Traffic Signal Backplates. Delete section.

834. Electrical Conductors for Traffic Signals. Delete section.

850. Signs. Delete section.

JS

851. Galvanized Steel Sign Posts. Delete section.

855.04.B. Application of Markings. At the end of the first paragraph, add "Remove temporary markings and reflective tabs prior to installing permanent markings."

856. Traffic Stripe (Multi-Polymer). Delete section.

858.04. Construction Methods. At the end of the second sentence of the first paragraph, delete "maker", and replace with "marker".

880.02.B.(5). Warning Lights. In the first sentence, delete "6F-7OF", and replace with "6F.83".

880.05.B. Lump Sum Pay Item. At the beginning of the second paragraph, revise "If additional and compensation" to recite "If additional compensation".

Section 2. REPEAL OF CONFLICTING ORDINANCES. *That all other ordinances or parts of ordinances in conflict herewith be and the same are now expressly repealed.*

Section 3. SEVERABILITY. *If any section, subsection, paragraph, subparagraph, sentence, clause or phrase of this ordinance shall be declared invalid for any reason whatsoever, such decision shall not affect the remaining portions of this ordinance, which shall remain in full force and effect, and to this end the provisions of this ordinance are hereby declared to be severable.*

Section 4. EFFECTIVE DATE. *This ordinance shall be effective on July 1, 2021.*

ADOPTED by the Council: JUN 0 2 2021
Date

Vanessa Hall Hoy
Chair of the Council

OFFICE OF THE MAYOR

Received by the Mayor: _____ at _____
Date Time

G.T. Bynum, Mayor

By: _____
Secretary

JS

APPROVED by the Mayor of the City of Tulsa, Oklahoma: JUN 09 2021
Date

at _____.
Time

Mayor

ATTEST:

City Clerk

APPROVED:

City Attorney

OK-JMS

JS

SPECIFICATIONS

A. Oklahoma Department of Transportation Standard Specifications for Highway Construction, 2019 Edition, shall be used on this project including Section 100-General Provisions, as modified by Ordinance No. 24616

B. City of Tulsa, Engineering Services Department Construction Specifications – March 2022 are incorporated herein as if fully set forth and are on file, including all revisions posted on internet prior to bid opening, with the Engineering Services Department, Engineering Design Division, 175 E. 2nd Street, Tulsa, Oklahoma or access on the internet at: http://www.cityoftulsa.org/government/departments/engineering-servicess/specification-checklists-and-details

SPECIAL

PROVISIONS

SPECIAL PROVISION
SUPPLEMENTAL CONTRACT REQUIREMENTS
PROJECT NO. 147250 & SW-2020-01-06 TO7
IMPROVE OUR TULSA WOODWARD PARK IMPROVEMENTS

1. Successful Contractor shall return fully executed contract documents (including bonds and insurance) to the City of Tulsa, Contract Administration Section 175 E. 2nd Street, Ste. 261, OK 74103 within two (2) weeks after bid opening.

2. If the successful Contractor can provide proper bonds and insurance and the contract is executed, the Pre-Construction Conference for this project will be held within eight (8) weeks after bid opening.

SPECIAL PROVISIONS

INSURANCE REQUIREMENTS

In reference to Ordinance No. 24616 Adoption of State Specification for Highway Construction, Section 107.12 shall be modified as follows:

The CONTRACTOR (and any subcontractors) shall carry and keep in force during this Contract, policies of insurance issued by an insurer authorized to transact business in Oklahoma in minimum amounts as set forth below or as required by the laws of the State of Oklahoma. The CONTRACTOR shall also furnish an Owner's Protective Policy in the same amounts naming the City of Tulsa as the assured, issued by the same insurance company as the CONTRACTOR'S liability coverage and indemnifying the City of Tulsa against any and all actions, claims, judgments or demands arising from injuries of any kind and character sustained by any person or persons because of work performed by the CONTRACTOR.

General Liability Insurance with a bodily injury and property damage combined single limit of not less than $1,000,000.00 for each occurrence.

Employer's Liability and Workmen's Compensation in the amounts as required by law.

The CONTRACTOR shall provide proof of such coverage:

(a) By providing Certificate(s) of Insurance prior to the execution of this contract; and

(b) By submitting updated Certificate(s) of Insurance with each and every subsequent request for payment. The Certificate(s) should show that the policies are current and should be dated within 30 days of payment request.

The CONTRACTOR shall not cause any required insurance policy to be cancelled or permit it to lapse. If the CONTRACTOR cancels, allows to lapse, fails to renew or in any way fails to keep any required insurance policy in effect, the City will suspend all progress and/or final payments for the project until the required insurance is obtained. Further, a CONTRACTOR who fails to keep required insurance policies in effect may be deemed by the City to be in breach of contract, ineligible to bid on future projects, and/or ineligible to engage in any new contracts.

The Contractor shall execute and furnish a Statutory Bond for the protection of laborers, mechanics, and material men in a sum equal to one hundred percent (100%) of the contract price.

The Contractor shall execute and furnish a Performance Bond in a sum equal to one hundred percent (100%) of the contract price.

The Contractor shall execute and furnish a Maintenance Bond in a sum equal to one hundred percent (100%) of the contract price.

Prior to doing blasting, the Contractor shall furnish a Certificate of Insurance, which shall certify that any damage caused by blasting is within the coverage of the Contractor's liability insurance to the full limits thereof.

All bonds and insurance must be executed by a company licensed to do business in the State of Oklahoma and must be acceptable to the City.

SPECIAL PROVISIONS GENERAL

1. Work Days: All work to be completed within **365 calendar days** for the Base Bid.

2. No work shall be done between the hours of 6:00 p.m. and 8:00 a.m., nor on Saturday, Sunday, or legal holidays without the prior written approval or permission of the Engineer in each case, except such work as may be necessary for the proper care, maintenance, and protection or work already done, or of equipment, or in the case of an emergency.

3. Traffic Control: All work shall be done in cooperation with the City to establish, install, maintain and operate complete, adequate and safe traffic control during the entire construction period. Barricades, signs, lights, flags and all other traffic control devices shall meet the requirements and specifications of the Standard Drawings entitled "Typical Applications of Traffic Control Devices" and shall be approved by the Traffic Engineer of the City of Tulsa. Two-way traffic shall be maintained at all times, unless otherwise approved by the Engineer. All contractors shall contact the City of Tulsa Traffic Engineering Section before removing or replacing traffic devices, detector loops and street signs. A traffic plan must be submitted for any temporary street closure at least 2 working days prior to planned closing.

4. Contractor shall provide an acceptable 10' straightedge for this Project. All transverse joints shall be straight edged and approved by the Engineer. Surface elevations will meet ODOT 401.04 and all other contract requirements.

5. The Engineer may do quality assurance testing in addition to that performed by the Contractor. The Engineer or a testing laboratory designated by the Engineer will do any testing for quality assurance. The City will pay all costs of quality assurance.

6. Full depth sawing of patches is required. This area to be removed shall be marked by the Contractor under the direction of the Engineer. The Contractor will provide personnel and equipment for marking of the patches as directed by the Engineer. Cost of full depth sawing shall be included in bid item for patching areas.

7. Areas to be patched shall be delineated in a straight-line geometric pattern. When completed, the patch shall be level and provide a smooth riding surface. Portland Cement Concrete patches will be protected from all traffic for a minimum period of 24 hours before removal of protective devices. No open excavations will be left overnight.

8. All asphalt patch work will require that asphalt rollers and an asphalt laydown machine be available for use on the job as directed by the Engineer.

9. Contractor will be required to employ the use of an Automatic Grade Referencing System. The equipment shall be capable of accurately and automatically establishing grades along each edge of the machine by referencing the existing pavement by means of a ski or joint matching shoe, or from an independent grade control. Minimum length of ski shall be 40'.

10. Prior to application of tack coat, the street shall be blown clean with compressed air to the satisfaction of the Engineer.

11. The tack coat must be uniformly distributed and adequately cured prior to beginning the overlay.

12. Contractor shall be responsible for cleanup and/or removal of any excessive over spray of any tack coat material to the satisfaction of the Engineer.

13. Debris from routing of cracks and cold milling shall be swept and vacuumed from the street to the satisfaction of the Engineer.

14. Contractor will be responsible for preparation and distribution of a written notice to residents within 48 hours of beginning milling and overlay operations. Costs associated with this requirement will be included in other items of work.

15. Contractor shall provide a continuous work effort towards total completion of the work in an area prior to moving to a different location.

16. No masonry structures shall be used in street right of way. Either precast or cast-in-place structures shall be used.

17. No lifting holes will be allowed in any reinforced concrete pipes or reinforced concrete boxes.

18. No fly ash is allowed to be used on this project.

19. The Contractor certifies that it and all of its Subcontractors to be used in the performance of the Contract are in compliance with 25 O.S. Sec. 1313 and participate in the Status Verification System. The Status Verification System is defined in 25 O. S. Sec. 1312 and includes but is not limited to the free Employee Verification Program (E-Verify) available at **www.dhs.gov/E-Verify**.

20. **Driveways**. Access to properties and businesses adjacent to the right of way must be provided and maintained at all times unless otherwise directed/approved by the Engineer. The Contractor will contact the business or property owner at least 5 days in advance of any driveway closure. Driveways and patches in front of driveways, which are removed, shall not be left unusable overnight. If concrete cannot be placed the same day as removal, the Contractor shall furnish screening or other suitable aggregate material to maintain temporary access until concrete

can be placed. The cost of placing and removing the material for temporary access shall be included in the pay item for Concrete Driveway (High Early Strength). **Failure to leave any driveway usable will subject the Contractor to a $1000.00 per day fine for each and every calendar day that the driveway remains non-useable.** The only exception for a driveway to be non-useable is to allow for curing time for concrete. Cure time will not exceed 48 hours.

21. Driveways in excess of 18-feet in width shall be constructed in half-sections and access shall be maintained at all times.

22. Contractor shall prepare and present a schedule and plan for lane and driveway closures throughout the project. The Contractor shall include in the plan, driveway signage for local business access. Payment for signs will be included under the pay item "**Signage for Local Business Access**" and will be paid for by the square foot. Coordination with the City of Tulsa and local business operators shall be required before a driveway schedule and plan is approved.

23. Contractor shall coordinate with the City of Tulsa and local business operators to identify opportunities to perform weekend or "after business hours" construction on driveways to minimize impacts to the area.

24. Local and through traffic shall be maintained at all times through the project unless otherwise permitted by the Engineer. All public and private streets shall be accessible at all times. All detours, horizontal traffic movements, etc. are directly related to the sequence of work; therefore, the Contractor shall proceed with his construction operation in conformity with the details shown on the plans and as required by this special provision.

26. Traffic must be handled appropriately through the entire project during construction and it shall be the responsibility of the Contractor to provide for the safety and comfort of the traveling public at all times. The Contractor shall be required to give the traveling public at least **48 hours** advance notice of any lane and/or street closures.

27. The Contractor may propose/recommend modifications to the sequence of work for consideration by the Engineer. Any major recommended modification by the contractor shall include any changes to the various pay items, impact to traffic, and effect of overall project in time and cost, etc. The Contractor shall not proceed with any construction operations based on a revised phase/sequence until the Contractor obtains written approval from the Engineer.

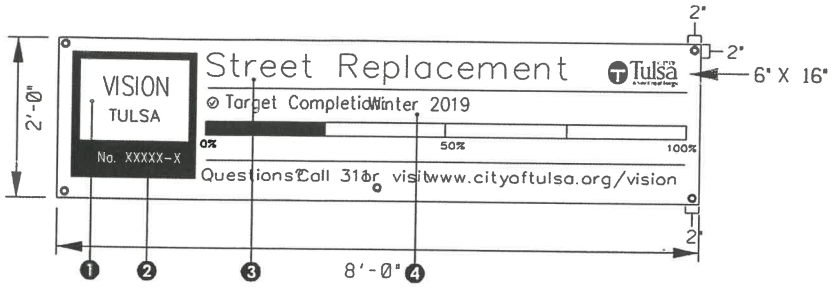
28. Two lanes shall remain open to traffic, one in each direction, throughout all phases of construction, unless otherwise approved/directed by the Engineer. Left turn lanes shall remain open to traffic throughout all phases of construction, unless otherwise approved/directed by the Engineer. Transitions from pavement elevations through construction areas to access driveways or intersections shall be the Contractor's responsibility. Contractor shall maintain signs and markings on a continuous basis.

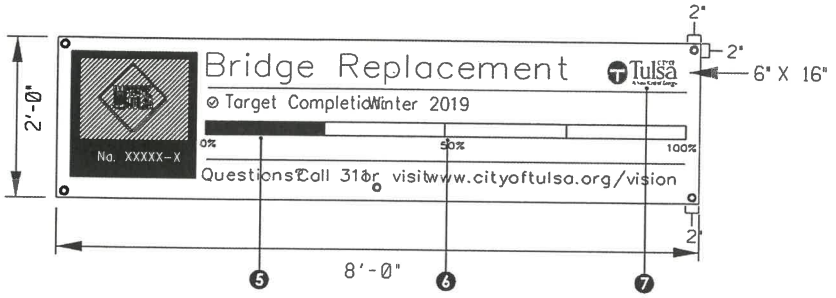
SPECIAL PROVISIONS
OWNER ALLOWANCE

The "Owner Allowance" may be used for various work and miscellaneous items not specifically identified in the Contract Documents with the following provisions:

A. The allowance shall be used for cost of design and construction, including all materials, labor, equipment, profit and overhead, of work items not specifically identified in the Construction Documents, or included in original pay items bid for the contract.
B. The allowance shall be utilized only at the discretion of the City of Tulsa. Any balance remaining at the completion of the Project will be retained by the City of Tulsa.
C. The Contractor shall provide, to the City of Tulsa, a written request for the use of any allowance, including a schedule of values and associated backup information, including validity of need, materials, labor, equipment, and time required to perform the associated work.

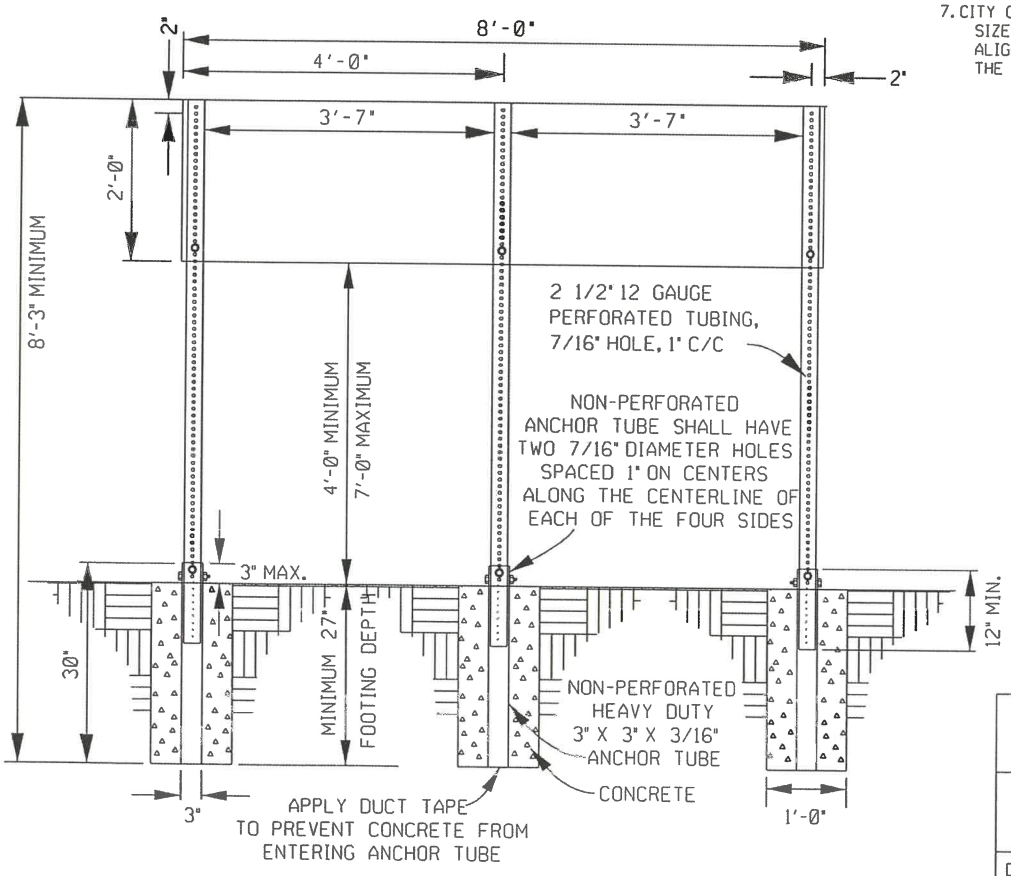
Contractor shall proceed with the allowance work only after receiving written permission from the City of Tulsa. Proceeding with associated allowance work without written permission from the City of Tulsa will be at the Contractor's sole expense.





NOTE:

1. CAPITAL PROGRAM LOGO
   - VISION TULSA
   - IMPROVE OUT TULSA
2. PROJECT NUMBER
   FONT: HELVETICA BOLD
   SIZE: 2.5 INCHES
   ALIGNMENT: CENTER
   COLOR: WHITE
3. GENERAL PROJECT TITLE
   FONT: HELVETICA BOLD
   SIZE: 4.72 INCHES
   ALIGMENT: LEFT
   COLOR: CITY BLUE
   GENERALIZED
   - STREET REPLACEMENT
   - STREET REHABILITATION
   - STREET WIDENING
   - STREET RESURFACING
   - BRIDGE REPLACEMENT
   - BRIDGE REHABILITATION
4. TARGET COMPLETION
   FONT: HELVETICA REGULAR AND BOLD
   SIZE: 2.5 INCHES
   ALIGNMENT: LEFT
   COLOR: CITY BLUE AND BLACK
5. PROJECT PROGRESS BAR
   SIZE: 2" TALL X 66" WIDE
   COLOR: GREEN
   MATERIAL: 2" GREEN, INDUSTRIAL DUCT TAPE CUT AT 1/4 SEGMENTS SHOULD BE USED TO INDICATE PROJECT PROGRESS/ADVANCEMENTS IN THE PROGRESS BAR. PAINT SHOULD ONLY BE USED IN THE EVENT THAT TAPE IS NOT AVAILABLE OR UNABLE TO REMAIN AFFIXED OVER A LONGER CONSTRUCTION PERIOD.
6. CONTACT INFORMATION
   OPTIONS: 311 AND CORRESPONDING URL
   FONT: HELVETICA REGULAR AND BOLD
   SIZE: 2.5 INCHES
   ALIGNMENT: LEFT
   COLOR: CITY BLUE AND BLACK
7. CITY OF TULSA LOGO
   SIZE: 10" WIDE
   ALIGNMENT: OUTER RIGHT MARGIN EDGE AND TO THE BASELINE OF THE GENERAL PROJECT TITLE.



ASSEMBLY OF PLYWOOD SIGN

PROJECT SIGN	
CITY OF TULSA, OKLAHOMA ENGINEERING SERVICES DEPARTMENT	
DRAWN BY: CHECKED BY: HAS DATE: MARCH 2022	APPROVED
NOT TO SCALE	STANDARD NO. 102

PATH: e1/parts/std/DGN standard Drafts/102-project-sign-new-Mono.dgn RMD 3/6/18

03/31/22

SPECIAL PROVISION
FOR UTILITY RELOCATIONS
AND DESIGN ISSUES

It is the intent of this specification to provide no more than seventy-five **(75)** calendar days due to delays caused by required utility relocations and required design clarifications. Should the Contractor be delayed in the final completion of work by any utility relocation or design issue, additional days as determined by the Engineer shall be granted by the City. However, the Contractor shall give the Engineer notice in writing of the cause of the delay in each case on the Extension of Time Request Form enclosed in these documents, and agrees that any claim shall be fully compensated for by the provisions of this specification to complete performance of the work. An adjustment will not be made to the contract time bid for incentive purposes.

Any time granted for utility relocations or design issues up to seventy-five **(75)** calendar days will be in addition to the number of days shown in the proposal for computation of disincentive and liquidated damages.

PROJECT MANUAL FOR

WOODWARD PARK IMPROVEMENTS

PROJECT NO. 147250

ENGINEERING SERVICES DEPARTMENT

CITY OF TULSA, OKLAHOMA

LANDSCAPE ARCHITECT:

LANDPLAN CONSULTANTS, INC

1110 West 23rd Street

TULSA, OK 74107

918.584.6464

SURVEYOR:

Fritz Land Surveying, LLC

2017 West 91st Street

TULSA, OK 74132

918.231.0575

100% Bid documents - June 7, 2024

TABLE OF CONTENTS

Division 1– General
01100 Summary
01140 Work Restrictions
01152 Applications for Payment
01153 Change Order Procedures
01200 Project Meetings
01260 Allowances
01270 Unit Costs
01310 Construction Schedule, Time of Completion and Liquidated Damages
01340 Submittals
01350 Substitutions
01370 Schedule of Values
01380 Construction Photographs
01410 Testing Laboratory Services
01500 Temporary Facilities and Controls
01510 Site Access
01640 Product Handling
01700 Contract Closeout
01720 Project Record Documents
01730 Operation and Maintenance Data
01731 Cutting and Patching
01732 Selective Demolition

Division 2 – Sitework
02000 Site Work
02100 Site Preparation
02210 Site Grading
02220 Excavating, Backfilling, and Compacting
02260 Planting Soils
02263 Firestone EDM Membrane
Firestone Pondgard Limited Lifetime Warranty
02265 Finish Grading
02276 Silt Fence
02400 Storm Drainage Utility Piping
02603 Water Distribution Piping
02751 Site Concrete
02810 Irrigation
02830 Retaining Walls & Pond Walls
02935 Sodding
02950 Trees, Shrubs, and Groundcover

Division 3 - Concrete
03350 Concrete Finishing

Division 4 – Masonry
04400 Stonework
044313 Anchored Stone Masonry Veneer

Division 5 - Metals
NOT USED

TABLE OF CONTENTS

Division 6 – Wood and Plastics
NOT USED

Division 7 – Thermal and Moisture Control
07900 Joint Sealants

Division 8 – Doors and Windows
NOT USED

Division 9 – Finishes
NOT USED

Division 10 - Specialties
NOT USED

Division 11 - Equipment
NOT USED

Division 12 - Furnishings
NOT USED

Division 13 – Special Construction
NOT USED

Division 14 – Conveying Systems
NOT USED

Division 15 – Mechanical
NOT USED

Division 16 – Electrical
16050 General Electrical Provisions
16110 Raceway Systems
16120 Wires and Cables
16140 Wiring Devices
16400 Service and Distribution

SECTION 01100
SUMMARY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: **Woodward Park Improvements**. Work consists of Creek and pond renovation, slope stabilization with retaining walls, above and below ground drainage, rockwork, storm pipe reconstruction, sidewalks, landscape and irrigation. Reference drawings and specifications for detailed scope of work.
   1. Project Location: **Woodward Park – 2435 S. Peoria Avenue Tulsa, OK 74114**
   2. Owner: **City of Tulsa**
   3. Owner's Representative: **LandPlan Consultants, Inc.**

B. Landscape Architect Identification: The Contract Documents were prepared for Project by LandPlan Consultants Inc., 1110 West 23rd Street Tulsa, OK 74107 (Phone) 918.584.6464

1.3 CONTRACT

A. Project will be constructed under a general construction contract.

1.4 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC "MasterFormat" numbering system.
   1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
   2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
      a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.5 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01140
WORK RESTRICTIONS

PART 1 – GENERAL

1.1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 USE OF PREMISES

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
   1. Owner Occupancy: Allow for Owner occupancy of site and use by the public.
   2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01152
APPLICATIONS FOR PAYMENT

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work included: Comply with procedures described in this Section and the General Conditions when applying for progress payment and final payment under the Contract.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
2. The Contract sum and the schedule for payments are described in the Form of Agreement.
3. Payments upon substantial completion and completion of the Work are described in the General Conditions and in Section 01700 Contract Closeout of these Specifications.

4. The Owner's Representative's approval of applications for progress payment and final payment may be contingent upon the Owner's Representative's approval of status of Project Record Documents as described in Section 01720 Project Record Documents, of these Specifications.

5. Schedule of Values - Section 01370.

6. Final Payment check list.

1.02 QUALITY ASSURANCE

A. Prior to start of construction, secure the Owner's Representative's approval of the schedule of values required to be submitted.

B. During progress of the work, modify the schedule of values as approved by the Owner's Representative to reflect changes in the contract sum due to change orders or other modifications of the Contract.

C. Base requests for payment on the approved schedule of values.

1.03 SUBMITTALS

A. Formal submittal: Unless otherwise directed by the Owner's Representative:

1. Make formal submittal of request for payment by filling in the agreed data, by typewriter or neat lettering in ink, on AIA Document G702, "Application and Certificate for Payment", plus continuation sheet or sheets, or other form as approved by Owner.

2. Sign and notarize the Application and Certificate for Payment and City of Tulsa's "Affidavit of Claimant".

3. Submit the original of the Application and Certificate of Payment plus two (2) identical copies of the continuation sheet or sheets to the Owner.
4. Owner will, upon approval, disburse directly to the Contractor. Normal billings to the City are approved within 30 calendar days.

B. First Payment Request Check list:

1. The following documents or tasks are required to be approved prior to the first payment.
2. If the contract is anticipated to have only one payment, these items or tasks should be completed prior to any work activity.

Item	Reference
Construction Schedule	Section 01310
Submittal Log	Section 01340
Substitutions Request (30 days)	Section 01350
Schedule of Values	Section 01370
Construction Photographs	Section 01380
Project Sign Installation	Section 01500
Pre-Construction Photo or Video	Section 01510
Site Protection Installation	Section 01510

C. Final Payment Request Check List:

1. The following documents or tasks are required to be approved prior to Final Payment.

Item	Reference
City of Tulsa Affidavit for Payment	TUL-373-G
Application marked "Final"	Project Manual
Consent of Surety to Final Payment	Project Manual
Affidavit of Payment of Debts & Claims. (Subcontract & General Contract)	Project Manual
Affidavit of Release of Liens	Project Manual
Owner's Representative	Project Manual
MFBE Actual Usage	Project Manual
Record Documents	Section 01720
Operation & Maintenance Data	Section 01730

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION

SECTION 01153
CHANGE ORDER PROCEDURES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work included: Make such changes in the work, in the contract sum, in the contract time of completion or any combination thereof as are described in written Change Orders signed by the Owner and the Owner's Representative and issued after execution of the Contract, in accordance with the provisions of this Section.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such measures as are needed to assure familiarity of the Contractor's staff and employees with these procedures for processing Change Order data.

1.03 SUBMITTALS

A. Make submittals directly to the Architect at the address indicated in Section 01100, Summary and send City of Tulsa - Field Engineering transmittal notice.

B. Submit the number of copies called for under the various items listed in this Section.

1.04 PRODUCT HANDLING

A. Maintain a "Register of Field Orders and Change Orders" at the job site, accurately reflecting current status of all pertinent data.

B. Make the Register available to the Owner and his Representative for review at his request.

1.05 PROCESSING CHANGES INITIATED BY THE OWNER

A. Should the Owner contemplate making a change in the work or a change in the contract time of completion the work, or a change in the contract time of completion, the Owner will issue a "Request for Proposal (RFP)" to the Contractor.
   1. RFP’s will be dated and will be numbered in sequence.
   2. The RFP will describe the contemplated change and will carry one of the following instructions to the Contractor:
      a. Make the described change in the work at no change in the contract sum and no change in the contract time of completion;
      b. Promptly advise the Owner as to credit or cost proposed for the described change. This is not an authorization to proceed with the change.

B. If the Contractor has been directed by the Owner to promptly advise him as to credit or cost proposed for the described change, the Contractor shall:

   1. Analyze the described change and its impact on costs and time;

2. Secure the required information and forward it to the Owner for review;
3. Meet with Owner as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective;
4. Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Owner in writing when such avoidance no longer is practicable.

1.06 PROCESSING CHANGES INITIATED BY THE CONTRACTOR

A. Should the Contractor discover a discrepancy among the Contract Documents, a concealed condition or other cause for suggesting a change in the work, a change in the contract sum or a change in the contract time of completion, he shall notify the Owner as required by pertinent provisions of the Contract Documents.

1.07 PROCESSING CHANGE ORDERS AND PERFORMING INCLUDED IN CHANGE ORDERS

A. Change Orders will be dated and will be numbered in sequence.

B. The Change Order will describe the change or changes, will refer to the Request(s) for Proposal involved and will be prepared by the Owner.

C. Should the Contractor disagree with the stipulated change in contract sum or change in contract time of completion, or both:
1. The Contractor shall issue a letter signed by the Contractor and stating the reason or reasons for the Contractor's disagreement.
2. The Contractor's disagreement with the Change Order shall not in any way relieve the Contractor of his responsibility to proceed with the change as ordered and to seek settlement of the dispute under pertinent provisions of the Contract Documents.

D. No work associated with a Change Order is to be performed prior to receipt of a signed and approved Change Order from the Owner. Any Change Order work performed by the Contractor without a signed and approved Change Order will be at the Contractor’s expense.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work included: To enable orderly review during progress of the work and to provide for systematic discussion of issues, the Owner will conduct project meetings throughout the construction period. The Contractor shall be present at such meetings.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   2. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are not the Owner's Representative responsibility and normally are not part of project meetings content.

1.02 QUALITY ASSURANCE

A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

B. The Owner shall be notified of all such meetings one week in advance.

1.03 SUBMITTALS

A. Agenda items: To the maximum extent practicable, advise the Owner's Representative at least 24 hours in advance of project meetings regarding items to be added to the agenda.

B. Job notes:
   1. The Owner will compile job notes of each project meeting and will furnish copies to the Contractor and to the Owner.
   2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 - PRODUCTS (Not used.)

PART 3 - EXECUTION

3.01 MEETING SCHEDULE

A. Except as noted below for Pre-construction Meeting, project meetings will be held semimonthly.

B. Coordinate as necessary with the Owner and Owner’s Representatives to establish mutually acceptable schedule for meetings.

3.02 MEETING LOCATION

A. The Owner will establish meeting location.

3.03 PRE-CONSTRUCTION MEETING

A. A Pre-construction meeting will be scheduled prior to work commencing.
   1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
   2. The Owner will advise other interested parties, including the Owner's Representative, and request their attendance.

B. Minimum agenda: Data will be distributed and discussed on at least the following items.
   1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers and Owner's Representative.
   2. Channels and procedures for communication.
   3. Construction schedule, including sequence of critical work and closing of any facilities.
   4. Contract documents, including distribution of required copies of original documents and revisions.
   5. Human Rights discussion of hiring practices.
   6. Processing of shop drawings and other data submitted to Owner's Representative for review.
   7. Rules and regulations governing performance of the work.
   8. Procedures for safety and first aid, security, quality control, housekeeping and related matters.
   9. Location of underground utilities.
   10. Notification procedures for adjacent property owners.

3.04 PROJECT MEETINGS

A. Attendance:
   1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the work.

   2. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the work is involved.

B. Minimum agenda:
   1. Review, revise and approve job notes of previous meetings.
   2. Review progress of the work since last meeting, including status of submittals for approval.
   3. Identify problems which impede planned progress.
   4. Develop corrective measures and procedures to regain planned schedule.
   5. Identify issues that may impact the Contract amount.
   6. Review progress: look ahead for next two (2) weeks and next thirty (30) days.
   7. Complete other current business.

C. Revisions to job notes:
   1. Unless published job notes are in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
   2. Persons questioning published job notes shall reproduce and distribute copies of the question to all indicated recipients of the particular set of job notes.
   3. Questions to job notes shall be settled as priority portion of "old business" at the next regularly scheduled meeting

END OF SECTION

SECTION 01260
ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Refer to bid proposal form for additional information.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Allowances.

1.3 WORK COVERED BY ALLOWANCES

A. An Allowance as listed on the Bid Proposal Form has been provided in the contract for unforeseen conditions.

B. The Allowance shall be used for the cost of materials, labor, installation, and overhead and profit for additional work required or requested by the Owner, that is not identified in the Construction Documents, and not included in the Base Bid.

C. The Allowance shall be used only at the discretion of the City of Tulsa.

D. The Contractor shall provide, to the City of Tulsa Representative, a written request for the use of the allowances, with a schedule of values, and associated backup information.

E. The Contractor shall proceed with Work included in the allowances only after receiving a written order, from the City of Tulsa Representative, authorizing such work. Proceeding with Work in the allowance without a written order from the City of Tulsa Representative will be at the Contractor's cost.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01270
UNIT COSTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
B. Refer to bid proposal form for additional information.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for unit costs.

1.2 DEFINITIONS

A. Unit cost is an amount proposed by bidders, stated on the Bid Proposal Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit costs include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to Bid Proposal Form for description of Work that requires establishment of unit costs. Methods of measurement and payment for unit costs are specified on the Bid Proposal Form.

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

D. List of Unit Costs: A list of unit costs is included on the Bid Proposal. Specification Sections included in the Project Manual contain requirements for materials and systems described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT COSTS

A. Refer to Bid Proposal Form.

END OF SECTION

SECTION 01310
CONSTRUCTION SCHEDULE, TIME OF COMPLETION AND LIQUIDATED DAMAGES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: To assure adequate planning and execution of the work so that the work is completed within the number of calendar days allowed in the Contract and to assist the Owner's Representative in appraising the reasonableness of the proposed schedule in evaluating progress of the work and assessing liquidated damages for breach of contract. Prepare and maintain the schedules and reports described in this Section.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   2. Construction period: Form of Agreement.

1.02 QUALITY ASSURANCE

A. Time for completion: The work shall be commenced within ten (10) calendar days from the date of the Notice to Proceed from the City. The Contractor agrees that the work shall be prosecuted regularly, diligently and uninterruptedly at a uniform rate of progress so as to ensure completion within the contracted calendar days as stated in the Bid Proposal. It is expressly understood and agreed that the said time for completion of the work described herein is a reasonable time for the completion of same. If the Contractor fails to substantially complete the work of the contract as indicated within the time specified, then the Contractor agrees to pay to the City, not as a penalty, but as liquidated damages for such breach of contract, the sum as noted in the General Conditions for each and every calendar day of failure to complete the work after the specified time set forth in the Bid Proposal. The said amount is fixed and agreed upon because of the impracticality and extreme difficulty of fixing and ascertaining the actual damages the City would in such event sustain. A Certificate of Substantial Completion must be executed by the Owner's Representative and Contractor stating the contract status. At Substantial Completion, a project must be available for Owner's intended purpose.

B. Perform data preparation, analysis, charting and updating in accordance with standards approved by the Owner's Representative.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Preliminary analysis: Within ten calendar days after the Contractor has received the notice for execution of Contract, submit one reproducible copy and four prints of a preliminary construction schedule prepared in accordance with Part 3 of this Section.

C. Construction schedule: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit one reproducible copy and four prints of a construction schedule prepared in accordance with Part 3 of this Section.

D. Periodic reports: On the first working day of each month following the submittal described in Paragraph 1.03 C. above, submit four prints of the construction schedule updated as described in Part 3 of this Section.

PART 2 - PRODUCTS

2.01 CONSTRUCTION ANALYSIS

A. Graphically show by bar-chart the order and interdependence of all activities necessary to complete the work and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram. Clearly document the critical path for the Project.

B. Include, but do not necessarily limit indicated activities to:
   1. Project mobilization.
   2. Submittal and approval of Shop Drawings and Samples.
   3. Procurement of equipment and critical materials.
   4. Fabrication of special material and equipment, and its installation and testing.
   5. Final cleanup.
   6. Final inspecting and testing.
   7. All activities by the Owner's Representative that effect progress, required dates for completion, or both, for all and each part of the work.

PART 3 - EXECUTION

3.01 PRELIMINARY ANALYSIS

A. Contents:
   1. Show all activities of the Contractor under this work for the period between receipt of Notice to Proceed and submittal of construction schedule required under Paragraph 1.03 C. above.
   2. Show the Contractor's general approach to remainder of the work.

B. Submit in accordance with Paragraph 1.03 B. above.

3.02 CONSTRUCTION SCHEDULE

A. As soon as practicable after receipt of Notice to Proceed, complete the construction analysis in preliminary form, meet with the Owner's Representative, review contents of the proposed construction schedule and make all revisions agreed upon.

B. Submit in accordance with Paragraph 1.03 C. above.

3.03 PERIODIC REPORTS

A. As required under Paragraph 1.03 D. above, update the approved construction schedule.
   1. Indicate "actual" progress in percent completion for each activity.
   2. Provide written narrative summary of revisions causing delay in the program and an explanation of corrective actions taken or proposed.

3.04 REVISIONS

A. Make only those revisions to approved construction schedule as are approved in advance by the Owner.

END OF SECTION

SECTION 01340
SUBMITTALS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Procedures:
   1. Wherever possible throughout the Contract Documents the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog number, reference to recognized industry and government standards, or description of required attributes and performance.
   2. To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for their review by the Owner's Representative and Owner.
   3. Make all submittals required by the Contract Documents and revise and resubmit as necessary to establish compliance with the specified requirements.

B. Construction progress schedules.

C. Schedule of values.

D. Shop drawings, product data and samples.

E. Manufacturer's instructions and certificates.

F. Submittal log.

1.02 RELATED REQUIREMENTS

A. Individual requirements for submittals are described in pertinent sections of these Specifications.

B. Related work:
Section 01350: Substitutions.
Section 01410: Testing Laboratory Services.
Section 01700: Contract Closeout.

1.03 QUALITY ASSURANCE/CONTRACTOR RESPONSIBILITIES

A. Coordination of submittals: Before each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item, and the submittal for it, conforms in all respects with the requirements of the Contract Documents. Coordinate with other trades as required. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.

B. Grouping of submittals: Unless otherwise specified, make all submittals in groups containing all associated items to ensure that information is available for checking each item when it is received. Partial submittals may be rejected as not complying with the provisions of the Contract Documents and the Contractor shall be strictly liable for all delays so occasioned.

C. Timing: Make all submittals far enough in advance of scheduled dates for installation to provide all time required for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing deliveries.

D. Notify Owner's Representative in writing with submittal of any deviations in submittals from Contract Document requirements.

E. Do no fabrication or work which requires submittals until accepted by the Owner's Representative.

1.04 SUBMITTAL SCHEDULE

A. Compile a complete and comprehensive schedule of all submittals anticipated to be made during progress of the work. Include a list of each type of item for which Contractor's drawings, shop drawings, certificates of compliance, material samples, guarantees or other types of submittals are required. Adhere to the schedule except when specifically, otherwise permitted. Submittal log is for Owner's Representative and Owner to track review.

B. Coordinate the schedule with all necessary subcontractors and materials suppliers to ensure their ability to adhere. Coordinate as required to ensure the grouping of submittals.

C. Revise and update the schedule on a monthly basis to reflect conditions and sequences. Promptly submit revised schedules to Owner's Representative for review and comment.

1.05 SCHEDULE OF VALUES

A. Refer to Section 01370: Schedule of Values.

1.06 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop Drawings:
   1. Present in clear and thorough manner, with details referenced to sheet, detail, schedule or room numbers shown on Contract Drawings. Provide quantity directed by Owner's Representative.

B. Product Data:
   1. Preparation: Clearly mark each copy to identify pertinent products or models. Show performance characteristics and capacities, dimensions and clearances required, and wiring or piping diagrams and controls.
   2. Modify manufacturer's standard drawings, diagrams and literature to delete information not applicable to work and supplement information specifically applicable to the work.

C. Samples:
   1. Office samples: Provide in quantity and size directed, complete with integrally related parts and attachment devices and illustrating functional characteristics of product and full range of color, texture and pattern.
   2. Field samples/mock-ups: Erect at project site at location acceptable to Owner's Representative in size or area specified in other specification sections. Fabricate to be complete and finished. Remove at conclusion of work or when directed.

D. Make submittals promptly and in such sequence as to cause no delay in work.

E. Submission Requirements:
   1. Quantity required:
      a. Shop drawings: One (1) unfolded reproducible transparency and seven (7) opaque reproductions.
      b. Submit seven (7) index brochures of mechanical and electrical submittals

(manufacturer's literature and drawings) for final approval and distribution.

c. Product data: Submit seven (7) copies each. Complete catalogs will not be acceptable. Manufacturer's regular catalog sheets will be acceptable if they indicate completely all specification requirements. When manufacturer's catalog sheets are submitted, material not directly connected with subject shall be completely lined out. Where drawings cover several sizes or types of construction they shall clearly indicate size or type of construction to be used including a schedule identifying each piece of equipment. Sheets of submittals containing more than five different items of equipment shall be assembled in an index brochure.

2. Submittal contents:
   a. Submission date and dates of any previous submissions.
   b. Project title and number.
   c. Names of Contractor, supplier and manufacturer.
   d. Identification of product, with specification section number.
   e. Field dimensions, clearly identified as such.
   f. Applicable standards, such as ASTM, Federal Spec numbers, etc.
   g. Relation to adjacent or critical features of work or materials.
   h. Identification of deviations from Contract Documents.
   i. Identification of revisions on resubmittals.
   j. Contractor certification of submittal review, to include product verification, field measurements, quantities, coordination with adjacent equipment structural members, or architectural features, and coordination of information within submittal with requirements of work and Contract Documents. Certification may be by stamp of approval or a letter of transmittal containing a statement to the effect that they have been reviewed. Uncertified submittals will be rejected.

F. Resubmission Requirements:
   1. Make corrections or changes required by Owner's Representative and resubmit until accepted.
   2. Shop drawings and product data: Revise and resubmit as specified for initial submittal; indicate any changes which have been made other than those requested by Owner's Representative.
   3. Samples: Submit new samples as required for initial submittal.
   4. Resubmission of structural shop drawings and product data: Resubmit finalized drawings and product data. File copy to Owner's Representative and Owner; field copy to field office. Resubmit all subsequent changes with changes and dates noted.

G. Distribution:
   1. Distribute reproductions of shop drawings and product data which carry Owner's Representative and Owner's stamp of approval to job site and record documents file, other affected contractors, subcontractors and supplier or fabricator.
   2. Distribute samples with Owner's Representative and Owner's stamp of approval as directed by Owner's Representative.

1.07 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Submit in accordance with Section 01350: Substitutions.

1.08 MANUFACTURER'S CERTIFICATES

A. Submit certificates in accordance with requirements of each specification section.

1.09 PROJECT RECORD DOCUMENTS

A. Submit in accordance with Section 01720 Project Record Documents.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 GENERAL PROCEDURES

A. Deliver submittals to Owner's Representative.

B. Transmit each item under Contractor's Standard Letter of Transmittal. Identify project, contractor, subcontractor, major supplier, pertinent drawing sheet and detail number and specification section number as appropriate. Identify deviations from Contract Documents.

C. Submit initial progress and submittal schedules within ten (10) days after execution of Contract and schedule of values prior to the first application for payment. Update with each Application for Payment reflecting changes since previous submittal.

D. Comply with progress schedule for submittals related to work progress.

E. After Owner's Representation and Owner's review of submittal, revise and resubmit as required, identifying changes made since previous submittal.

F. Distribute copies of review submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

3.02 OWNER'S REPRESENTATIVE REVIEW

A. Owner's Representative duties:
   1. Review submittals with reasonable promptness.
   2. Affix stamp and initials or signature and indicate resubmittal requirements or approval of submittal.
   3. Submit to Owner for approval.
   4. Return submittals to Contractor for distribution or for resubmission.

B. Fourteen calendar days shall be allotted to the Owner’s Representative for review unless coordination with other submittals is required. Review by the Owner's Representative shall not be construed as a complete check, but only that the general method of construction and detailing is satisfactory. Review shall not relieve the Contractor from responsibility for errors which may exist.

C. Authority to Proceed: The notations "Approved" or "Approved as Corrected" authorizes the Contractor to proceed with fabrication, purchase, or both, of the items so noted, subject to the revisions, required by the Owner's Representative review comments.

D. Revisions: Make only those revisions directed or approved by the Owner's Representative and Owner.

E. Revisions after approval: When a submittal has been reviewed by the Owner, resubmittal for substitution of materials or equipment will not be considered unless accompanied by an acceptable explanation as to why the substitution is necessary.

END OF SECTION

SECTION 01350
SUBSTITUTIONS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Product options and substitutions.

1.02 QUALITY ASSURANCE

A. To the greatest extent possible, provide products, materials and equipment of a singular generic kind and from a single source.

B. Where more than one choice is available as options for Contractor's selection of a product or material, select an option which is compatible with other products and materials already selected. Total compatibility among options is not assured by limitations within contract documents, but must be provided by Contractor. Compatibility is a basic general requirement of product/material selection.

1.03 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Requirements Included:
   1. The Contract is based on the standards of quality established in the Contract Documents.
   2. All products proposed for use, including those specified by required attributes and performance, shall require approval by the Owner's Representative before being incorporated into the work.
   3. Do not substitute materials, equipment or methods unless substitution has been specifically approved for this work by the Owner's Representative and Owner.

B. Products List:
   1. At the time of execution of the Contract, submit to the Owner's Representative five copies of complete list of major products which are proposed for installation and require submittals.
   2. Tabulate products by specification section number and title.

C. Contractor's Options:
   1. For products specified only by reference standard, select product meeting that standard by any manufacturer.
   2. For products specified by naming several products or manufacturers, select any one of products and manufacturers named which complies with specifications.
   3. For products specified by naming one or more products or manufacturers and stating "or equal", "or equal as approved by the Owner's Representative" or "approved substitute", etc., in the Contract Documents do not assume that materials, equipment, or methods will be approved as equal unless the item has been specifically approved for this work by the Owner's Representative and Owner. Submit a request for substitutions for any product or manufacturer which is not specifically named. The decision of the Owner's Representative and Owner shall be final.

D. Substitutions:
   1. Within a period prior to 10 calendar days before the bids are due, the Owner's Representative will review considerations for substitutions. Within the 10 calendar day window before the bids are due, no substitution requests will be accepted. After the end of that period, requests will be considered only in case

of product unavailability or other conditions beyond the control of Contractor.

2. Submit separate request for each substitution on form provided by the Owner.
3. The Contractor shall support each request with;
   a. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents, product identification, including manufacturer's name and address, manufacturer's literature, product description, reference standards, performance and test data, samples as applicable, name and address of similar projects on which product has been used, and date of each installation.
   b. Itemized comparison of the propose substitution with product specified; list significant variations.
   c. Data relating to changes in construction schedule.
   d. Any effect of substitution on separate contracts.
   e. List of changes required in other work or products.
   f. Accurate cost data comparing proposed substitution with product specified.
   g. Amount of net change to Contract Sum.
   h. Designation of availability of maintenance services, sources of replacement materials.
4. Substitutions will not be considered for acceptance when:
   a. They are indicated or implied on shop drawings or product data submittals without a formal request from Contractor.
   b. They are requested directly by a subcontractor or supplier.
   c. Acceptance will require substantial revision of Contract Documents.
5. Substitute products shall not be ordered or installed without written acceptance of Owner's Representative and Owner.
6. Owner's Representative will recommend acceptability of proposed substitutions.
7. Contractor shall bear any additional cost due to the substitution and shall be responsible for the coordination of any work affected by said substitution.

E. Owner's Representative Duties:
   1. Review Contractor's requests for substitutions with reasonable promptness.
   2. Recommend to Owner acceptance or rejection of request.
   3. Notify Contractor, in writing, of decision to accept or reject requested substitution.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION

SECTION 01370
SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the work as specified herein and in other provisions of the Contract Documents.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   2. Schedule of values is required to be compatible with the "Continuation Sheet" accompanying applications for payment as described in Section 01152.

1.02 QUALITY ASSURANCE

A. Use required means to assure arithmetical accuracy of the sums described.

B. When so required by the Owner's Representative provide copies of the subcontracts or other data acceptable to the Owner's Representative substantiating the sums described.

1.03 SUBMITTALS

A. Prior to first application for payment, submit a proposed schedule of values to the Owner and Owner's Representative for coordination and approval.
   1. The following should appear as a line item where applicable:
      a. Work shall be broken down by site when multiple sites are involved.
      b. Description of work shall include, but not limited to, the following as applicable:
         (1) Bonds and Insurance.
         (2) General Conditions (Layout, temporary facilities, mobilization).
         (3) Site Preparation.
         (4) Demolition.
         (5) Erosion Control
         (6) Site Grading.
         (7) Restroom.
         (8) Concrete: All paving surfacing.
         (9) Playground Equipment.
         (10) Playground Surfacing.
         (11) Splash Pad.
         (12) Pump Track.
         (13) Site Furnishings.
         (14) Sodding.
      2. Meet with Owner's Representative and determine additional data, if any, required to be submitted
      3. Secure the Owner’s and Owner's Representative's approval of the schedule of values prior to submitting first application for payment.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION

SECTION 01380
CONSTRUCTION PHOTOGRAPHY

PART 1 - GENERAL

1.01 DISTRIBUTION

A. Work included: Provide photographs taken at the specified stages during construction.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limit to, General Conditions, Supplementary Conditions and Sections in division 1 of these Specifications.
   2. Section 01510: Site Access.

1.02 QUALITY ASSURANCE

A. Digital camera or equal.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

PART 2 - PRODUCTS

2.01 CONSTRUCTION PHOTOGRAPHS

A. Provide JPEG formatted pictures in hard copy and on CD ROM media:
   1. A minimum of 12 views per site per month during construction.

B. Provide the following on each picture:
   1. Job name.
   2. Location from which photographed.
   3. Date of photograph.
   4. Photographer's name, address and photograph number.

C. Retain the file for at least two years following date of substantial completion, and provide additional pictures to the Owner during that period at the prevailing commercial rates for such prints.

D. Do not permit pictures to be issued for any other purpose without specific written approval from the Owner.

PART 3 - EXECUTION

3.01 CONSTRUCTION PHOTOGRAPHY

A. Except as otherwise specifically approved by the Owner's Representative make the pictures within two calendar days of the date of the Contractor's application for progress payment.
   1. To the maximum extent practicable, make pictures at approximately the same time of day throughout progress of the work.
   2. When inclement weather is anticipated, consult with the Owner's Representative and determine acceptable alternative arrangements.

B. Except as otherwise specifically approved by the Owner's Representative, take the

pictures from three separate locations around the work.

1. Select the locations to provide diversified overall views of the work from positions which are expected to remain accessible throughout progress of the work.
2. Identify each location by word description, by marked drawing, or by such other means as acceptable the Owner's Representative to enable future pictures to be taken from the same position.
3. When so directed by the Owner's Representative because of the stage of construction, change one or more of the locations to new locations inside or outside the buildings the Owner's Representative directs.

C. Make each picture clear, in focus, with high resolution and sharpness, and with minimum distortion.

D. Submit photographs monthly with Application for Payment.

END OF SECTION

SECTION 01410
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 SELECTION AND PAYMENT

A. Owner shall employ and pay for the services of an independent engineering and testing laboratory to perform specified services and testing.

1.02 EXTENT OF LABORATORY TESTS AND INSPECTIONS

A. Inspections, engineering and testing required by law, ordinance, rules, regulations, orders or approvals required by public authorities having jurisdiction at project site.

B. Inspections and testing required in various sections of specifications.

C. Additional inspections and testing requested by Owner.

1.03 LABORATORY DUTIES AND TEST METHODS

A. Cooperate with Owner and Contractor to provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction.
   1. Comply with latest standards of ASTM and other recognized authorities, and pertinent sections of specifications.
   2. Ascertain compliance with requirements of contract documents.

C. Promptly notify Owner's Representative and Contractor of irregularities or deficiencies of work or products being tested.

D. Promptly submit written report of each test and inspection with one copy each to the Owner, contractor and project record documents file. Each report shall include:
   1. Date issued.
   2. Project title and number.
   3. Testing laboratory name, address and telephone number.
   4. Name and signature of laboratory inspector.
   5. Date and type of inspection or test.
   6. Results of tests or inspections and compliance with contract documents.
   7. Interpretation of tests or inspection results when requested by Owner's Representative.

E. Laboratory is not authorized to:
   1. Release, revoke, alter or enlarge on requirements of contract documents.
   2. Approve or accept any portion of the work.
   3. Perform any duties of the Contractor.

1.04 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory and:
   1. Make available, without cost, samples of all materials to be used and which require testing.
   2. Furnish such nominal labor and sheltered working space as is necessary to obtain samples at project.
   3. Advise laboratory of identity of materials sources and instruct suppliers to allow

tests or inspections.

4. Notify laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel.
5. Notify laboratory sufficiently in advance of cancellation of required testing operations. Contractor shall be responsible to laboratory for changes due to failure to notify if requirements for testing are canceled.

B. Furnish copies of product test reports as required.

C. Contractor shall be responsible for the subsequent testing costs following a failed test for any material.

PART 2 – PRODUCTS (Not Used)

PART 2 – EXECUTION (Not Used)

END OF SECTION

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work included: Provide temporary facilities and controls needed for the work including, but not necessarily limited to:
   1. Temporary utilities such as heat, water, electricity and telephone;
   2. Field office for Contractor's personnel;
   3. Sanitary facilities;
   4. Enclosures such as tarpaulins, barricades and canopies;
   5. Temporary fencing of the construction site;
   6. Project sign.
   7. Tree Fencing, per Section 02100 – Site Preparation.
   8. Construction entrance.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   2. Except that equipment furnished by Subcontractors shall comply with requirements pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the work are not part of this Section.
   3. Permanent installation and hookup of the various utility lines are described in other Sections of these Specifications.

1.02 PRODUCT HANDLING

A. Maintain temporary facilities and controls in proper and safe condition throughout progress of the work.

PART 2 - PRODUCTS

2.01 UTILITIES

A. Water:
   1. Use existing water service on site, as available. Owner will pay utility costs if existing service is utilized. Take all reasonable measures to conserve usage.
   2. Provide necessary temporary piping and water supply and, upon completion of the work, remove such temporary facilities.

B. Electricity:
   1. Use existing electrical service on site, as available. Owner will pay utility costs if existing service is utilized. Take all reasonable measures to conserve usage. Provide necessary temporary wiring and, upon completion of the work, remove such temporary facility.
   2. Provide area distribution boxes so located that the individual trades may furnish and use 100 ft. maximum length extension cords to obtain power and lighting at points where needed for work, inspection and safety.

C. Telephone:
   1. Contractor shall provide a dedicated telephone and facsimile service at the field office.

2.02 FIELD OFFICES AND SHEDS

A. Contractor's facilities:
   1. Provide a single field office building and sheds adequate in size and accommodation for Contractor's offices, supply and storage. Locate field office at location to be determined by Owner.

B. Sanitary facilities:
   1. Provide temporary sanitary facilities in the quantity required for use by all personnel.
   2. Maintain in a sanitary condition at all times.

2.03 ENCLOSURES

A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges and other temporary construction necessary for proper completion of the work in compliance with pertinent safety and other regulations.

2.04 TEMPORARY FENCING

A. Provide and maintain for the duration of construction a temporary chain link fence barricade to prevent entry onto the work by the public.

2.05 PROJECT SIGNS

A. Prior to start of construction, furnish and install one standard City of Tulsa project sign as required by city standards. Mount at the job site were directed by the Owner's Representative.

B. Upon completion of the work, demount signs.

C. Except as otherwise specifically approved by the Owner's Representative, do not permit other signs or advertising on the job site. Backs of signs may be utilized for permits and other notices as may be required on site.

PART 3 - EXECUTION

3.01 MAINTENANCE AND REMOVAL

A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the work.

B. Remove such temporary facilities and controls as rapidly as progress of the work will permit, or as directed by the Owner's Representative.

END OF SECTION

SECTION 01510
SITE ACCESS

PART 1 - GENERAL

1.01 REQUIREMENTS

A. Work included: this information applies to situations in which a Contractor or his representatives including, but not limited to, suppliers, subcontractors, employees and field engineers enter upon City of Tulsa property.

1.02 QUALITY ASSURANCE

A. Upon approval by Owner for access, notify all pertinent personnel regarding requirements of this information.

B. Require that all personnel who will enter upon City property certify their awareness of and familiarity with the requirements of the Owner.

C. Tree protection in accordance with Section 02100.

1.03 SUBMITTALS

A. Pre-construction pictures in accordance with Paragraph 1.07.

1.04 TRANSPORTATION FACILITIES

A. Truck and equipment access:
   1. Limit the access of trucks and equipment to the route shown on the drawings as "Access Route" or pre-determined route identified by Owner.
   2. Provide protection for curbs, sidewalks, roads, parking, utilities and amenities over which trucks and equipment pass to reach work areas.

B. Contractor's vehicles:
   1. Limit the access of vehicles belonging to employees and all other vehicles entering upon City property to use only the access route.
   2. Do not permit vehicles to park on any other area of City property except in the areas so designated as parking areas.

1.05 NOTIFICATION BY CONTRACTOR

A. The Contractor shall notify the Owner, in writing, two weeks in advance of any proposed construction activity on Owner's property. Said notice does not constitute authority to proceed with work in the Park. Official notice of approval will be at the discretion of the Owner.

1.06 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE

A. The Contractor shall be responsible for the preservation of all City property and shall protect carefully from disturbance or damage all said property until the City has witnessed or otherwise referenced their location and shall not move any item until directed.

B. The Contractor shall be responsible for all damage or injury to property of any character, during the prosecution of the work, resulting from any act, omission, neglect, or misconduct in his manner or method of executing the work, or at any time due to

defective work or materials.

C. The Contractor shall consult with the Owner regarding his work activities and shall install any and all barriers, warning signs, fencing, property protection, access control or other devices to the satisfaction of the Owner and needed to provide for public safety and protection of City Property.

D. When or where any direct or indirect damage or injury is done to City property by or on account of any act, omission, neglect, or misconduct in the execution of the work or in consequence of the non-execution thereof by the Contractor, he shall restore, at his own expense, such property to a condition similar or equal to that existing before such damage or injury was done by repairing, rebuilding or otherwise restoring as may be directed by the Owner or he shall make good such damage or injury in an acceptable manner to the Owner.

E. Tree protection in accordance with Section 02100.

1.07 PRE-CONSTRUCTION PICTURES OR VIDEO

A. The Contractor shall provide pictures or video of the specified work area one day prior to any work starting, but after appropriate construction staking and protection.

B. Pictures shall have the following information: Job name, location of picture, date of picture and photographer's name, address and picture number.

C. Pictures shall be from a minimum of twenty-four (24) diversified overall views of the work area and of any pertinent City property within construction limits. Additional photos may be required in unusual or extremely large sites.

D. Each picture shall be clear, in focus, with high resolution and sharpness and with minimum distortion.

1.08 CLEANING

A. Progress cleaning:
   1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, packaging and shipping material. Remove such items from premises weekly.
   2. Weekly, and more often if necessary, inspect all materials stored on site, restack, tidy, or otherwise arrange in safe condition, mow and weed trimming.

B. Final cleaning:
   1. Completely remove resultant construction debris, particularly any loose rock or stone imported or uncovered during construction.
   2. Broom clean paved areas on site.
   3. Mow grass areas as directed, which had not been under normal park maintenance.
   4. Repair any areas of turf that have been damaged by construction operations in accordance with Section 02935 Sodding.
   5. Alleviate compacted turf areas if access has been over turf, but no turf has to be placed. A coring implement with 6” O.C. minimum coverage of 3” deep should alleviate compaction. Drag cores until leveled.
   6. Often when fences are erected for protection, holes are left when fence posts are pulled. Holes should be filled with appropriate topsoil and settled with water to grade.

1.09 RECORD DOCUMENTS

A. Submit to Owner a complete record drawing in accordance with Section 01720.

1.10 FINAL APPROVAL

A. Upon the completion of all work a final inspection must be made by the Owner to determine whether the work has been completed in accordance with the contract, plans and/or specifications.

B. When the work has been so completed the Owner will provide certification of it and forward to appropriate contracting authorities.

C. Acceptance by Owner shall not restrict or prohibit the rights provided for in regard to latent defects; frauds or such gross mistakes as may amount to fraud or as regards the rights under any warranty guarantee.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION

SECTION 01640
PRODUCT HANDLING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Protect products scheduled for use in the work by means including, but not necessarily limited to, those described in this Section.

B. Related work:

1. Additional procedures also may be prescribed in other sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work materials.

1.03 MANUFACTURER'S RECOMMENDATIONS

A. Except as otherwise approved by the Owner, determine and comply with manufacturer's recommendations on product handling, storage and protection.

1.04 PACKAGING

A. Deliver products to the job site in their manufacturer's original container with labels intact and legible.

1. Maintain packaged materials with seals unbroken and labels intact until time of use.
2. Promptly remove damaged material and unsuitable items from the job site and promptly replace with material meeting the specified requirements.

B. The Owner's Representative may reject as non-complying such material and products that do not bear identification satisfactory to the Owner's Representative as to the manufacturer, grade, quality and other pertinent information.

1.05 PROTECTION

A. Protect finished surfaces through which equipment and materials are handled.

B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.

C. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.

1.06 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs to the approval of the Owner's Representative and at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the Owner to justify an extension in the contract time of completion.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Provide an orderly and efficient transfer of the completed work to the Owner.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.

1.02 QUALITY ASSURANCE

A. Prior to requesting inspection by the Owner's Representative, use adequate means to assure that the work is completed in accordance with the specified requirements and is ready for the requested inspection.

1.03 PROCEDURES

A. **SUBSTANTIAL COMPLETION**
   1. Substantial Completion is the stage in the progress of Work when the Work or designated portion thereof is sufficiently complete in general accordance with Contract Documents to Owner can occupy or utilize Work for its intended use.
   2. Work will not be considered for Substantial completion until all systems and equipment are operational; all designated or required governing agency inspections and certifications have been made and posted, including the Certificate of Occupancy; instruction of designated Owner’s personnel in operation of systems and equipment has been completed; operation and maintenance data has been satisfactorily turned over to Owner; and finishes are in place. In general, the only remaining portion of Work shall be minor in nature, such that Owner may occupy or utilize Work or designated portion thereof, and completion or correction of Work by Contractor would not materially interfere or hamper Owner’s intended business use or operation.
   3. Contractor shall certify that all remaining Work will be completed within 10 consecutive calendar days following date of identified Substantial Completion, or as agreed to in writing, and failure to do so shall automatically reinstate provisions for damages due Owner as contained elsewhere in Contract Documents, or a provided by law for such period of time as may be required by Contractor to fully complete Work whether Owner has occupied Work or not.
   4. Owner's Representative will make an inspection within seven (7) days after receipt of certification together with the Owner.
   5. Should Owner's Representative consider that work is substantially complete in accordance with the construction contract:
      a. Contractor shall prepare a punch list of items to be completed or corrected as determined by the inspection.
      b. Owner's Representative will prepare a Certificate of Substantial Completion and shall submit to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in such Certificate. The Certificate of Substantial Completion shall contain the following:
         (1) Date of Substantial Completion;
         (2) Punch list of items to be completed or corrected.

(3) The time within which Contractor shall complete or correct work of listed items.
(4) Date and time Owner will assume possession of work or designated portion thereof.

c. Contractor shall:
(1) Complete work listed for completion or correction within the designated time.
(2) Refer to Construction Contract for post substantial completion requirements.

6. Should Owner's Representative consider that work is not substantially completed:
a. He shall immediately notify Contractor in writing stating reasons.
b. Contractor: Complete work and send second written notice through Owner's Representative to Owner certifying that the project is substantially complete.
c. Owner's Representative will reinspect work.

B. **Final Completion:**
1. Contractor shall submit written certification that:
a. Contract documents have been reviewed;
b. Project has been inspected for compliance with contract documents.
c. Work has been completed in accordance with the construction contract.
d. Equipment and systems have been tested in presence of Owner and are operational.
(1) Equipment and systems shall be operated in a normal mode for a minimum period of three (3) weeks prior to final inspection.
e. Owner's personnel have been instructed in operation of all systems, mechanical, electrical and other equipment.
f. Project is completed, ready for final inspection.
2. Owner and Owner's Representative will make final inspection within seven (7) days after receipt of certification.
3. Should Owner and Owner's Representative consider that work is finally complete in accordance with contract documents, contractor shall submit final Application for Payment as set forth in the General Conditions, Paragraph GC-29.
4. Should Owner's Representative consider that work is not finally complete:
a. He shall notify contractor, in writing, stating reasons.
b. Contractor shall take immediate steps to remedy the stated deficiencies and send second written notice through Owner's Representative to Owner certifying that work is complete.
c. Owner's Representative will re-inspect work.

1.04 RETURN OF CONTRACT DOCUMENTS

A. Return of Drawings: Drawings, details, sketches and specifications are property of Owner, and are issued to contractor as instruments of service only. If required, contractor shall return same to Owner.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included:
   1. Throughout progress of the work, maintain an accurate record of changes in the Contract Documents as described in Article 3.01 below.
   2. Upon completion of the work, transfer the recorded changes to a set of Record Documents, as described in Article 3.02 below.

B. Related work:
   1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of the Specifications.
   2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Owner's Representative.

B. Accuracy of records:
   1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to show the change properly.
   2. Accuracy of records shall be such that future search for items shown in the Contract Documents may relay reasonably on information obtained from the approved Project Record Documents.

C. Make entries within 24 hours after receipt of information that the change has occurred.

D. Information shall be tied to base line control data of the Owner and so noted on the Owner's field books.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. The Owner's Representative's approval of the current status of Project Record Documents may be a prerequisite to the Owner's Representative approval of requests for progress payment and request for final payment under the Contract.

C. Prior to submitting each request for progress payment, secure the Owner's Representative's approval of the current status of the Project Record Documents.

D. Prior to submitting request for final payment, submit and secure approval for the final Project Record Documents by the Owner and Owner's Representative.

1.04 PRODUCT HANDLING

A. Maintain the job set of Record Documents completely protected from deterioration and

from loss and damage until completion of the work and transfer all recorded data to the final Project Record Documents.

B. In the event of loss of recorded data, use means necessary to again secure the data to the Owner's Representative's approval.
   1. Such means shall include, if necessary, in the opinion of the Owner's Representative, removal and replacement of concealing materials.
   2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS

2.01 RECORD DOCUMENTS

A. Job set: Promptly following receipt of the Owner Notice to Proceed, secure from the Owner's Representative at no charge to the Contractor one complete set of all Documents comprising the Contract.

PART 3 - EXECUTION

3.01 MAINTENANCE OF JOB SET

A. Immediately upon receipt of the job set described in Paragraph 2.01 above, identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET."

B. Preservation:
   1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Owner's Representative.
   2. Do not use the job set for any purpose except entry of new data and for review by the Owner's Representative until start of transfer of data to final Project Record Documents.
   3. Maintain the job set at the site of work as that site is designated by the Owner's Representative.

C. Making entries on Drawings:
   1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
   2. Date all entries.
   3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
   4. In the event of overlapping changes, use different colors for the overlapping changes.

D. Make entries in the pertinent other Documents as approved by the Owner's Representative.

E. Conversion of schematic layouts:

   1. In some cases, on the Drawings, arrangements of conduits, circuits, piping, ducts and similar items is shown schematically and is not intended to portray precise physical layout. Provide digital locations (GIS) for these items.
      a. Final physical arrangement is determined by the Contractor, subject to

the Owner's Representative's approval.

b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the Drawings.

2. Show on the job set of Record Drawings, by dimension accurate to within one inch, the centerline of each run of items such as are described in subparagraph 3.01 E. 1. above.
   a. Clearly identify the item by accurate note such as "cast iron drain", "galv. water" and the like.
   b. Show, by symbol note, the vertical location of the item ("under slab", "in ceiling plenum", "exposed" and the like).
   c. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.
3. The Owner's Representative may, subject to Owner approval, waive the requirements for conversion of schematic layouts where, in the Owner's Representative's judgment, conversion serves no useful purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Owner.

3.02 FINAL PROJECT RECORD DOCUMENTS

A. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modification of the work to proceed without lengthy and expensive site measurement, investigation and examination.

B. Approval of recorded data prior to transfer:
   1. When Substantial Completion of work has been granted, secure the Owner's Representative's approval of all recorded data.
   2. Make required revisions.

C. Review and submittal:
   1. Submit the completed set of Project Record Documents to the Owner as described in Paragraph 1.03 D. above.
   2. Participate in review meetings as required.
   3. Make required changes and promptly deliver the final Project Record Documents to the Owner's Representative.

3.03 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Contractor has no responsibility for recording changes in the work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

END OF SECTION

SECTION 01730
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: To aid the continued instruction of operating and maintenance personnel and to provide a positive source of information regarding the products incorporated into the work, furnish and deliver the data described in this Section and in pertinent other Sections of these Specifications.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   2. Required contents of submittals also may be amplified in pertinent other Sections of these Specifications.

1.02 QUALITY ASSURANCE

A. In preparing data required by this Section, use only personnel who are thoroughly trained and experienced in operation and maintenance of the described items, completely familiar with the requirements of this Section and skilled in technical writing to the extent needed for communicating the essential data.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. At 30 calendar days prior to the scheduled project completion, submit two copies of a preliminary draft of the proposed Manual or Manuals to the Owner's Representative for review and comments.

C. Unless otherwise directed in other Sections, or in writing by the Owner's Representative, submit two (2) hardcopies and one (1) digital copy on compact disk or thumb drive of the final Manual to the Owner's Representative prior to indoctrination of operation and maintenance personnel.

PART 2 - PRODUCTS

2.01 INSTRUCTION MANUALS

A. Where instruction Manuals are required to be submitted under other Sections of these Specifications prepare in accordance with the provisions of this Section.

B. Format:
   1. Size: 8-1/2" x 11".
   2. Paper: White bond, at least 20 lb. Wt.
   3. Text: Neatly written or printed.
   4. Drawings: 11' in height; bind in with text; foldout acceptable, not to exceed 11x17".
   5. Flysheets: Separate each portion of the Manual with neatly prepared flysheets briefly describing contents of the ensuing portion; flysheets may be in color.

6. Binding: Use heavy-duty plastic or fiberboard covers with binding mechanism concealed inside the Manual; 3-ring binders will be acceptable; all binding is subject to Owner's Representative's approval.
7. Measurements: Provide all measurements in U.S.standard units such as feet and inches, lbs., and cfm.

C. Provide front and back covers for each Manual, using durable material approved by the Owner's Representative and clearly identified on or through the cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS
Name and address of work
Name of Contractor
General Subject of this Manual
Owner's Representative

D. Contents: Include at least the following:
1. Neatly typewritten index near the front of the Manual.
2. For architectural products, applied materials and finishes:
   a. Manufacturer's data, giving full information on finishes:
      (1) Catalog number, size, composition.
      (2) Color and texture designations.
      (3) Information required for reordering special manufactured products.
   b. Instructions for care and maintenance:
      (1) Manufacturer's recommendations for types of cleaning agents and methods.
      (2) Cautions against cleaning agents and method which ARE detrimental to product.
      (3) Recommended schedule for cleaning and maintenance.
   c. All approved submittals.
3. For moisture protection and weather exposed products:
   a. Manufacturer's data, giving full information on products.
      (1) Applicable standards.
      (2) Chemical composition.
      (3) Details of installation.
   b. Instructions for inspection, maintenance and repair.
   c. All approved submittals.
4. For each electric and electronic system and mechanical system as appropriate:
   a. Description of system and component parts. Function, normal operating characteristics and limiting conditions. Complete nomenclature and commercial number of replaceable parts.
   b. Circuit directories of panel boards: Electrical service, controls and communications.
   c. Operating procedures: Routine and normal operating instructions, sequences required and special operating instructions.
   d. Maintenance procedures: Routine operations, guide to "trouble shooting", disassembly, repair and reassembly and adjustment and checking.
   e. Manufacturer's printed operating and maintenance instructions.
   f. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
   g. Other data as required under pertinent sections of specifications.
   h. All approved submittals.
5. Certificate of substantial completion.
6. Master list of extended warranty items.

PART 3 - EXECUTION

3.01 INSTRUCTION MANUALS

A. Preliminary:
   1. Prepare a preliminary draft of each proposed Manual.
   2. Show general arrangement, nature of contents in each portion, probable number of drawings and their size, and proposed method of binding and covering.
   3. Secure the Owner's Representative's approval prior to proceeding.

B. Final:
   1. Complete the Manuals in strict accordance with the approved preliminary drafts and the Owner's Representative's review comments.

C Revisions:
   1. Following the indoctrination and instruction of operation and maintenance personnel review all proposed revisions of the Manual with the Owner's Representative.

END OF SECTION

SECTION 01731
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:
1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
2. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   5. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION

SECTION 01732
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected portions of the project site, or external elements such as pavement, equipment, furnishings, and footings.
   2. Repair procedures for selective demolition operations.

B. Related Sections include the following:
   1. Division 1 Section "Summary" for use of the premises and phasing requirements.
   2. Division 1 Section "Work Restrictions" for restrictions on use of the premises due to Owner or tenant occupancy.
   3. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
   4. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.
   1. Owner shall have first right of refusal for items to be removed from the site, such as playground equipment, benches, picnic tables, barbeque grills, sports equipment.

   B. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 SUBMITTALS

A. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

B. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site with the Owner and Owner’s Representative to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.7 PROJECT CONDITIONS

A. Owner will occupy portions of site immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
   1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. Visit the site and verify the extent and location of selective demolition required.
   1. Carefully identify limits of selective demolition.
   2. Mark interface surfaces as required to enable workmen also to identify items to be removed and items to be left in place intact.
   3. Contractor to field verify remaining items for demolition.

D. Prepare and follow organized plan for demolition and removal of items.
   1. Shut off, cap and otherwise protect existing public and private utility lines in accordance with the requirements of the public agency or utility having jurisdiction.

2. Completely remove items scheduled to be so demolished and removed, leaving surfaces clean, solid and ready to receive new materials specified elsewhere.
3. In all activities, comply with pertinent regulations of governmental agencies having jurisdiction.

E. Owner assumes no responsibility for condition of areas to be selectively demolished.
1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

F. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

G. Storage or sale of removed items or materials on-site will not be permitted.

H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.
1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
   1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
   1. Arrange to shut off indicated utilities with utility companies. Coordinate with Owner.
   2. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
   3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   3. Protect existing site improvements, appurtenances, and landscaping to remain.

C. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.

D. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other

construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

3.4 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
   2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly.
   10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Existing Facilities: Comply with Owner’s requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.

C. Removed and Salvaged Items: Comply with the following:
   1. Clean salvaged items.
   2. Store items in a secure area until delivery to Owner.

D. Removed and Reinstalled Items: Comply with the following:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Division 1 Section "Cutting and Patching."

C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
   1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 02000
SITE WORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. These general site work requirements apply to all site work operations.

B. Related work:
Section 01510: Site Access.
Section 01732: Selective Demolition.
Section 02100: Site Preparation.
Section 02210: Site Grading.
Section 02220: Excavating, Backfilling, and Compacting.
Section 02260: Planting Soils.
Section 02265: Finish Grading.
Section 02276: Silt Fence.
Section 02400: Storm Drainage Utility Piping.
Section 02751: Site Concrete.
Section 02810: Irrigation.
Section 02935: Sodding.
Section 02950: Trees, Shrubs, and Groundcover.
Section 03350: Concrete Finishing.
Section 07900: Joint Sealants.

1.2 QUALITY ASSURANCE

A. Comply with all applicable local, state and federal requirements regarding materials, methods of work and disposal of excess and waste materials.

B. Obtain and pay for all required inspections, permits and fees. Provide notices required by governmental authorities.

1.3 PROJECT CONDITIONS

A. Locate and identify existing underground and overhead services and utilities within contract limit work areas. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations at Contractor's expense.

B. Arrange for disconnection, disconnect and seal or cap all utilities and services designated to be removed before start of site work operations, and as required for demolition work. Perform all work in accordance with the requirements of the applicable utility company or agency involved.

C. Contractor shall be responsible to locate all existing utilities. Cooperate with the applicable utility company in maintaining active services in operation. If the services are Owner maintained, notify Owner's Representative immediately.

D. Locate, protect and maintain benchmarks, monuments, control points and project engineering reference points. Re-establish disturbed or destroyed items at Contractor's expense.

E. Perform site work operations and the removal of debris and waste materials to assure minimum interference with streets, walks and other adjacent facilities.

F. Obtain governing authorities written permission when required to close or obstruct street, walks and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways when required by governing authorities.

G. Control dust caused by the work. Dampen surfaces as required. Comply with pollution control regulations of governing authorities.

H. Protect existing buildings, utilities, paving and other services or facilities on site and adjacent to the site from damage caused by site work operations. Cost of repair and restoration of damaged items at Contractor's expense.

I. Protect and maintain street lights, utility poles and services, traffic signal control boxes, curb boxes, valves and other services, except items designated for removal. Provide for temporary relocation when required to maintain facilities and services in operation during construction work.

J. The Owner will occupy the premises and adjacent facilities during the entire period of construction. Perform site work operations to minimize conflicts and to facilitate Owner's use of the premises and conduct of his normal operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine the areas and conditions under which site work is performed. Do not proceed with the work until unsatisfactory conditions are corrected.

B. Consult the records and drawings of adjacent work and of existing services and utilities that may affect site work operations.

PART 4 - Prior to beginning work, carefully document existing site conditions with photographs and / or video, per Specification 01510.

END OF SECTION

SECTION 02100
SITE PREPARATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Perform site preparation work as shown on Drawings and as specified. The work includes:
   1. Protecting existing trees to remain.
   2. Removing designated site items. Refer to Drawings for demolition work.
   3. Install safety fencing and silt fencing as needed to provide safety, protection, and erosion control.

B. Related work:
Section 01510: Site Access.
Section 01732: Selective Demolition.
Section 02000: Site Work.
Section 02210: Site Grading.
Section 02220: Excavating, Backfilling, and Compacting.
Section 02260: Planting Soils.
Section 02265: Finish Grading.
Section 02276: Silt Fence.
Section 02400: Storm Drainage Utility Piping.
Section 02751: Site Concrete.
Section 02810: Irrigation.
Section 02935: Sodding.
Section 02950: Trees, Shrubs, and Groundcover.
Section 03350: Concrete Finishing.
Section 07900: Joint Sealants.

1.2 QUALITY ASSURANCE

A. Comply with Section 02000 Site Work requirements.

B. Notify all contractor employees and subcontractors of provisions of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and equipment: As selected by the contractor except as noted.
   1. Fence shall be 4’ high green or orange (contractor’s preference) safety type, Exxon High Density Polyethylene (or approved equal).
   2. Fence posts shall be 6’ steel ‘T’ posts, 8’ on-center maximum.
   3. Where safety fence is adjacent to play areas, provide wood stakes—do not use steel ‘T’ posts.

PART 3 - EXECUTION

3.1 TREE PROTECTION

A. Do not park vehicles or store materials under the critical root zone (CRZ)

of trees. Protect existing trees scheduled to remain against injury or damage, including cutting, breaking or skinning of roots, trunks or branches; smothering by stockpiled construction materials, excavated materials or vehicular traffic within critical root zone (CRZ).

1. Provide safety fencing for trees within project work area, minimum.
2. Tree protection fence shall surround perimeter of tree at the critical root zone as defined on the drawings and the tree protection fencing detail.
3. Erect temporary fencing before commencing site preparation work. Maintain fencing during full construction period. Remove temporary fencing at conclusion of work.
4. Repair trees scheduled to remain and damaged by construction operations in a manner acceptable to the Owner's Representative. Repair damaged trees promptly to prevent progressive deterioration caused by damage.
5. Replace trees scheduled to remain and damaged beyond repair by construction operations as determined by the Owner's Representative with trees of similar size and species of equal dollar value.
6. Replacement of trees scheduled to remain and damaged by construction operations during construction operations, shall be at contractor's expense, and in accordance with Parks Department Specifications.
7. Contractor to review tree protection measures on-site with City of Tulsa and follow City requirements.

3.2 CLEARING

A. Locate and suitably identify trees and improvements indicated to remain.

B. Clear and grub areas within contract limits as required for site and execution of the work.

3.3 STRIPPING TOPSOIL

A. Strip topsoil to depths required to achieve grading shown on Drawings, within contract limit work area, for:
   1. New pavement.
   2. Landscape planting beds along slopes at ponds.

B. Stockpile topsoil in a location acceptable to the Owner's Representative for use in finish grading and preparation of lawns.
   1. Grade and slope stockpiles for proper drainage and to prevent erosion.
   2. No topsoil shall be removed from the site unless approved by Owner and Owner’s Representative.

C. Protect all areas which are not to be resurfaced or regraded and adjacent areas outside of the contract limits from damage due to site preparation work.

3.4 SITE IMPROVEMENTS

A. Existing Utilities
   1. Information on the drawings relating to existing utility lines and services is from a City of Tulsa topographic survey. DRAWINGS DO NOT SHOW LOCATIONS OF ALL UNDERGROUND UTILITIES. Contractor shall be responsible for locating all existing utilities. All such information is furnished only for information and is not guaranteed. Excavate test pits as required to determine exact locations of existing utilities.
   2. Call OKIE for utility staking not City owned.
   3. Call Owner's Representative to coordinate City maintained utility staking lines.

3.5 DISPOSAL OF WASTE MATERIALS

A. Stockpile, haul from site and legally dispose of waste materials and debris. Accumulation is not permitted. Maintain disposal routes clear, clean and free of debris. On-site burning of combustible cleared materials is not permitted.

3.6 CLEANING

A. Upon completion of site preparation work, clean area within contract limits, remove tools and equipment. Provide site clear, clean and free of materials and debris and suitable for site work operations. Regrade any damaged areas and resod per plans and specifications.

END OF SECTION

SECTION 02210
SITE GRADING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work includes: Excavate, backfill, compact and grade the site to the elevations shown on the drawings as specified herein and as needed to meet the requirements of the construction shown in the Contract Documents. Import specified materials to achieve grading / elevations per plans. Refer to Drawings and this specification section for specific materials and procedures.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these specifications.

Section 01510: Site Access.
Section 01732: Selective Demolition.
Section 02000: Site Work.
Section 02100: Site Preparation.
Section 02220: Excavating, Backfilling, and Compacting.
Section 02260: Planting Soils.
Section 02265: Finish Grading.
Section 02276: Silt Fence.
Section 02400: Storm Drainage Utility Piping.
Section 02751: Site Concrete.
Section 02810: Irrigation.
Section 02935: Sodding.
Section 02950: Trees, Shrubs, and Groundcover.
Section 03350: Concrete Finishing.
Section 07900: Joint Sealants.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.

C. Do not proceed until utility locations are identified.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. See Section 02220 – Excavating, Backfilling, and Compacting.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PROCEDURES

A. Utilities:
   1. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Owner's Representative and secure his instructions. Field verify location of all existing utilities.
   2. Perform new utility work per Drawings.

B. Protection of persons and property:
   1. Barricade open holes and depressions occurring as part of this work and post warning lights on property adjacent to or with public access.
   2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
   3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

C. Dewatering:
   1. Remove all water, including rainwater, encountered during trench and substructure work to an approved location by pumps, drains and other approved methods.
   2. Keep excavations and site construction free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.3 GRADING

A. General:
   1. Uniformly grade the areas within limits of grading under this Section including adjacent transition areas.
   2. Smooth the finished surfaces within specified tolerance.
   3. Compact with uniform levels or slopes between points where elevations are shown on the drawings or between such points and existing grades.
   4. Finish the surfaces to be free from irregular surface changes, and:
      a. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than 0.04 ft. above or below the required subgrade elevation.

3.4 COMPACTING

A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D1557.

B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place:

1. Lawn and unpaved areas:
   a. Compact the subgrade and each layer of fill material or backfill material at 85% of maximum density.
2. Site paving and playground slabs:
   a. Compact the subgrade and each layer of fill material or backfill material at 95% of maximum density (maximum laboratory dry density, in accordance with ASTM D-698).

C. Moisture control:
1. Where subgrade or layer of soil material must be moisture-conditioned before compacting uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Owner's Representative.

3.5 FIELD QUALITY CONTROL

A. Provide tests to the Owner, performed by an independent testing laboratory in accordance with Specification 01410.

B. If, in the opinion of the Owner's Representative based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing under the provisions of Section 01410 of these Specifications. Receive approval of corrective measures prior to paving operations.

3.6 MAINTENANCE

A. Protection of newly graded areas:
1. Protect newly graded areas from traffic and erosion and keep free from trash and weeds.
2. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

END OF SECTION

SECTION 02220
EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Excavate, backfill, compact and grade the site to the elevations shown on the drawings as specified herein and as needed to meet the requirements of the construction shown in the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these specifications.
2. Section 01510: Site Access.
Section 01732: Selective Demolition.
Section 02000: Site Work.
Section 02100: Site Preparation.
Section 02210: Site Grading.
Section 02260: Planting Soils
Section 02265: Finish Grading.
Section 02276: Silt Fence.
Section 02400: Storm Drainage Utility Piping.
Section 02751: Site Concrete.
Section 02810: Irrigation.
Section 02935: Sodding.
Section 02950: Trees, Shrubs, and Groundcover.
Section 03350: Concrete Finishing.
Section 07900: Joint Sealants.

1.2 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2001 (2004).

B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.

C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2007.

D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

E. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2007.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.

1.4 SUBMITTALS

A. Comply with provisions of Section 01340.

B. Materials Sources: Submit name of imported materials source.

C. Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. Transport material in accordance with Oklahoma State laws and regulations.

C. When fill/ backfill materials need to be stored on site, locate stockpiles as directed by Owner's Representative.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 - PRODUCTS

2.1 SANDY LOAM TOPSOIL

A. For general fill / grading of areas not specified for Select Fill, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life and reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 1" in greatest dimension, noxious weeds, sticks, brush, litter and other deleterious matter. The top 12" layer of topsoil in lawn areas shall have no inorganic materials larger than ½" diameter.

B. The sandy loam topsoil is to be placed in conjunction with the slab sodding or seeding in the top 12 inches of finish grade, as shown on the drawings. The topsoil shall be placed in layers of six inches or less in pre-rolled thickness. Each layer shall be rolled in accordance with the requirements of this Section.

C. The soil will be sandy topsoil meeting the following requirements:
   1. Graduation:
      Passing No. 4 (4.75 mm) sieve 100%
      Passing No. 40 (.43 mm) sieve 95-100%
      Passing No. 40 (.20 mm) sieve 60-70%
      Passing No. 100 (.15 mm) sieve 15-30%
      Passing No. 200 (.08 mm) sieve 5-20%
   2. Atterberg Limits: Using a constant head hydraulic conductivity (permeability) measurement, the infiltration rate shall not be in excess of five inches per hour (4 x 10 cm/s). The testing procedure shall consist of compacting a cylindrical laboratory sample of drained sandy loam consist of Standard Proctor density and then measuring the water infiltration rate of the sample.

D. Fill material is subject to the approval of the Owner's Representative and is that material removed from excavations or imported from off-site borrow areas, predominantly granular non-expansive soils, free from roots and other deleterious matter.

E. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.

2.2 SELECT FILL

A. Select or Stabilized Fill: Imported soil or subsoil excavated on-site having a plasticity index not greater than 15 and a liquid limit of not greater than 45.

B. Graded, containing at least 15 percent fines (materials passing the #200 sieve, based upon dry weight)

C. Free of organic matter, lumps larger than 3 inches, rocks larger than 2 inches, and debris.

D. Provide Owner’s Representative composition test reports demonstrating suitability of material.

2.3 AGGREGATE

A. Where aggregate base is called for under concrete paving, provide Type ‘A’, washed aggregate complying with requirements of this Section.

B. Crushed Aggregate Base: Course aggregate, Pit run crushed stone; free of shale, clay, friable material, dirt, vegetation, and debris. Crushed rock shall have a maximum size between 3/4 inch and 1 inch, and with a minimum size number 4.

C. Clean No. 57 Aggregate: angular drain rock; washed; free of silt, clay, loam, friable or soluble materials, dirt, vegetation, and organic matter. Tested in accordance with ASTM C131 and ASTM C535.

2.4 OTHER MATERIALS

A. Provide other materials not specifically described but required for complete and proper installation as selected by the Contractor subject to the approval of the Owner’s Representative.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Utilities: Refer to Section 2000 Site Work.

B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of the work and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

C. Dewatering:
   1. Remove all water, including rainwater, encountered during trench an substructure work to an approved location by pumps, drains and other approved methods.
   2. Keep excavations and site construction area free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.

E. Maintain access to adjacent area at all times.

3.2 EXCAVATING

A. Perform excavating of every type of material encountered within the limits of the work to the lines, grades and elevations indicated and specified herein.

B. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

C. Satisfactory excavated materials:
   1. Transport to, and place fill or embankment areas within the limits of the work.

D. Unsatisfactory excavated materials:
   1. Excavate to a distance below grade as directed by the Owner's Representative and replace with satisfactory materials.
   2. Include excavation of unsatisfactory materials and replacement by satisfactory materials as parts of the work of this Section.

E. Surplus materials:
   1. Dispose of unsatisfactory excavated materials and surplus satisfactory excavated material offsite.

F. Borrow:
   1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the work from borrow area selected and paid for by the Contractor and approved by the Owner’s Representative.

G. Ditches and gutters:
   1. Cut accurately to the cross sections, grades and elevations shown.
   2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the work.

H. Unauthorized excavation:
   1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Owner’s Representative.
   2. Under footings, foundations or retaining walls:
      a. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom without altering the required top elevation.
      b. When acceptable to the Owner’s Representative, lean concrete fill may be used to bring the bottom elevation to proper position.
   3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Owner’s Representative.

I. Stability of excavations:
   1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by the Owner's Representative.
      a. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
      b. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

J. Excavating for structures:
   1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft. and extending a sufficient distance from footings and foundations to permit placing and removing concrete form work, installation of services, other construction required and for inspection.
   2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
      a. Excavate by hand tools to final grade just before concrete is placed.
      b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
      c. Excavate for footings and foundations only after general site excavating, filling and grading are complete.

K. Cold weather protection:
   1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.3 FILLING AND BACKFILLING

A. General:
   1. For each classification listed below, place acceptable soil material in layers to required subgrade elevations.
   2. In excavations:
      a. Use satisfactory excavated or borrow material.
   3. Under slabs:
      a. Use aggregate fill.

B. Backfill excavations as promptly as progress of the work permits, but not until:
   1. Acceptance of construction below finish grade;
   2. Inspecting, testing, approving and recording locations of underground utilities;
   3. Concrete formwork is removed;
   4. Shoring and bracing are removed and voids have been backfilled with satisfactory materials.
   5. Trash and debris have been removed.

C. Ground Surface preparation:
   1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious matter from ground surface prior to placement of fills.
   2. Plow, strip or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
   3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.
   4. At exposed soils in areas for sidewalks, scarify to a minimum depth of 6" and recompact at a moisture content that will permit proper compaction as specified for fill.

D. Placing and compacting:
   1. Compact subgrade to 95% standard proctor density.
   2. Place backfill and fill materials not more than 8” in loose depth.
   3. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
   4. Compact each layer to required percentage of maximum density for area.
      a. Do not place backfill or fill material on surfaces that are muddy, frozen or containing frost or ice.
   5. Place backfill and fill materials evenly adjacent to structures to require elevations.
      a. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation each lift.
   6. Refer to grading plan on Drawings for specific elevations to achieve.

3.4 GRADING

A. General
   1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
   2. Smooth the finished surface within specified tolerance.
   3. Compact with uniform levels or slopes between points where elevations are shown on the drawings or between such points and existing grades.
   4. Where a change of slope is indicated on the drawings, construct a rolled transition section having a minimum radius of approximately 8’-0’ unless adjacent construction will not permit such a transition or if such a transition defeats positive control of drainage.
   5. Place and spread coarse aggregate uniformly to a total compacted thickness as indicated in drawings.
   6. Level and contour surfaces to elevations and gradients indicated.

B. Grading outside structure lines:
   1. Grade adjacent to structures to achieve drainage away from the structures and to prevent pounding.
   2. Finish the surfaces to be free from irregular surface changes, and:
      a. Shape the surface of areas scheduled to be under walks to line, grade and cross-section with finished surface not more than 0.04 ft above or below the required subgrade elevation.
      b. Shape the surface of areas scheduled to be under pavement to line, grade and cross-section, with finished surface not more than 0.04 ft above or below the required subgrade elevation.

3.5 COMPACTING

A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D1557. 85% proctor density in lawn area and 95% proctor density in building area.

B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place and as approved by the Owner’s Representative.
   1. Structures:
      a. Compact the top 8” of subgrade and each 8” lift (maximum) layer of fill material or backfill material at 95% of maximum density.
   2. Lawn and unpaved areas:

a. Compact the top 8” of subgrade and each 8” lift (maximum) layer of fill material or backfill material at 85% of maximum density.
b. Compact the upper 12” of filled areas, or natural soils exposed by excavating, at 85% of maximum density.

3. Pavements:
a. Place all aggregate in maximum 8” lifts, and roller compact to specified density. Compact aggregate with roller using a 50 ton compression type roller or approved equal.
b. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
c. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
d. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
e. Compact the top 8” of subgrade and each 8” lift (maximum) layer of fill material or backfill material at 95% of maximum density.

C. Moisture control:
1. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Owner’s Representative.
2. Where subgrade or layer of soil material must be moisture-conditioned before compacting uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.

3.6 FIELD QUALITY CONTROL

A. Secure Owner’s Representative’s inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon.

B. Provide at least the following tests to the approval of the Owner’s Representative,
1. At paved areas, at least one field density test for every 2000 sq. ft. of paved area, but not less than three tests.
2. In each compacted fill layer, one field density test for every 2000 sq. ft. of overlaying paved area, but not less than three tests.

C. If, in the Owner’s Representative’s opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing under the provisions of Section 01410 of these Specifications.

3.7 MAINTENANCE

A. Protection of newly graded areas:
1. Protect newly graded areas from traffic and erosion and keep free from trash and weeds.
2. Repair and reestablish grades in settled, eroded and rutted areas to the specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

3.8 CERTIFICATION

A. Upon completion of this portion of the work and as a condition of its acceptance, deliver to the Owner's Representative a written report certifying that the compaction requirements have been obtained. State in the report the area or fill or embankment, the compaction density obtained and the type or classification of fill material placed.

3.9 CLEANING

A. Remove all unused materials from site.

END OF SECTION

SECTION 02260
PLANTING SOILS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. As called for in the drawings. Provide all labor, materials, and equipment to properly install planting soils.

B. This section includes:
1. Preparation of soil mixes
2. Testing of soil mixes and compost
3. Striping and stockpiling of existing soil
4. Installation of soils
5. Treatment of soils
6. Protection of newly placed soils

1.2 RELATED WORK

A. Section 02810 – Irrigation

B. Section 02930 – Sodding

C. Section 02950 – Trees, Shrubs, Ground Cover

1.3 DEFINITIONS

3.1.1 Compaction: Compaction of the soil results in a loss of large- and medium porosity and increase in soil density. Compaction may be purposeful to establish soil stability, or a result of unwanted forces applied to the soil.

3.1.2 Dry Soil: The condition of the soil near or below the wilting point of plant available water in which the soil may be very hard and blocky or is powdery and subject to blowing.

3.1.3 Field Capacity: The percentage of water remaining in a soil after having been saturated and free gravimetric drainage has ceased. Moisture contents for the Planting Soil on the Project are defined in Part 3 of this Specification.

3.1.4 Moist Soil: The condition of the soil in where it can be formed into a ball and maintain its shape. Free water is not visible and is considered a point approximately 20 percent less than the optimal water content to achieve maximum dry density as determined by Standard Proctor testing.

3.1.5 Saturated: All the pore space within a soil is filled with water and the remaining water freely drains by gravitational forces through the profile.

F. Scarification: The loosening of the surface of a soil lift by mechanical or manual means to alleviate compaction or smoothed surfaces of the soil. Depth of scarification is dependent on material and extent of compaction. Depths are noted within the specifications.

G. Subsoil: The soil horizon directly below topsoil that typically exhibits lower organic matter content, and often lower nutrient supply capacity than the topsoil.

H. Subgrade: The in-situ soil material that the planting soil will be installed upon.

I. Topsoil: The mineral surface layer of soil that often exhibits an accumulation of humified organic matter closely mixed with the mineral fraction, has strong, aggregate peds with good soil pore distribution (a mix of macro-, meso-, and micropores).

J. Wet Soils: Soils that are considered wet will easily be deformed by hand pressure, and not break apart. Free water may be visible within the pore spaces, but is held firmly within the soil pores.

1.4 SUBMITTALS

A. The following submittals shall be prepared:
   1. Laboratory Test Reports: Submit certified reports for tests as described in this Section.
      a. Laboratory reports of all imported soil analyses.
      b. Laboratory reports of all owner-supplied on-site soils
      c. On-site compost Solvita maturity tests with date and time-stamped photographic documentation
   2. Soil procurement and testing tracking (Soil Tracking Log)
      a. All soil materials blended and delivered to the project site must be tested as described herein and as approved by the Landscape Architect and Soil Scientist. The installer shall keep records of all laboratory analytical reports provided by the soil supplier/blender.
   3. Production Schedule: The SSC shall coordinate with the Soil Installation Contractor (SIC) and provide a production schedule to the Construction Manager. Submit an updated production schedule as requested by the Construction Manager.
   4. Product Source Data:
      a. Soil Supply Contractor shall have a minimum of five-years' experience at supplying custom soil materials and shall certify that they are able to provide sufficient quantities and consistency of component materials.
      b. Product Sourcing: The Soil Supply Contractor shall submit with their bid the names and locations of the sources for each of the planting soil components in this specification, including testing results for imported materials and owner-supplied on-site soils (if applicable) that meet the specifications for each of the planting soil components. Certification of the soil source shall include:
         i) Areal extent of source soil
         ii) Current use of the source soil site
         iii) Soil quantity available at the source
         iv) Soil testing results
      c. Source verification may be independently conducted by the Design Team.

1.5 REFERENCE STANDARDS FOR ANALYSIS AND TESTING

A. For all materials, provide complete analysis by a recognized laboratory made in strict compliance with the standards and procedures of the following:
   1. American Society for Testing Material (ASTM)
   2. ASTM D 6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
   3. ASTM D-422-63 Standard Test Methods for Soil Texture – Hydrometer Method
   4. American Society of Agronomy Methods of Soil Analysis, Par 2, 1986
   5. Association of Official Agricultural Chemists (AOAC)

1.6 QUALITY ASSURANCE

A. Long Lead Time Item: The Soil Supply Contractor shall be advised that the sourcing, testing, procurement, and blending of planting components and soil is a CRITICAL PATH item, requiring timely attention to meet the requirements of the Documents. The Soil Supply Contractor shall consider planting soil mixes to be A LONG LEAD TIME ITEM. Soil Blending Contractor's failure to heed this notice shall not be a reason for substitution of unacceptable material(s).

B. Soil Source Inspection Meeting: The Landscape Architect and the Soil Scientist will meet with the Soil Supply Contractor to examine source soils to verify soil quantity, quality, and production capacity for the project. This meeting will be prior to beginning soil production. Schedule the examination at least two (2) months before the soil production process begins

C. Pre-Submittal and Scheduling Conference: A Conference with the Construction Manager, Landscape Architect, and Soil Scientist to discuss the work of this Section shall be held prior to beginning submittals for this Section.

1.7 TESTING

A. Tests Required:
   1. The following tests shall be completed for compost:
      a. Certified reports on analyses from producers of composted organic materials, including composted sewage sludge, are required, particularly when sources are changed. Analyses will include all tests for criteria specified in Section 2, article 2.17 A. Submittals.
      b. Provide laboratory analytical results of biological testing completed for compost and confirmation of compost sources.

B. The following tests shall be completed for the Existing and Imported soils, and all Planting Soil Mixes:
   1. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System for sieve sizes #10, 18, 35, 60, 140 and 270. Percent clay (0.002 mm) shall be reported separately in addition to silt (ASTM D-422-63, hydrometer method).
   2. The silt and clay content shall be determined by a Hydrometer Test of soil passing the #270 sieve.
   3. Chemical analysis shall be undertaken for Total Nitrogen, Nitrate Nitrogen, Ammonium Nitrogen, Total Phosphorus, Available Phosphorus, Potassium, Calcium, Magnesium, Sodium, Aluminum, Iron, Manganese, Lead, Cation Exchange Capacity, Soluble Salts, soil reaction (pH) and buffer pH.
   4. Organic matter content shall be determined on a dry sample by weight using the Loss on Ignition (LOI) method
   5. Production Test Frequency: The following tests shall be required during soil production and delivery to the site.
      a. Horticultural Subsoil blend shall be sampled and tested for every 1,000 cubic yards.
      b. Lawn, Groundcover, and Tree and Shrub Planting Soils and will be sampled for every 500 cubic yards until three successive tests show consistent (test results within 10 percent of major parameters such as particle size, pH, Organic Matter) results.

C. Testing Facilities:
1. For each test type, use the same testing laboratory throughout the work. Notify the Landscape Architect of any change in laboratory and do not proceed until the Soil Scientist has approved the change.
2. Testing Laboratory Qualifications: An independent laboratory, recognized by the State of Oklahoma Department of Environmental Quality and/or Department of Agriculture, with the experience and capability of conducting the tests indicated and the types of test to be performed.
3. The following testing facilities have been pre-approved for testing of planting soil components and blended planting soil mixes. Testing agencies not listed below shall be approved by the Landscape Architect and Soil Scientist.
    a. Soil Physical Parameters
        i) Turf Diagnostics & Design, Inc., 613 East 1st Street, Linwood, KS 66052, Phone: 913.723.3700, Fax: 913.723.3701, www.turfdiag.com.
        ii) Or approved equal
    b. Soil Nutrient/Micronutrient Testing
        i) Ward Laboratories, 007 Cherry Ave, Kearney, NE 68847 Phone: (800) 887-7645
        ii) Soil, Water and Forage Analytical Laboratory, 045 Agriculture Hall, Stillwater, OK 740.787.7845 Phone: 405.744.7771
        iii) Or approved equal
    c. Compost Testing:
        i) Ward Laboratories, 007 Cherry Ave, Kearney, NE 68847 Phone: (800) 887-7645
        ii) Soil, Water and Forage Analytical Laboratory, 045 Agriculture Hall, Stillwater, OK Phone: 405.744.7771
        iii) Or approved equal

D. Testing Methods:
1. Horticultural Testing Definitions and Methods:
    a. Horticultural testing shall be completed for all planting soils. Horticultural testing for planting soils shall include:
        i) Mechanical Gradation:
            a) Mechanical gradation (sieve analysis) shall be performed as described in ASTM D 6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis using sieve screen sizes 4, 10, 18, 35, 60, 140 and 270.
            b) Tests for silt and clay shall be by combined hydrometer and wet sieving in compliance with ASTM D-422-63, hydrometer method. Percent clay and silt shall be tested and reported as separate particles. The results of gradation must be reported at the specified particle size breaks listed in this Section and by plotting as a particle size distribution curve on a five cycle semi-log graph.

        ii) Soil Chemical Properties
            a) Testing for soil chemistry shall include Total Nitrogen, Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sodium, Manganese, Lead, Calcium Carbonate, Cation Exchange Capacity (CEC), Soluble Salts (Electrical Conductivity), Soil Organic Matter, soil reaction (pH) and buffer pH.

2. Soil Biological Testing
    a. Phospholipid Fatty Acid (PLFA) Test

1.8 SAMPLING FOR TESTING

A. Horticultural Soil Testing
1. Soil Sources
    a. Soil sources shall be tested for Mechanical Gradation and Soil Chemical Properties. Samples shall be collected from each 250 cubic yards of source soil and labeled with source name, sample location (at source), and depth interval. After three consecutive tests providing similar results for major parameters in soils from the same source, testing frequency can be reduced to one sample per 1,000 cubic yards. If new sources are used, the testing frequency will resume one test per 250 cubic yards.
    b. Compost sources shall be tested for Compost Maturity and Compost Chemical and Physical Requirements. Composite samples consisting of a minimum of 6 subsamples collected from the interior of stockpiled compost shall be collected for each 500 cubic yards of compost produced for the project prior to mixing with other soil components.
2. Soil Production
    a. Sampling: During soil production operations, samples shall be collected for each planting soil mix. Samples shall be retained at the Soil Supply Contractor's site for review by the Landscape Architect during the construction process. Samples shall be collected for every 500 cubic yards of soil mix during soil blending production. Samples are tested per the frequency noted below.
    b. Testing: During soil production operations, samples from each 250 cubic yards of existing sandy loam soil and planting soil types shall be submitted for analyses of the following tests:
        i) Soil Gradation, Total Soil Organic Matter, and Biological Testing.
        ii) After planting soil types have successfully passed three consecutive tests, frequency for testing may be decreased to one test every 1,000 cubic yards.

PART 2 - PRODUCTS

2.1 GENERAL

A. Planting Soil Materials (PSM) are components that will be used to build final soil profiles. Planting Soil profiles shall typically consist of horticultural subsoil and horticultural topsoil layers (horizons) combined for the Effective Rooting Zone (ERZ).

B. Constructed planting profile for gardens are described in Part 3.5

C. Sources

1. Soil component sources include:
    a. Soil that is harvested or salvaged from existing on-site soils must meet the soil requirements as provided in this specification.
    b. Soils from off-site sources must meet applicable the horticultural requirements defined in this Section, Part 2.3.
2. Submit information identifying sources for all soil components and the soil sources responsible for any mixing of soil components.

a. Submit name, address, telephone number, and email information for source contact.
b. Owner, Landscape Architect and Construction Manager shall have the right to reject any soil supplier.
c. Submit certification that accepted soil suppliers are able to provide sufficient quantities of material and mixes for the entire Project.

2.2 PLANTING SOIL MIX COMPONENTS

A. SANDY LOAM

The Existing Sandy Loam soil shall consist of uniform sandy loam or loam soil salvaged from the project site with the following requirements:

1. Gradation shall conform to the following grain size distribution:

U.S. Sieve Size No.	% Passing Minimum	% Passing Maximum
10 (small gravel)	99	100
18 (very coarse sand)	95	100
35 (coarse sand)	85	95
60 (medium sand)	55	70
140 (fine sand)	40	50
270 (very fine sand)	25	35
0.05mm to 0.002mm (silt)	10	15

2. Chemical Properties: (chart to be completed)

Item	Units	Range
pH	Std units	6.5 – 7.8
Salt concentration	dS.m-1	<2.5
Total nitrogen	mg kg^{-1}	100 - 300
Total phosphorus	mg kg^{-1}	8 - 50
CEC	meq/100gmm	>12
Aluminum (available)	mg kg^{-1}	<1
Manganese	mg kg^{-1}	100 – 2,000
Lead	mg kg^{-1}	<50

3. Source soil shall not contain objects larger than 1” in any dimension, including clay clods, gravel, or other foreign matter.

B. DRY SCREENED SAND

1. Sand shall be a uniformly graded coarse sand consisting of clean, inert, sub-angular or rounded grains of quartz or other durable rock free from loam or clay, surface coatings, mica, and other deleterious materials.
2. Sand shall be from native river sources. Manufactured sand shall not be used.
3. Mechanical Gradation: Dry screened sand shall have the following gradation for material passing a Number 4 Sieve for washed sieving

U.S. Sieve Size No.	% Passing Minimum	% Passing Maximum
4	95	100
10	75	95
18	65	85
35	65	80
60	0	20
140	0	5
270	0	0
0.002 mm	0	1

a. Maximum size shall be one half-inch largest dimension. The maximum retained on the #4 sieve shall be 2% by weight of the total sample. The ratio of the particle size for 80% passing (D80) to the particle size for 30% passing (030) shall be 3.0 or less. (D80/030 <3.0)

C. COMPOST

1. Compost shall be a stable, humus-like material produced from the aerobic decomposition and curing of organic vegetative residues derived from feedstock consisting of woody stems, leaves, grass cuttings, and livestock manure (up and no more than 10 percent of the compost mix by volume). NO FOOD WASTES/PRODUCTS, PAPER PRODUCTS, OR PROCESSED LUMBER ARE ACCEPTABLE IN THE COMPOST FEEDSTOCK. The compost shall be a dark brown to black color and be capable of supporting plant growth with appropriate management practices with no visible free water or dust, with no unpleasant odor.
2. Chemical Properties: Compost shall conform to the following values: (chart to be completed)

Item	Units	Range
Total nitrogen	mg kg^{-1}	>8,000
Extractable nitrate	mg kg^{-1}	20 - 200
Total phosphorus	mg kg^{-1}	50 - 2000
Available phosphorus	mg kg^{-1}	5 - 200
pH		5.5 – 8.0
Salt concentration	dS.m-1	<2.5
C:N Ratio	No unit	<25
Moisture	% wt	30-55

a. The ratio of carbon to nitrogen (C:N) shall range between 10:1 to 25:1.
b. Organic matter content of compost shall be at least 40 percent (dry weight). One hundred percent of the material shall pass a 1/2-inch screen. Debris such as metal, glass, plastic, wood (other than residual chips), asphalt or masonry shall not be visible and shall not exceed one percent dry weight.
c. The compost shall be screened to ½-inch maximum particle size and shall contain no more that 3 percent material finer than 1.0mm (No. 18 sieve) as determined by sieve analysis.

d. Additional tests defined in Part I as Chemical Properties shall be performed, and the results will be utilized to evaluate amendments to the planting soil mixes that may be required.

3. Maturity:
   a. $C0^2$ test: Compost respiration shall be no more than 6 mg C02-ClgBVS day.
   b. Solvita test: The compost must achieve a maturity index of 6 or more.
4. Pathogens/Metals/Vector Attraction reduction shall meet 40 CFR Part 503 rule, Table 3, page 9392, Vol. 58 No. 32.

2.3 PLANTING SOILS

A. PLANTING SUBSOIL

1. Planting Subsoil shall consist of 9 parts Existing Sandy Loam and 1 part compost by volume (9:1 Ratio). Planting Subsoil shall be free of solids larger than 1-inch in any dimension and not consisting of such solids more than 2 percent by volume.
2. Mechanical Gradation: The Planting Subsoil shall be a uniform, homogenized mixture of the soil components with a gradation conforming to the approved Sandy Loam.
3. Chemical Properties shall meet the following:
4. Organic Content: Between 0.5 and 2.0 percent on a dry weight basis.
   a. pH: 6.5 to 7.3.
   b. Total nitrogen (all forms) between 50 to 200 mg kg^{-1} soil
   c. Available nitrogen (NH_4 and NO_3) greater than 10 mg kg^{-1}.
   d. Total available P content between 5 to 50 mg kg^{-1}.

2.4 LAWN, GROUNDCOVER, AND TREE SOIL

A LAWN SOIL

1. Shall consist of 4 parts Existing Sandy Loam and 1-part compost by volume (4:1 Ratio). The Lawn and Groundcover Soil shall be a uniform, homogenized mixture of the soil components with a gradation conforming to the approved Sandy Loam.
2. Chemical Properties shall meet the following:
   a. Organic Matter Content: Between 3.5 and 5.0 percent on a dry weight basis
   b. pH: Lawn and Groundcover soil pH shall be between 6.5 and 7.3.
   c. Total nitrogen (all forms): between greater than 650 mg kg^{-1} soil
   d. Available nitrogen (NH_4 and NO_3) content greater than 20 mg kg^{-1}
   e. Total available P content between greater than 20 mg kg^{-1}.

B. IMPORTED GARDEN PLANTING SOIL

1. Imported Garden Planting Soil shall consist of 3 parts Imported Sandy Loam and 1-part compost by volume (3:1 Ratio). The Imported Garden Planting Soil shall be a uniform, homogenized mixture of the soil components with a gradation conforming to the approved Sandy Loam.
2. Chemical Properties shall meet the following:
   a. Organic Matter Content: Between 3.0 and 5.0 percent on a dry weight basis
   b. pH: Tree and Shrub Planting soil pH shall be between 6.5 and 7.3.
   c. Total nitrogen (all forms): Greater than 800 mg kg^{-1} soil
   d. Available nitrogen (NH_4 and NO_3) content greater than 25 mg kg^{-1}
   e. Total available P content greater than 25 mg kg^{-1}.

PART 3 – EXECUTION

3.1 PREPARATION AND COORDINATION

A. The Soil Preparation Contractor shall be responsible for communicating and coordinating with the Construction Manager on all matters to ensure that the delivery of the planting soil to the Site meets the Project Schedule.

B. The Soil Preparation Contractor shall not be held responsible for production issues that are the sole responsibility of the Soil Installation Contractor.

C. Stockpile areas within the project area are limited. The Soil Supply Contractor shall carefully coordinate stockpiling with Construction Manager and Soil Installation Contractor.

D. Coordination with Weather: Planting Soils shall not be worked (including hauled, handled, placed, compacted, or tracked over) when soil is wet. Refer to Part 1- “Definitions” herein for definitions of moist and wet soil.

E. The Soil Supply Contractor shall take a proactive approach in communication with the Soil Installation Contractor to avoid delays in providing them with material.

F. All preparation and mixing shall be accomplished when the soil moisture content is less than 20% by weight.

3.2 PRE-EXAMINATION AND VERIFICATION

A. Before preparation of planting soils, Soil Scientist and/or Landscape Architect shall visually inspect the soil for moisture content, non-aggregated soil particles, clumping, debris, deleterious or foreign materials, or any other physical conditions that could affect the quality of the planting soil and the Soil Installation Contractor’s installation operations.

3.3 SOIL STRIPPING AND STOCKPILING

A. Soil Stripping: Existing sandy loam soil shall be stripped and salvaged in areas where grading and/or soil disturbance will occur before such actions are initiated. Soil from within or adjacent (within 15 feet) of the pond (either full or drained) is excluded from being salvaged. The Contractor shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work.
   1. Inspect all surfaces to check for consistent soil conditions, including soil texture, unstable areas, and areas requiring additional removal of debris, plants, or excess soil. During the inspection, use a soil probe to assess soil quality with depth to be certain that uniform soil texture extends at least 4 to 10 inches below the soil surface, and that no compacted layers exist, or that buried debris is within 12 inches of the surface.
   2. The General Contractor shall be responsible for verification, in writing, that all of the project areas to be stripped have been identified and mapped properly per drawings and specifications. Verify that subgrade and drainage components of the areas scheduled to be stripped are without ponded water or saturated soil. Submit any and all noted discrepancies which will impact the proper installation or execution of the work to the Owner prior to beginning soil conditioning processes.
   3. The General Contractor assumes responsibility for all soil salvage stripping and conditions upon beginning soil stripping operations.

4. The General Contractor shall be responsible to ensure no soil compaction will occur from construction traffic or other soil stripping activities. Damage caused by construction equipment or other construction activities will be repaired by the landscape contractor at no additional cost to the Owner.
5. Verify that the surface moisture content is suitable for soil stripping and stockpiling. Under no circumstances shall the contractor strip and stockpile soil when the soil is too wet. Soil is too wet to strip, stockpile, or generally handle if soil can form a ball with hand pressure that then can either be formed into a ribbon or different shape, or when pressed with finger pressure breaks into 2- or 3 large pieces. Soil is suitable for handling if the soil is dry to slightly moist. This occurs if the soil won't form a ball, or if a ball will readily break into many small peds or pieces.

B. Stockpiles: Stockpile stripped, salvaged soil in locations with good drainage and protection from disturbance. Provide large, clear signage identifying the contents of each pile.
1. Height of pile: Soil stockpiles shall not exceed 8 feet in height.
2. Construct storage piles to allow free drainage of surface water. Slope at the top of any pile shall be a minimum of 3%.
3. If stockpiles will be maintained for more than 6 weeks, 4-inch perforated PVC pipe shall be installed at the base of the stockpile, with individual pipes approximately 12-feet from each other and sloped to a downhill position that will allow water to drain from the middle and bottom of piles.
4. Cover storage piles if required to prevent windblown dust and protect against erosion.
5. Protect stockpiles from contamination of any sort.
6. Prohibit vehicles and pedestrian traffic on stockpiled soil materials.
7. Only low ground pressure (< 6 psi) vehicles are permitted to drive on stockpiles.
8. In no case shall the stockpiled soil be allowed to go anaerobic as this condition is irreversible and renders the soil unusable for planting. The Soil Supply Contractor shall keep logs for soil management while it is in stockpiles. If the Contractor suspects that stockpiled soils have become anaerobic, notify the Resident Site Inspector and/or Landscape Architect and wait for further instructions before aerating stockpiles.

3.4 PREPARING SOIL TYPES

A. Planting Subsoil and Planting Soil shall be prepared as mixtures of SANDY LOAM SOIL and COMPOST as described in Part 2 of this Section.

B. Blending of Sandy Loam Soil with compost shall be conducted by bucket blending the soil components of each type to provide uniform, consistent soil mixtures.
1. Specified amounts of each soil component shall be placed together in a pile. Using the bucket of a front-end loader, the soil components shall be picked up by the bucket and then dropped to the clean soil blending area from a height of approximately 4- to 5-feet. This process shall be repeated until a uniform mix of Sandy Loam Soil and compost is achieved.
2. A "uniform" blend of soil and compost shall be determined by the site manager, with the soil blend consisting of soil and equal distribution of compost into that soil such that no discernable concentrations of compost are noticeable (soil will appear darker, with even amount of compost particles distributed about the soil).
3. Complete blending of soil with as few lifts/drops of the soil as possible.
4. Soil blending shall not be conducted when soil components are wet.

3.5 PLANTING SOIL PLACEMENT

A. Soil Placement and Preparation
Part 2 Notify the soil scientist and landscape architect of soil placement operations at least seven calendar days prior to the beginning of work.
Part 3 The landscape architect will stake trees and shrubs after placement of the planting soil.
Part 4 Cover crop or protective vegetation shall be planted on installed or amended soil within 5 days of soil completion to protect soil from erosion or damage from wetting and solar heating affects. An acceptable cover crop is annual rye (Lolium multiflorum)

3.6 EXAMINATION OF SUBGRADE

A. The subgrade shall be inspected prior to the start of soil placement for conformance with the Drawings for elevations of subgrade relative to finish grade. Subgrade shall be graded smooth and parallel to the finish grades, and scarified (roughened) to a depth of 2 inches prior to placement of horticultural subsoil and planting soils.

3.7 INSTALLATION OF PLANTING SUBSOIL AND PLANTING SOILS

A. Planting Soils shall be installed to prevent excessive traffic over soil lifts and the final grade to prevent the creation of undesirable soil compaction. The contractor shall install live plants after completing the installation of the Planting Soil. Planting Soils shall be inspected and accepted by the Landscape Architect before installation of plants.

B. During installation of Planting Soils, wheel-driven equipment or trucks are not allowed in the construction are. Only low ground-pressure (tracked) equipment is allowed during and after soil installation.
1. Damaged to soils caused by any equipment operations, including soil rutting, compaction, smearing, pulverizing (loss of soil structure) must be repaired immediately. Repairs may require and include replacement of damaged soil.

C. The soil shall be placed in lifts not to exceed 12 inches in thickness and only compacted not to exceed between 84 and 87 percent of maximum dry density as determined from Standard Proctor testing with the following exception:
1. For tree plantings, in those cases where the final soil profile depth exceeds the height of the plant rootball, the soil depth beneath the rootball shall be compacted to between 88 and 92% Standard Proctor to create a firm pedestal and prevent settlement of the rootball.
2. For tree plantings, soil excavated from tree planting pits shall be replaced firmly around the root ball to an elevation equal to the surrounding existing native soil. Soil must be replaced and packed firmly around the rootball leaving no voids or open spaces. After the existing soil has been replace around the rootball, Tree Planting Soil shall be installed to an elevation equal to the surrounding soil grade.
3. Soil must be scarified to a depth of 1- to 1.5 inches between lifts to prevent slickened faces occurring between soil lifts and profiles.
4. Soils will be compacted to between 84 and 87 percent maximum dry density as determined by Standard Proctor testing for all planting areas unless otherwise previously stated. In all cases, the soil being placed shall be in a dry to damp conditions. No wet soils shall be installed. In-place testing of soils shall be completed where soil profiles have been reconstructed. In-place testing shall be completed following ASTM D6938 - 10 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

5. Prevention of compacted soils can be accomplished by beginning the work in the center of planting area locations, against walls, or the center of isolated beds, and progressing outwards towards the borders.
6. Planting soils shall never be moved or worked when wet or frozen.

3.8 TREATMENT OF AMENDED EXISTING SOILS

A. This work shall consist of amending soils left in place that require conditioning to improve horticultural capacity, including treatment in non-disturbed areas and treatment of existing soils that have been graded but otherwise minimally disturbed as indicated in the plans, and furnishing all materials, equipment, and labor including but not limited to:
   1. Compost.
   2. Core Aeration.
   3. Testing.

B. Soil Treatment of Non-Disturbed Areas
   1. Soil in areas in which vegetation [grass] will not be stripped or disturbed will be treated to improve structure and aeration. Surface treatment of grass-covered soil will include core aeration to a minimum depth of 3-inch below ground surface, surface application of 1 cubic. Core aeration shall not occur within areas of tree critical root zones.
   2. Areas identified in the Plans where Amended Existing Soil will be used will be graded to elevation. Grading must be accomplished using low load-bearing equipment, such as track backhoes or small dozers, but not wheeled equipment to minimize compaction. Following grading, any compaction resulting from excess foot traffic or equipment will be broken using manual equipment (shovels and rakes), working from the middle of the planting area to the outside. Surface treatment of soil shall include:
   3. Core Aeration: Core aeration using a coring tool with cores to a minimum depth of 12-inches below ground surface. Core aeration shall not occur within areas of tree critical root zones.
   4. After core aeration has been completed, Microlife Ultimate 8-4-6 fertilizer shall be surface applied over the soil at a rate of 12 lbs of fertilizer per 1,000 square feet.
   5. Top Dress: Compost shall be surface applied to all areas designated on the plans to fill the cores, and to a depth approximately 1-inch deep across the surface of the soil (1 cy of compost per 36 cy of area).
   6. Existing Soil shall never be graded, moved, or worked when wet or frozen.

3.9 PROTECTION

A. The Contractor shall place barricades as required to prevent any unnecessary compaction of planting and/or structural soil from vehicles, equipment, or pedestrian traffic.

B. Protect newly graded areas from traffic, freezing and erosion. Keep free of trash, debris or construction materials from other work.

C. Repair and re-establish grades to specified tolerances where completed or partially competed surfaces become eroded, rutted, settled or compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace material to a depth as direct by the engineer and landscape architect; reshape and re-compact at optimum moisture content to the required density.

D. Where settling occurs, before final acceptance or during the warranty period, remove finish surfacing, backfill with additional approved material, compact to specified rates, and restore any disturbed areas to a condition acceptable to Owner.

3.10 TESTING

A. Compaction Testing: Soil compaction shall be tested using a static cone penetrometer (compaction tester) as described in "Diagnosing Soil Compaction Using a Penetrometer (Soil Compaction Tester" (https://extension.psu.edu/diagnosing-soil-compaction-using-a-penetrometer-soil-compaction-tester).
   1. Resistance to penetration using the cone penetrometer shall not exceed 250 pounds per square inch (psi) for subsoil.
   2. Resistance to penetration shall not exceed 200 psi for surface planting soils. Testing shall be completed at a rate of one test per 500 square feet, or for each smaller planting area.

B. Nuclear Density Tests: ASTM D6938 - 10 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth). In-place density tests shall be carried out at a rate of one test per 2,000 square feet for each type of material placed.

3.11 COORDINATION AND EXCESS MATERIALS

A. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.

B. Excess Planting Soil and Structural Soil Mixture and Materials. Remove the excess planting soil mixture and materials from the site at no additional cost to Owner unless otherwise requested.

3.12 ACCEPTANCE AND MAINTENANCE

A. Request for Acceptance. In writing, request engineer and landscape architect inspection for acceptance at least 10 days in advance of preferred inspection date. Do not request inspection for acceptance until work is 100% complete (not including maintenance) and in compliance with the Contract requirements.

B. Partial Acceptance. Acceptance of partial areas or portions of the total work may be granted, at Landscape Architect and Owner's option, if the area to be inspected for acceptance is large, well defined, and easily described. Engineer and Landscape Architect are not obligated to provide partial acceptance of the work.

C. Final Acceptance is defined as the time at which all work has been performed and accepted by the engineer and landscape architect including any work noted on the "Punch List".

3.13 SUBSTANTIAL PERFORMANCE OF WORK

A. The Landscape Architect and Soil Scientist shall evaluate all of the test results and shall reserve the right to reject, at any time, any soil that does not meet the baseline criteria for acceptance. The baseline criterion for acceptance of horticultural criteria is established by the Soil Scientist and Landscape Architect when the initial sample mixes are approved. All soils must meet environmental criteria as defined.

B. Rejected planting soil materials shall not be released or distributed to the Soil Installation Contractor.

3.14 WARRANTY

A. The Soil Supply Contractor shall provide all test data and certify in writing that all of the soil produced and delivered for this project has met the requirements of this Section and/or been approved in writing by the Construction Manager and/or Landscape Architect.

END OF SECTION

SECTION 02263
FIRESTONE EPDM GEOMEMBRANE

PART 1 - GENERAL

This manual contains information on lining systems using Firestone EPDM Geomembrane. Apart from general recommendations on the use of the sheet, it also gives general information on site, design, and excavation considerations.

As a product manufacturer, Firestone does not perform geotechnical or other design functions. The following information is provided as general guidelines and design considerations only.

Generally, for simple projects, the design may be carried out by the owner or the contractor. However, in the case of larger ponds, canals, water features and commercial installations the problems are often considerably more complex. In these installations, it is recommended that a licensed engineer, geologist, or architect be consulted to ensure that the project is designed in accordance with applicable standards and performs as desired.

1.1 APPLICATION SUITABILITY

A. The Firestone EPDM geomembrane System is appropriate for any of the following installations:
   1. Irrigation and water containment
      a. Canals
      b. Raw water reservoirs
      c. Potable water reservoirs
      d. Dam facings
   2. Waste containment – municipal or agricultural
      a. Animal waste lagoons
      b. Municipal landfill covers
   3. Aquaculture
      a. Pond liners
      b. Fish hatcheries
      c. Tank liners
      d. Raceways

B. The Firestone EPDM Geomembrane System is not appropriate where any of the following conditions exist:
   1. Any containment structure where conditions exist that the substrate will not provide continuous and uniform support for the Firestone EPDM Geomembrane.
   2. Any containment for hydrocarbons or chemicals that are known to damage Firestone EPDM Geomembrane.

C. The Firestone EPDM Geomembrane System is not applicable without special consideration from the Firestone Building Products Technical Department, where any of the following conditions exist:
   1. The Firestone EPDM Geomembrane will be subjected to chemical discharge.
   2. Where the side slopes exceed 2H:1V
   3. Projects where the water table may reach the elevation of the liner
   4. Projects that contain erodible or collapsing soils or karst terrain
   5. Any project where subterranean gases will be generated or exist
   6. Any project where the contained liquid exceeds 80° C (180° F)

1.2 PROTECTION AND PRECAUTIONS

A. Additional precautions and/or protection may be required in the following situations:
   1. Wind
      a. Ballast at the bottom, on slopes at the top of slopes
      b. Correct section of anchor trench depending on pullout calculation
   2. Waves
      a. Mechanical protection of the embankments depending on slope (rock, precast blocks, cast-in-place concrete)
   3. Floating objects (dead wood and debris)
      a. Small ponds: cleaning
      b. Large ponds: protection of side slopes
   4. Ice – Mechanical protection of side slopes
   5. Animals
      a. Escape ladders or access ramps for large animals such as deer
      b. Enclosure fence around reservoir
      c. Geotextile under the Firestone EPDM Geomembrane on slopes
      d. Soil cover in high traffic areas
   6. Vandalism
      a. Enclosure fence around reservoir
      b. Mechanical protection of embankments
   7. Operating vehicles
      a. Protection of the Firestone EPDM Geomembrane with a soil layer minimum 18″ (450 mm) in depth
      b. Access ramp designed for equipment travel
   8. Local turbulence [with water velocity exceeding 1.2 m/sec (4.0 ft/sec) (internal agitator or canals)]
      a. Protection with designed cover system or ballast

1.3 SITE AND SUBSTRATE CONSIDERATIONS

A. Site Selection – When selecting the construction site, there are numerous design elements that must be considered to ensure long-term performance of the system and to avoid future problems. Site selection is the responsibility of the design professional.
   1. The nature of the soil substrate and subsurface rock
   2. The presence of cavities (karst terrain)
   3. The depth to and the variation of the groundwater level
   4. The presence of gases in the soil (i.e., peat, organic matter)
   5. The risk of differential settling (i.e., poorly consolidated soil, recent backfill, landfills)
   6. The risk of internal erosion (i.e., karst soils, fine silty sands

B. Site Excavation - The configuration of the impoundment is usually constructed by means of one of the following methods:
   1. Fully excavating into the natural soil
   2. Building raised embankments
   3. Partial excavation with raised embankments

C. Soils
   1. A thorough geotechnical investigation of the site should be conducted to ensure that the underlying soil will remain stable.
   2. The type of soil (classification) density, permeability, thickness of the strata, and the depth under the lining system must be known. Table I.1 below outlines some risks based on general soil types.
   3. The soil supporting the Firestone EPDM Geomembrane system should be compacted to between 90% and 95% of Standard Proctor density, either by

construction equipment or by mechanical vibrating roller compacting.

TABLE I-1: SOIL TYPES, RISKS, AND SOLUTIONS

SOIL TYPE	RISK	SOLUTIONS
Compressible (peat, fine sand, saturated clay, loose backfill)	• Gas generation • Pressure under Firestone EPDM Geomembrane • Settling • Under-consolidation of backfill materials • Differential settlement and tearing of Firestone EPDM Geomembrane	• Gas Drainage • Slope must be adapted to facilitate gas drainage • Appropriate compaction methods • Soil reinforcement
Soil containing organic matter (old sugar or paper industry ponds, landfill, peat)	• Decomposition of organics • Gas generation • Pressure under membrane	• Gas drainage • Slope must be adapted to facilitate gas drainage
Soil with internal erosion potential (backfill material containing waste, limestone-type soil, gypsum chalk)	• Dissolution of the soil by liquid due to leaks or groundwater • Slope stability • Collapse caused by eroding water	• Change site or provide a good geological assessment to find cavities if any • Special reinforcement, double • waterproofing, or compaction
Soft clay, silt (CL, SC)	• Differential settling and tearing of the Firestone EPDM Geomembrane	• An intermediate layer for drainage and special compacting around penetrations
Coarse substrate soil (GW, GP, GM GC)	• Puncture of Firestone EPDM Geomembrane	• Provide geotextile protection

Table I-1: Soil Types, Risks, and Solutions

D. Slopes

If no slope stability study is carried out, the contractor should provide a maximum recommended slope of 2H:1V. If the height of the embankment (above the base of the pond) is between 4.6 and 9.2 m (15.0’ and 30.0’), a maximum slope of 3H:1V is recommended when a soil cover is to be used. The values in Table I.2 may be used as a general guide for exposed installations. These values are given according to a uniform type of soil. They should be considered as general guidelines only. Slope stability is the responsibility of the design professional.

1. Bottom
   a. A slope of 1 – 2% is recommended for the following:
      (1) Correct operation of the drainage system
      (2) Easy maintenance of the pond (if unprotected)
      (3) Positive gas movement
2. Side slopes or embankment inclines

   Stability of the impoundment are geotechnical and geosynthetic issues that must be addressed by a professional design engineer. The presence of groundwater and the type of the soil play an important part in the stability of side slopes. The Firestone EPDM Geomembrane system is not a structural component and is not to be used to provide stability of side slopes. The design engineer should investigate the following:
   a. The stability of the drainage system and of other layers between the bottom of the pond and the Firestone EPDM Geomembrane.
   b. Effects of waves

c. Consequences of rapid drop in water level
d. Consequences of excessive leakage
e. Stability of the protection layer, (max. slope for soil cover is 3H:1V)
f. Ease of installation

TABLE I-2: TYPE OF SUBSTRATE AND MAXIMUM SLOPE

TYPE OF SUBSTRATE	MAXIMUM SLOPE
Clay	2H:1V
Sandy Clay	2.5H:1V
Sand, Sandy Gravel	3H:1V
Soft Fractured Rock	1.5H:1V

Table I-2: Type of Substrate and Maximum Slope

3. Top of slope crest
   a. The crest at the top of the embankment should have a minimum width as follows:
      1) m (5.0') for installation of the anchor trench
      2) 4.5 m (15.0') if vehicles are used during the construction and operation of the water feature.
      3) If a minimum width cannot be obtained, adequate anchoring methods (mechanical connection, anchor trench) must be used. Also, a slight incline of 1% towards the outside of the water feature is recommended for drainage.

E. Drainage

The need for a drainage layer beneath the membrane depends on local site conditions. In all cases, where liquid may cause instability of the subsoil, the amount of water in the soil should be minimized. This may be done by means of a drainage system. The application of a drainage system is not required if the permeability of the supporting layer exceeds 10-4 m/s or if no gas pressure is anticipated. Water/gas drainage is always required under the following conditions:

1. When water flows are possible under the Firestone EPDM Geomembane
2. Soils containing organic matter (gas generation)
3. Slopes containing clay or fine sands (stability when emptying...)
4. Whenever variations of groundwater level can be anticipated
5. Whenever the Firestone EPDM Geomembrane is not fixed and can move (wind...)
6. Rise of the groundwater level/gas entrapment
7. Groundwater level exceeding the pond water level:
   If the ground water level is higher than the bottom of the impoundment, the Firestone EPDM Geomembrane lining system will be subject to hydrostatic backpressure (i.e., uplift). Also, air may be entrapped, causing gas pressure from the groundwater as the level rises. The depth of the groundwater table must be known (both the average level and the extreme level). If the groundwater elevation exceeds the lowest elevation of the Firestone EPDM Geomembrane system, the Firestone EPDM Geomembrane risks being lifted, and the function of the gas drainage system (if installed) may be disturbed. In this case, an appropriate drainage system under the Firestone EPDM Geomembrane membrane, including ballast on top of the Firestone EPDM Geomembrane, should be provided. Groundwater issues and design of dewatering systems must be addressed and designed by a professional engineer.
8. Water drainage and gas drainage are often combined. For this reason, a slope of 1 – 2% of the base toward the side slopes is recommended. The water drainage may be facilitated by means of one or more of the following:
   a. A layer of cohesionless soil (sand or fine gravel) with a minimum thickness

of 300 mm (12.0″).

b. A layer of permeable geosynthetic material (thick non-woven geotextile or drainage geocomposites).

c. To prevent drain blockage, a natural or synthetic filter must be installed between the soil and the drainage layer. Rules for correct filter design should be followed and addressed by a professional design engineer.

d. A double lining system with a drainage layer between the two Firestone EPDM Geomembranes

e. A network of drainage pipes linked to each other covered with permeable geotextile or a layer of permeable material. Water is collected through a designed network of primary and secondary perforated collection pipes directed to a collection sump or low point. This can also be accomplished with a layer of geonet composite. Again, any drainage system must be designed by a professional engineer.

F. Substrate Venting

A substrate venting system may be required. If so, a design professional with experience in design of similar systems should be consulted prior to commencement of any work. The venting system could be composed of perforated pipes, porous mineral layer, geonet composite, or flat drainpipes. In addition to gas drainage under the Firestone EPDM on the bottom and slopes, top of slope gas vents must be installed.

G. Water Impoundment Shape and Length and Wave Action

1. Waves created by the wind or by boats can cause an impact on the side slopes. The greater the length of the pond in the direction of the prevailing winds and the steeper the slope, the stronger the wave action will be.
2. Depending on the specific height of the waves, the type of soil and the slope of the embankments, one or a combination of the following is recommended:
   a. Firestone EPDM Geomembrane protection adapted to the slope (concrete, concrete block mattress, rip rap, soil cover)
   b. Provide adequate anchoring of the Firestone EPDM Geomembrane lining system
   c. Provide adequate compaction of the base soil
   d. Provide geotextile protection under the Firestone EPDM Geomembrane lining system to prevent soil sloughing on slopes.

H. Wind Uplift

1. In areas of high wind ballasting with sand tubes on slopes may be necessary.
2. Temporary ballasting may be removed if and when permanent ballast is installed (i.e. water, cover soils, ballast tubes, etc.)

I. Maximum Liquid Level

The higher the liquid level in the pond, the higher the hydrostatic pressure. The risks of the base soil settling and the membrane tearing are also increased. Even when considering the high elongation at break properties (500%) of the Firestone EPDM Geomembrane lining systems, settlement could cause the membrane or seams to be stressed and ruptured or punctured by rock. If settlements are anticipated, the subsoils must be structurally designed with geogrids or geotextiles to limit movement. Stabilization of base soils must be designed by a professional prior to the EPDM installation.

1.3 PRODUCTS

A. Membranes:

1. The Firestone EPDM Geomembrane is a synthetic rubber membrane. The panels are assembled in the factory prior to vulcanization to widths up to 15.25 m (50′) thus limiting on- site field seaming. The panels are folded and rolled on

cores 3.30 m (10.8′) long.

2. Refer to product TIS for factory panels sizes.
   a. Thickness – 1.14 mm (0.045″), 1.52 mm (0.060″and 2.28 mm (0.090″)
   b. Scrim reinforced EPDM Geomembrane is also available in 1.14 mm (0.045″) and 1.52 mm (0.060″).
   c. Each roll is labeled with the membrane type, thickness, dimensions, manufacture date, and production lot, and an arrow indicating direction of unroll/unfold.
3. All elements of the Firestone EPDM Geomembrane lining system shall be Firestone products as described in the Technical Data Sheets or products, which are approved by Firestone.

B. Protection Geotexiles
1. Firestone can provide a protection geotextile that is acceptable as an underlayment.
2. Geotextiles or geocomposites may be acceptable but should be verified with the design professional and Firestone prior to installation.

C. Anchorage / Attachment Considerations
1. Perimeter Anchoring
   a. Anchor Trenches – An anchor trench is commonly used as a perimeter termination. The trench is excavated, and the membrane is loose laid in it. The trench is then backfilled and compacted with the excavated material or concrete. The type of trench and any requisite pullout calculations shall be completed by a design professional to determine the dimensions of the anchor trench for any given project. In any event, the top of slope runout length to an anchor trench should be a minimum of 0.91 m (3.0’).
2. Intermediate Anchoring
   a. If the embankment is high with long slopes, it may be necessary to provide intermediate anchoring to reduce the potential for membrane movement. In these cases, a bench may be added along the slope to provide stability of the EPDM geomembrane. Ballast applied over the membrane at the bench may provide the desired stability.
3. Toe of Slope / Bottom Ballast
   a. In some cases, especially on large reservoirs, temporary and/or permanent ballast (soil cover) may be required due to operating conditions or wind conditions. Additionally, and especially on embankments or dam facings, a toe of slope anchor trench may be required.
4. Inlet Pipe or Concrete Structure Terminations
   a. Where water enters or exits the lined area special considerations must be made for terminating the membrane to ensure that the termination remains intact. This may include prefabricated pipe boots or mechanical batten bar connections.

5. Mechanical Terminations
   a. Mechanical terminations shall be in accordance Firestone specifications and details as well as the design plans and specifications prepared by the design engineer.

D. Firestone EPDM Geomembrane Field Seaming Procedures

Two overlapping Firestone EPDM Geomembrane panels are seamed by means of a patented splicing tape or cap strip system. Section II.G of the Installation Guide provides details of the various steps required for correct seam procedures for the Firestone EPDM Geomembrane.

E. Flashings and Penetrations

1. Firestone recommends a minimum clearance of 300 mm (12.0″) between penetrations, pipes, conduits, etc.
2. Where possible, provide a minimum design height of at least 200 mm (8.0″) for all flashing terminations except pre-molded QuickSeam™ Pipe Flashings.
3. When installing mechanical bolt and batten bar terminations, ensure the surface termination provides a constant seal on the concrete or steel substrate.

F. Cover Soil Consideration and Access Ramps (base only or on side slopes)

1. Cover soil can and is commonly installed over the Firestone EPDM Geomembrane System:
   a. To provide protection from mechanical damage, but it is not required for UV.
   b. To provide habitat for fish and plant life.
   c. To provide additional protection from intense wildlife or equipment traffic.
   d. To provide a more aesthetically pleasing appearance.
2. Concrete and shotcrete can also be installed over and adjacent to the Firestone EPDM Geomembrane System to provider support pads or access ramps for equipment such as aerators, agitators, or other mechanical equipment.

G. Quality Assurance (Manufacturer and Contractor Experience)

1. A Firestone trained and approved installer is required to install the Firestone EPDM Geomembrane System for issuance of a Firestone material warranty.
2. Projects with membrane only warranties are not always inspected by Firestone.
3. Consultation:
   a. Firestone Building Products Technical Department is available for consultation with respect to any deviations from Firestone specifications and details.
   b. If there is any deviation from Firestone procedures without first obtaining written approval from the Firestone Building Products Technical Department, it may not be possible for Firestone to issue a site-specific warranty.

H. Job Site Considerations (Cautions and Warnings)

1. Protect the membrane against wind damage by ballasting the bottom and side slopes and designing the perimeter anchorage.
2. Ensure against mechanical damage from floating objects, ice, operating vehicles, equipment, etc.
3. Animals can present significant problems. Provide escape ladders, fence around reservoirs, and use a geotextile under the membrane to prevent damage.
4. Confirm compatibility of the membrane with all materials being stored or retained in conjunction with the membrane.
5. Confirm the suitability of the compacted subgrade to ensure that it will have sufficient structural integrity to fully support the membrane and specify repair as required.
6. Avoid contact with asphalt or petroleum products with components of the Firestone EPDM Geomembrane System.
7. Protect all components of the Firestone EPDM Geomembrane System from discharges or contact with petroleum products, greases, oils (mineral and vegetable), and animal fats. Contact Firestone Building Products Technical Department for suggested methods of protection.

I. Warranty
   1. Upon acceptance of the installed Firestone EPDM Geomembrane System by Firestone, the requested warranty shall be issued. Only Firestone supplied components are covered by the Firestone warranty.
   2. See Warranty Section for a listing of available Firestone warranties for Firestone EPDM Geomembrane installations.

PART 2 – INSTALLATION

Furnish and completely install the Firestone EPDM Geomembrane System in accordance with Firestone's published Installation Procedures, specifications, and details as well as project design requirements.

2.1 SUBMITTALS

A. Panel Layout
   a. The installation contractor shall provide a panel layout drawing or plan.
   b. The panel layout drawing shall be based on the specification and design details and will show the position and size of each panel and location of field seams.
   c. The placement of the panels will proceed according to this plan unless changes must be made due to unforeseen site conditions.

B. Installation Details
   The installation contractor shall provide copies of any special detail terminations that may be required.

C. Job Site Considerations (Cautions and Warnings)
   1. Ignition Sources
      Keep all adhesives, sealants, and cleaning materials (e.g., gas, heptane, etc.) away from ALL ignition sources (i.e., torches, flames, fire, sparks, etc.).
   2. Safety Instructions
      Consult container labels and Safety Data Sheets (SDS) for specific safety instructions.
   3. Storage
      Store Firestone EPDM Geomembrane in the original undisturbed plastic wrap in such a manner as to protect it from site damage, equipment and standing water.
   4. Membrane Contamination
      Do not use oil-based or bituminous-based materials with Firestone EPDM Geomembrane.
   5. Miscellaneous Contamination
      All bonding, splicing, and sealing surfaces must be free of dirt, moisture, and any other contaminates.
   6. Temperature
      When the outside temperature is below 4.4° C (40° F), certain combinations of temperature and humidity may cause condensation on the surface of solvent-based adhesives and primers. If this condition occurs, discontinue the application. When the ambient air conditions no longer cause condensation on the adhesive surfaces, reapply additional adhesive or primer and proceed.
      a. The consistency of sealants, adhesives and primers will begin to thicken as the temperature drops. To minimize this, the following is recommended:
         1) Start work with sealants, adhesives and primers that have been stored between 15.5 °C and 26.7 °C (60 °F and 80 °F). Insulated and/or heated boxes may be helpful.
         2) Complete test areas to determine if conditions will cause problems such as condensation with the application of the

material.

3) Stop the operation or change to another warm container when material becomes too thick to properly dry.

b. Do not use heat guns or open flames to dry adhesives and primers.

7. Cautions

a. Do not thin or modify any Firestone material.

b. Deliver materials to job site in their original containers as labeled by the manufacturer.

c. Follow manufacturer's directions for protection of materials prior to and during installation. Do not use materials, which have been damaged to the point that they will not perform as specified.

d. Care should be taken not to damage the Firestone EPDM Geomembrane during transport, loading, and unloading. The rolls must be stacked on a flat, clean surface, free of sharp protrusions that could damage the geomembrane.

e. Firestone EPDM Geomembrane does not require any special protection against weather conditions. However, all accessories need to be stored in a dry and cool place between 10° C and 25° C (50° F and 77° F), protected against extreme weather conditions.

D. Subgrade Inspection and Preparation

1. Inspection of Support Surface

a. As part of Construction Quality Control (CQC) and before installing the Firestone EPDM Geomembrane, quality of the soil subgrade and the surface condition should be examined to determine compliance with design requirements and Firestone minimum requirements for placement and seaming of the EPDM geomembrane panels.

2. Soil Preparation

a. The subgrade soils in intimate contact with the Firestone EPDM Geomembrane shall be smooth, compacted, and free of aggressive angle changes, ruts, loose stones, and angular stones in excess of 12.0 mm (0.5″). The subsoil should be roller compacted to minimum 95% of Standard Proctor Density and designed to resist any differential settling of the soil and facilitate the installation of a drainage system, if required. Adequate support can be provided in the following ways dependent on design requirements:

b. Excavate the unsuitable subgrade base soil, remove rock, vegetation, saturated soils etc., followed by smoothing and compacting of the base.

c. Backfill with layers of select fill material which are then compacted to the desired density and grade.

3. Vegetation

All plant growth should be removed from the base soil prior to grading and compaction to avoid any gas generation and compressible areas. Depending on the conditions, the use of water-based herbicide is recommended. The herbicide must not contain any chemicals, known to affect the Firestone EPDM Geomembrane lining system.

4. Compaction

a. All soils supporting the Firestone EPDM Geomembrane System must be roller-compacted smooth to between 90% and 95% of Standard Proctor Density and in accordance with methods and specifications provided by the Design Engineer.

b. The supporting surface should not contain any loose angular stones exceeding 12.0 mm (0.5″) in diameter. The final surface should be smooth and uniform with no abrupt changes in elevation.

c. If site conditions and soils are not acceptable, a protection layer of

minimum 10 oz/yd^2 (340 gm/m^2) non-woven geotextile should be provided. around concrete structures
The Firestone EPDM Geomembrane liner fixed to a concrete structure must be on firm soil subgrade. Compaction of backfill around such structures must be performed with particular care and shall be compacted to minimum 95% of Standard Proctor Density and must comply with Design Engineer requirements.

E. Underlayment Installation

1. Hard Substrates (concrete, treated soils, etc.)On hard substrates such as concrete, it is always necessary to install a protection layer, unless the Firestone EPDM Geomembrane is fully adhered. On a bituminous support (bituminous concrete, bitumen emulsion stabilized soil), a geotextile of at least 270 g/m^2 (8.0 oz/yd^2) or more should be used.
2. Installation of a geotextile between the subgrade soil and the Firestone EPDM Geomembrane is generally recommended. It is an absolute necessity on slopes where deposition of an additional support layer is often difficult. Depending on the type of soil and roughness of the surface, the mass of the geotextile may vary between 270 and 540 g/m^2 (8 and 16 oz/yd^2). The typical geotextile is a non-woven, needle punched fabric. There are other types of geosynthetics, such as geonets, and geonet composites that can provide gas and water drainage as well as protection and may be required dependent on the design.
3. Protection geotextiles are usually thermally welded at an overlap of 100.0 mm (4.0″). To avoid any wind uplift, the geotextile should be temporarily ballasted with sandbags.

F. Firestone EPDM Geomembrane Installation

1. The panels are unrolled and/or unfolded into the position indicated on the layout plan.
2. Generally, side slope panels are placed and temporarily ballasted (sandbags) first, followed by the bottom panels.
3. The Firestone EPDM Geomembrane panels are unrolled from the anchor trench down the side slopes and the geomembrane is temporarily anchored to avoid movement down slope.
4. No rocks or sharp objects are allowed under the geomembrane during placement. Damage to the supporting soil or geotextile underlayment must be avoided and must be repaired.
5. The side slope panels should extend a minimum of 1.65 m (5.0′) out onto the pond bottom for connecting with adjoining panels.
6. All Firestone EPDM Geomembrane panels must be allowed to relax at least 30 – 45 minutes prior to seaming or attachment to structures.
7. To avoid movement and wind uplift of the Firestone EPDM Geomembrane during installation, a temporary ballast (sandbags) is recommended. Such ballasting also facilitates the seaming operations.

G. Firestone EPDM Geomembrane Lap Seaming

1. The seaming of adjacent panels should be performed immediately after the relaxation of the Firestone EPDM Geomembrane.
2. All panels must be installed without tension and without wrinkles overlapping by at least 100 mm (4.0″). All seams on side slopes must be parallel with the slope (i.e., up and down the slope). Horizontal field seams on slopes are not allowed.
3. For soft or rough subsoils, a board or piece of conveyor belt is used under the Firestone EPDM Geomembrane in the area of the seam. The seaming board is moved by means of a rope as the seaming process progresses.

4. Seams should not be made under the following conditions:
   a. Moisture
   b. Soft subgrade soil
   c. Condensation on the primer or on the geomembrane
   d. Rainfall
   e. Ponded water
   f. Excessive wind/dusty conditions
   g. Other contaminants
5. Moisture in the seam will cause failure of the seam.
6. Use only Firestone-approved products. Non-Firestone products cannot be approved to make seams and will void any warranties.
7. Clean the seam area with water and dry before applying the QuickPrime™ Plus, if it is contaminated (mud, etc.).
8. Stop the application of the QuickSeam™ Tape and FormFlash™ when the atmospheric conditions are unfavorable (humidity, condensation on the QuickPrime Plus or rain).
9. Movement of the Firestone EPDM Geomembrane during application of the QuickSeam Splice Tape and during the first few minutes after application should be avoided.
10. Positioning of a large number of panels than cannot be seamed together in one day is not allowed.

H. Firestone EPDM Geomembrane Seaming Procedures
1. 150 mm (6.0″) wide cover strip tape seaming system:
   a. Position the Firestone EPDM Geomembranes
   b. Both adjacent panels are positioned with sufficient overlap 100 mm (4.0″).
   c. The panels should lay flat and without any tension.
2. Clean the Overlap
   If there is dirt in the overlap area, clean the overlap area using a broom, air blower or clean cotton cloth. Soil should not be allowed to contaminate the Firestone EPDM Geomembrane in the splicing area.
3. Apply the QuickPrime
   a. Stir the QuickPrime Plus before and during use and transfer a small quantity 1.5 L (0.4 gal) to a bucket. The Primer is applied with a scrubbing pad.
   b. Immerse the scrubbing pad in the QuickPrime Plus, keeping the pad horizontal and
   c. let excess of QuickPrime Plus drip off the pad.
   d. Each pad immersed in QuickPrime Plus will cover an area of about 0.92 m (3.0’) in length, over a width 100 mm (4.0″) one side.
   e. Change scrubbing pads every 61.0 m (200.0’) or when the primer has dried on the pad. Used pads are to be discarded at the end of the working day.
   f. Additional priming is required at factory seams, at the intersection of two seams and to areas covered with adhesive.
   g. Both sides to be seamed are treated simultaneously to obtain an identical drying time.
   h. Prime a minimum of 76.0 mm (3.0″) on either side of the overlap edge.
4. Test QuickPrime Plus for Readiness (use the touch-push method)
   Allow the primer to flash off. The primer needs to dry completely (5 – 10 minutes) before installing the tape. Check its dryness by touching the primed surface with a clean and dry finger to be certain that the primer does not string. When touching the primer, push forward on the primed surface at an angle to ensure that the primer is dry throughout its thickness. If either motion exposes a stringy primer when the finger is lifted, then the splice is not ready for installing the tape.

Flash-off time will vary depending on ambient air conditions (relative humidity, wind).

5. Install the QuickSeam Cover Strip
   a. Place the roll of QuickSeam Cover Strip on the ground a few feet ahead of the overlap starting point, positioned so that it unrolls from the top of the roll (release paper will be on top).
   b. Starting a minimum of 76.0 mm (3.0″) ahead of the edge of the panel, center the QuickSeam Cover Strip roll on the overlap edge and unroll onto the clean and primed surface.
   c. Advance the roll keeping the cover strip centered over the overlap edge. Peel the release paper as you apply the cover strip.
   d. When it is necessary to cover a longer overlap edge than the length of one roll of cover strip, it is required to overlap the next roll a minimum of 25.0 mm (1.0″) onto the installed roll before continuing to unroll the second roll. When the end of the overlap is reached, extend the cover strip 76.0 mm (3.0″) before cutting.
6. Roll the QuickSeam Cover Strip
   Apply pressure along the entire length of the cover strip by hand to completely mate the two surfaces. Using a 38.0 mm (1.5″) wide silicone rubber roller, roll the QuickSeam Cover Strip with positive pressure towards the outside edge then along the entire length of the cover strip.
7. Install Cover Strip at the End of Seaming Runs or T-Joints
   a. At the 25.0 mm (1.0″) laps of the cover strip it is required to install a 300 mm (12.0″) long section of cover strip parallel with the lap edge and centered over it. Before installing the cover strip, the area to be covered must be cleaned and primed in the normal fashion.
   b. When cover strips intersect at any point, a 300 mm (12.0″) long section of cover strip shall be installed centered over each T-joint area.
   c. Round the corners on the 300 mm (12.0″) section and then install it onto the dry primed area. Roll with the silicone rubber roller in the same manner as done to the cover strip.
8. Special Considerations – End Laps, T-Joints, etc.
   a. End Laps:
      When the splice is greater in length that the QuickSeam Cover Strip, the adjoining 150 mm (6.0″) QuickSeam Cover strip must be overlapped a minimum of 25 mm (1.0″)
   b. T-Joints:
      Apply a section of Firestone QuickSeam Flashing or QuickSeam Joint Cover over the T- Joint area.

I. Overlapped Inseam Double Faced Tape System (alternative to 150 mm (6.0″) wide cover strip tape seaming system) **NOTE:** This is an optional method only as the Cover Strip Seam is the method most commonly used in geomembrane applications.
1. Position the Firestone EPDM Geomembrane
   a. Both adjacent panels are positioned with a minimum overlap of 100 mm (4.0″).
   b. The panels should lay flat and without any tension.
   c. A marker is used to indicate on the lower sheet the exact location where the splice tape is to be installed.
   d. The mark shall be situated between 10 and 20 mm (0.4″ and 0.8″) from the edge of overlapping sheets and is repeated every 0.91 m (3.0′) of seam length.
2. Tack-back the Overlap
   a. The upper Firestone EPDM Geomembrane panel edge is folded back 254.0 mm (10.0″) and the fold is tacked down every 0.91 m (3.0′) with

QuickPrime Plus.

b. If there is dirt in the overlap area, clean the overlap area using a clean cotton cloth soaked in QuickPrime Plus. Soil should not be allowed to contaminate the Firestone EPDM Geomembrane in the splicing area.

3. Apply the QuickPrime
   a. Stir the QuickPrime Plus before and during use and transfer a small quantity 1.5 L (0.4 gal) to a bucket. The Primer is applied with a scrubbing pad.
   b. Immerse the scrubbing pad in the QuickPrime Plus, keeping the pad horizontal and let excess of QuickPrime Plus drip off the pad.
   c. Apply the QuickPrime Plus uniformly along the length of the overlap seam area, with long back and forth strokes, both to the lower face of the top sheet and the upper face of the lower sheet, until the surfaces become a dark gray in color. Avoid traces and wet spots. Each pad immersed in QuickPrime Plus will cover an area of about 0.91 m (3.0′) in length, over a width of 100 mm (4.0″) one side.
   d. Change scrubbing pads every 61.0 m (200.0′) or when the primer has dried on the pad. Used pads are to be discarded at the end of the working day.
   e. Additional priming is required at factory seams and at the intersection of two seams.
   f. Both sides to be seamed are treated simultaneously so as to obtain a similar drying time.
   g. Test QuickPrime Plus for readiness. Allow the primer to flash off. The primer needs to dry completely (5 – 10 minutes) before installing the tape. Check its dryness by touching the primed surface with a clean dry finger to be certain that the primer does not string. When touching the primer, push forward on the primed surface at an angle to ensure that the primer is dry throughout its thickness. If either motion exposes a stringy primer when the finger is lifted, then the splice is not ready for installing the tape. Flash-off time will vary depending on ambient air conditions (relative humidity, wind...).
4. Install the QuickSeam Splice Tape
   a. Apply the QuickSeam Splice Tape (with release paper intact) on the bottom sheet, aligning the edge of the release paper with the markings.
   b. Immediately roll the splice with a 100 mm (4.0″), wide silicone sleeved hand roller or other methods to achieve 100% bond area.
   c. When it is necessary to start a new roll of tape to continue seaming, it is required to overlap the installed tape by 25 mm (1.0″) minimum before unrolling the second roll.
5. Check the QuickSeam Splice Tape Alignment
   a. The Firestone EPDM Geomembrane is released, and the seam is closed by hand. To avoid wrinkling, close the splice gently with a movement perpendicular to the splice. The upper sheet must fall without wrinkling or tension onto the lower sheet. Allow the top sheet to rest on top of the tape's paper backing.
   b. Trim the top sheet as necessary to assure that 10 – 15 mm (0.4″ – 0.6″) of the QuickSeam Splice Tape will be exposed on the finished splice.
6. Remove the Paper Backing
   a. To remove the paper backing from the tape, first roll back the upper Firestone EPDM Geomembrane panel over the installed QuickSeam Splice Tape. Peel the paper backing off the QuickSeam Splice Tape by pulling against the weight of the bottom sheet at a 45° angle to the tape.
   b. Allow the top sheet to fall freely onto the exposed QuickSeam Splice Tape. Mate the entire length of the seam as the release paper is being removed.

7. Roll the Overlap Seam
    a. Finally, roll the seam area by means of a 38 mm (1.0″) silicone rubber roller, first across the splice and then along the entire length of the splice.
    b. For uneven or soft subgrades, a seaming board is required directly under the seam area. The seaming board is moved as the seam is completed.
8. Install QuickSeam Joint Covers or QuickSeam Cover Strip at the End of Seaming Runs and T-Joints
    a. Install a 146 mm (5.75″) QuickSeam Joint Cover over end laps or T-joints. Before installing the Joint Cover, the area to be covered must be cleaned and primed in the normal fashion. Roll the Joint Cover with the roller in the same manner as the overlap seam.
    b. At 25 mm (1.0″) laps in the seam tape it is required to install a 150 mm x 150 mm (6.0″ x 6.0″) section of cover strip centered over the seam edge and over the lap. Before installing the cover strip, the area to be covered must be cleaned and primed in normal fashion.
    c. Trim seam so that the edge of seam tape and the edge of the geomembrane are flush beneath the T-joint area. Apply a 228 mm (9.0″) long section of cover strip centered over the seam step-off.
    d. Round the corners of the cover strip section and then install it onto the dry-primed area. Be sure to center the cover strip so that it extends 76 mm (3.0″) in each direction from the center of the overlap and the edge of the seam. Roll with the roller in the same manner as done with the overlap seam.
9. Special Considerations – End Laps, T-Joints
    a. End Laps:
    When the splice is greater in length that the QuickSeam Cover Strip, the adjoining 150 mm (6.0″) QuickSeam Cover strip must be overlapped a minimum of 25 mm (1.0″).
    b. T-Joints:
        1) Apply a section of Firestone QuickSeam Flashing or QuickSeam Joint Cover over the T-Joint area.
        2) After the primer has dried, apply a continuous bead of Lap Sealant 0.52 mm x 6.35 mm (0.375 x 0.25″) around the cover strip section edge. Using the supplied Lap Sealant tool, feather the Lap Sealant immediately, taking care to leave a mound of sealant directly over the cover strip section edge.

J. Geomembrane Termination
The Firestone EPDM Geomembrane must be restrained in place to prevent movement down the slope and/or by wind. Depending on the design requirements, the Firestone EPDM Geomembrane may be anchored at various locations (i.e., top of embankment, toe of slope, or at an intermediate bench).

1. Top Anchoring the Firestone EPDM Geomembrane
    a. The top of the slope should be rounded to provide a smooth transition for the liner to reduce stress. An anchor trench must be excavated around the entire perimeter of the impoundment. The excavated soil material can be placed next to the trench for backfilling after Firestone EPDM Geomembrane placement. The anchor trench should be a minimum of 0.91 m (3.0′) back from the top of slope. The edge of the trench should be rounded and free of protrusions to reduce stress and damage on the Firestone EPDM Geomembrane.
    b. If considerable soil movements are expected during the filling of the pond, temporary anchoring should be provided at the crest so that the Firestone EPDM Geomembrane underlayment can move without being subjected to excessive tension. Partial ballasting in the anchor trench is

immediately provided and final backfill is done at a later stage. To avoid movement and wind uplift of the Firestone EPDM Geomembrane during installation, temporary ballast (sandbags) is recommended. Such ballasting also facilitates the seaming operations.

c. The Firestone EPDM Geomembrane must be kept in place to prevent down slope movement and/or wind uplift. Depending on the design requirements and potential for movement, the Firestone EPDM Geomembrane may be anchored at the top of the embankment (anchor trench), at the bottom, or at an intermediate bench.

d. The top of slope anchor is commonly accomplished by burying the Firestone EPDM Geomembrane in a trench or by holding it in place through soil backfilling or ballasting. The dimensions of the trench depend on the expected stress and pullout calculations that are provided by the design engineer and are reflected in the design drawings.

e. The Firestone EPDM Geomembrane should extend down the front (inside) of the trench wall and fully extend across the bottom of the trench.

2. Intermediate Anchors

a. If the embankment is high and slopes are relatively long, it may be necessary to provide an intermediate bench at mid slope to accommodate the potential for Firestone EPDM Geomembrane movement. A bench may be added by the design engineer to provide slope stability of the embankment in addition to restricting downslope movement and allowing soil cover stability.

b. The Firestone EPDM Geomembrane should be held in place by prefabricated ballast, anchor trench in the bench, or cover soil.

3. Toe of Slope / Bottom Ballast

In some cases, especially on large reservoirs, temporary and/or permanent ballast (soil cover) may be required due to operating conditions or wind conditions. Additionally, and especially on embankments or dam facings, toe of slope anchor trenches may be required as part of the design.

4. Inflow Terminations

Dependent on the design requirements, especially on reservoirs and canals, the point where the water enters the lined area must have proper termination as well as protection of the lining system. The area of inflow must be anchored against uplift and turbulence and must be protected by concrete or riprap as required in the design documents.

K. Terminations

1. Flashing Walls

a. Connections of the Firestone EPDM Geomembrane to concrete/masonry structures shall comply with the following:

1) Soil around the concrete/masonry shall be compacted to 95% standard Proctor density.

2) Connection surfaces shall be smooth, clean and free of any sharp protrusions.

3) Firestone EPDM Geomembrane shall be fully adhered to the walls using bonding adhesive or splice adhesive as required.

4) Corners are installed with QuickSeam Corner Flashings or by using QuickSeam FormFlash.

5) The detail of the Firestone EPDM Geomembrane connection with the wall shall not permit any leakage.

6) Firestone EPDM Geomembrane is fastened at the ends or top using termination bars and fasteners adapted to concrete/masonry. Firestone Water Block sealant can be placed

between the Firestone EPDM Geomembrane and the wall as shown in Firestone details. Alternatively, the design specifications and details may require specific mechanical attachment and sealing.

L. Flashing Penetrations

1. To avoid any differential settling, the backfill around the structures should be placed in successive layers, each compacted to 95% standard Proctor density.
2. If possible, avoid cutting the Firestone EPDM Geomembrane at details. In some cases, however, as with corner details against concrete/masonry walls, pipe connections, etc., a cut in the Firestone EPDM Geomembrane liner will simplify the installation. In such cases, QuickSeam FormFlash (unvulcanized EPDM sheet) will be used to provide a tight connection when properly installed according to the manufacturer's instructions.
3. For larger diameter pipes, connections to pipes shall be made by means of unvulcanized EPDM sheet, QuickSeam FormFlash, as follows:
   a. Pipe must be firmly anchored, and the pipe wall temperature must not exceed 80° C (175° F) during service
   b. Make a circular cut-out in the Firestone EPDM Geomembrane, measuring approximately 80% of the pipe diameter.
   c. Pull the Firestone EPDM Geomembrane over the pipe.
   d. Pipe and Firestone EPDM Geomembrane are sealed by means of a piece of QuickSeam FormFlash.
   e. Mechanically secure the connection with double stainless-steel clamping collar or as shown in the design details for the project.
4. Bottom Drains
   a. The Firestone EPDM Geomembrane shall be mechanically fastened at the location of concrete structures designed for water discharge.

M. Firestone EPDM Geomembrane Repair and Maintenance Procedures

1. A small tear or hole in the Firestone EPDM Geomembrane may be repaired by placing a piece of the 150 mm (6.0″) cover strip over the area to be repaired with 75.0 mm (3.0″) extending all directions beyond the repair. The patch must be round, oval, or contain rounded corners.
2. 150 mm (6.0″) Diameter QuickSeam Joint Cover patches
   a. Small holes may be repaired using the QuickSeam Cover Patch.
   b. Clean the damaged area by scrubbing with a cloth soaked in QuickPrime Plus. The surface should be dark gray in color with no streaking. Allow the area to dry.
   c. Repair the larger tears or holes by cutting a piece of Firestone EPDM Geomembrane that extends beyond the tear or hole by a minimum of 100 mm (4.0″) extending all directions beyond the repair. Tape all edge seams as per Section II.G using the cover strip seaming tape system.
3. Annual maintenance inspection of the EPDM installation is recommended to detect any problems or potential problems. This inspection process will limit costs if damage has occurred. As a minimum, the following items should be included:
   a. Visual inspection of the Firestone EPDM Geomembrane, seams, and terminations.
   b. Measurement of any leakage rate at collection sump and monitoring of water level.
   c. Inspect all gas drainage vents for proper operation.
   d. Inspect for any historical or current overflowing of the pond, canal, or water feature.
   e. Inspect and sample the chemical composition and the temperature of the liquids coming into contact with the Firestone EPDM Geomembrane.

f. Inspect any cover materials for stability and movement that could damage the EPDM.

N. Seam Test Procedures

1. Test Seam or Trial Seam – Destructive Mechanical Testing
   a. At the start of a shift and every 4 hours, the seaming crew should complete a trial seam of 3.0 m (10.0′) in length.
   b. From the trial seam, 25 mm (1.0″) wide strips are cut for testing on a field tensiometer – 3.0″ peel and 3.0″ – shear. Shear and peel tests are carried out in general accordance with ASTM D413 and D7272 with the strain rate of 500 mm/min (20 in/min) for both peel and shear due to the elastomeric properties of Firestone EPDM Geomembranes. Trial seam test strips and destructive samples should be allowed 24 hours of cure time prior to testing.
   c. The minimum requirements are as follows:
      1) Shear: 6.15 kN/m (35 lb/in) at 200% strain.
      2) Peel: 2.11 kN/m (12 lb/in) in cohesive bond mode.
   d. The same minimum requirements can be expected for specimens taken from a destructive field seam cut out when required.
2. Non-Destructive Test (NDT) Procedure
   a. Air Lance Test (ASTM D4437)
      1) Inspect all field seams for unbonded areas using an air nozzle directed on the upper seam edge and surface to detect loose edges, riffles indicating unbonded areas within the seam, or other undesirable seam conditions.
      2) Check all bonded seams using a minimum 345 kPa (50 lb/in2) air supply directed through a 4.8 mm (0.18″) nozzle, held not more than 50 mm (2.0″) from the seam edge and directed along the seam edge.

O. Protection of the Firestone EPDM Geomembrane During Service

1. Under all operating conditions, protection of the Firestone EPDM Geomembrane will be required and should be designed by a professional engineer. Table II.1 below illustrates some recommendations for the protection of exposed EPDM geomembrane against possible damage.
2. Protection of the geomembrane may be realized in the following ways and must be designed by a professional engineer:
   a. Base
      1) Sand cover (minimum thickness: 300 mm (12.0″) – protection with geotextile usually not required.
      2) Gravel (minimum thickness 300 mm (12.0″) – protection with geotextile required.
      3) Prefabricated blocks – protection with geotextile required.
   b. Slopes
      1) Rock covering (riprap) – This solution is applicable for slopes less than 3:1. A transition layer (geotextile plus sand cover) with a minimum thickness of 300 mm (12.0″) is required. Rock size depends on the level of the impacting forces, such as wave height.
      2) Prefabricated blocks – Stability investigations of prefabricated blocks and installation of a redundant layer of EPDM may be required.
      3) Cast-in-place concrete – Stability investigations and installation of a redundant layer of EPDM may be required.
      4) Shotcrete – installation of a geotextile may be required on steep

slopes (>2H:1V). Additionally, wire reinforcement may be required. (If wire reinforcement is used contact Firestone Building Products Technical Department for additional protection requirements.)

TABLE II-1: PROTECTION RECOMMENDATIONS

PROTECTION AGAINST	RECOMMENDATION
Wind	• Ballast at the bottom or on slopes • Correct section of anchor trench depending on pullout calculations
Waves	• Mechanical protection of the embankments depending on slope (rock covering, concrete pavement, cast-in-place concrete)
Floating objects (dead wood, debris)	• Small ponds: cleaning • Large ponds: protection of side slopes
Ice	• Mechanical protection of embankments
Animals	• Ladders • Fence around reservoir • Geotextile under the Firestone EPDM Geomembrane on slopes
Vandalism	• Enclosure around reservoir • Mechanical protection of embankments
Operating vehicles	• Protection of the Firestone EPDM Geomembrane with soil or a sand bed [min. 18″ (450mm)] • Access ramp protection of embankments
Local turbulence with water velocity exceeding 4 ft/sec (1.2 m/sec) (internal agitator or canals)	• Protection with designed cover system or ballast

Table II-1: Protection Recommendations

P. Warranty

1. Upon inspection and acceptance of the installed Firestone EPDM Geomembrane System, the requested warranty shall be issued. Only Firestone supplied components are covered by the Firestone warranty.

END OF SECTION

Firestone
BUILDING PRODUCTS

FIRESTONE PONDGARD™ LIMITED LIFETIME WARRANTY

Firestone Building Products Company, LLC d/b/a Firestone Specialty Products ("Firestone"), located at 250 West 96th Street, Indianapolis, IN 46260, subject to the terms, conditions, and limitations set forth herein, warrants for as long as the original owner ("Owner") named below that the Firestone PondGard membrane (the "PondGard") is fish friendly and that should any area of the Firestone PondGard experience a leak due to normal weathering or a manufacturing defect, Firestone will, at its sole option, repair the membrane, provide sufficient Firestone materials to repair the PondGard membrane or provide sufficient Firestone PondGard to replace the area that leaks.

TERMS, CONDITIONS, AND LIMITATIONS

1. **What Products are Covered by this Limited Lifetime Warranty**. This Limited Lifetime Warranty covers your Firestone PondGard sold on or after April 15, 2015 so long as the Firestone PondGard membrane is correctly installed in accordance with Firestone's Technical Specifications for normal use and in approved applications. This Limited Lifetime Warranty extends only to the Firestone PondGard and does not cover the installation of the PondGard, any third party fabrication of the PondGard, or any non-Firestone brand materials or accessories furnished or installed in connection with the PondGard.
2. **What Products and Services are not Covered by this Limited Lifetime Warranty**. This Limited Lifetime Warranty does not cover the installer's workmanship in the installation of the Firestone PondGard, or any materials or accessories not manufactured or supplied by Firestone. This Limited Lifetime Warranty does not cover any third party adhesives, sealants, or coatings used on the Firestone PondGard.
3. **Term.** This Limited Lifetime Warranty is a non-pro-rated warranty.
4. **How to Submit a Warranty Claim**. If you believe that you have a warranted claim due to a manufacturing defect in a Firestone PondGard membrane, you must give notice in writing or by telephone to Firestone within thirty (30) days of such occurrence. Written notice may be sent to Firestone at the street address or fax number shown within this Limited Lifetime Warranty. Evidence of this notice shall be the receipt by Owner of a Firestone PondGard Limited Lifetime Warranty Claim Notification form. The Owner's notice to Firestone will serve as authorization for Firestone or its agent to investigate the claim. Should the required notice not be given, the alleged defect and all further rights under this Limited Lifetime Warranty shall be deemed waived by the Owner, and this Limited Lifetime Warranty shall become null and void.
5. **Investigation of Warranty Claims**. If upon investigation, Firestone determines that the leak is the result of ordinary exposure to the elements or a manufacturing defect and not otherwise excluded by the terms of this Limited Lifetime Warranty, the Owner's sole and exclusive remedy and Firestone's liability will be limited to Firestone, at its sole option, repairing the PondGard or offering the Owner replacement PondGard or other Firestone repair products to repair or replace the area that leaks. Firestone shall not be obligated to perform repairs or replacements under this Limited Lifetime Warranty unless and until the area to be repaired or replaced is accessible, clean, dry and free from all water, dirt, sludge, animal wastes, residuals and/or liquids of any kind. Should the investigation reveal that the claim is excluded under the Terms, Conditions, and Limitations set forth below, the Owner is responsible for payment of the investigation costs and for any repairs affected during the investigation. Failure by the Owner to pay for these costs shall render this Limited Lifetime Warranty null and void. To the extent repairs that are the Owner's responsibility are not completed during the investigation, Firestone will advise the Owner of the type and/or extent of repairs required to be made at the Owner's expense that will permit this Limited Lifetime Warranty to remain in effect. Failure by the Owner to properly make these repairs in a reasonable manner and within a reasonable time shall render this Limited Lifetime Warranty null and void.
6. **What Claims are Excluded by this Warranty.** Firestone shall have no obligation under this Limited Lifetime Warranty, or any other liability, now or in the future if a leak or defect in the Firestone PondGard is caused by: (a) Natural forces, disasters, or acts of God including, but not limited to, hurricanes, tornadoes, hail, lightning, earthquakes, atomic radiation, insects, or animals; (b) Act(s), conduct or omission(s) by any person, or act(s) of war, which damages the Firestone PondGard or which impairs the product's ability to perform or resist leaks; (c) Failure by the Owner to use reasonable care in maintaining the Firestone PondGard, said maintenance to include, but not limited to those items listed on this Limited Lifetime Warranty; (d) Acid, oil, harmful chemicals, or the reactions between them; (e) any

atypical atmospheric conditions or weather, which damages the PondGard, or which impairs the PondGard's ability to resist leaks; (f) any penetrations, alterations or repairs to the PondGard not approved in writing by Firestone; (g) improper site preparation or covering materials, or improper application or installation; (h) excessive pressures or stresses from any source; or (i) any product not furnished by Firestone.

7. **Exclusive Remedy and Non Assignability**. The Limited Lifetime Warranty on the PondGard herein is given in lieu of all other warranties, either expressed or implied, and by accepting delivery of the PondGard, Owner waives all other warranties and/or remedies, except those specifically granted hereunder. This Limited Lifetime Warranty is extended to the Owner and is non-transferable and non-assignable and there are no third-party beneficiaries to this Limited Lifetime Warranty. This Limited Lifetime Warranty becomes an obligation of Firestone only upon receipt of full and final payment for the PondGard and execution by a duly authorized representative of Firestone.
8. **No Waiver**. Firestone's failure to enforce any of the terms or conditions stated herein shall not be construed as a waiver of such provision or of any other terms and conditions of this Limited Lifetime Warranty.
9. **Choice of Law.** This Limited Lifetime Warranty shall be governed and construed in accordance with the laws of the State of Indiana without regard to the conflicts of laws thereof.
10. **Handling of Disputes**. In the event of a dispute, controversy, or claim between the Owner and Firestone concerning this Limited Lifetime Warranty, the Owner and Firestone agree that neither party will commence or prosecute any suit, proceeding, or claim other than in the courts of Hamilton County in the State of Indiana or the United States District Court, Southern District of Indiana, Indianapolis Division. Each party irrevocably consents to the jurisdiction and venue of the above identified courts and waives any rights to challenge or otherwise raise questions of personal jurisdiction or venue in any action commenced or maintained in such courts.

THIS LIMITED LIFETIME WARRANTY SHALL BE THE OWNER'S SOLE AND EXCLUSIVE REMEDY AGAINST FIRESTONE, AND FIRESTONE SHALL NOT BE LIABLE TO OWNER OR TO ANY THIRD PARTY FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY, PUNITIVE OR OTHER DAMAGES INCLUDING BUT NOT LIMITED LIFETIME TO CLAIMS FOR PERSONAL INJURY OR DEATH, PROPERTY DAMAGE, ENVIRONMENTAL DAMAGE, DAMAGE TO THE SUBSTRATE, OR DAMAGE TO THE CONTENTS OF THE PONDGARD. THIS LIMITED LIFETIME WARRANTY CANNOT BE AMENDED, ALTERED, OR MODIFIED IN ANY WAY EXCEPT IN WRITING SIGNED BY AN AUTHORIZED REPRESENTATIVE OF FIRESTONE. NO OTHER PERSON HAS ANY AUTHORITY TO BIND FIRESTONE WITH ANY REPRESENTATION OR WARRANTY, WHETHER WRITTEN OR ORAL. FIRESTONE SPECIFICALLY DISCLAIMS ALL LIABILITY, UNDER ANY THEORY OF LAW, ARISING OUT OF THE INSTALLATION OR PERFORMANCE OF, OR DAMAGES SUSTAINED BY OR CAUSED BY, MATERIALS NOT FURNISHED BY FIRESTONE. THIS LIMITED LIFETIME WARRANTY SUPERSEDES AND IS IN LIEU OF ALL OTHER WARRANTIES OR GUARANTEES WHETHER WRITTEN, ORAL, OR EXPRESS. FIRESTONE SPECIFICALLY LIMITS ANY IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE TO THE TERM OF THE LIMITED LIFETIME WARRANTY, UNLESS A SHORTER PERIOD IS PERMITTED BY LAW OR UNLESS A FULL DISCLAIMER IS OTHERWISE PERMITTED BY LAW. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

Firestone
BUILDING PRODUCTS

Firestone PondGard Limited Lifetime Warranty Claim Notification Form

Return this completed form along with proof of purchase for the PondGard membrane to:

FIRESTONE BUILDING PRODUCTS
250 WEST 96TH STREET
INDIANAPOLIS, IN 46260
Attn: Lining Warranty Services Department
Fax: 317-575-7002

Owner Information (address must be that of the project site)**:**

Name**:**_____

Street Address**:**_____

City, State, Zip**:**_____

Owner Contact**:**_____

Phone**:**_____

Email**:**_____

Project Size (in square feet)**:**_____

Dimensions (length x width)**:**_____

Installer Information:

Installation Date**:**_____

Installer**:**_____

Street Address**:**_____

City, State, Zip**:**_____

Purchase Information:

Distributor/Installer/Vendor**:**_____

Street Address**:**_____

City, State, Zip**:**_____

Proof of Purchase Must be Attached (a warranty claim cannot be processed without valid proof of purchase, for example - receipt(s), contract, paid invoice or other purchase documents.)

Firestone reserves the right to withhold the processing of any claim until all the required information is provided to Firestone. Firestone reserves the right to require submission of samples of the PondGard membrane that contain representative evidence of any alleged defect. The sample or samples must be shipped to Firestone for inspection at the owner's expense. Submission of non-Firestone materials for review will result in a minimum $500 service charge for identification or other analysis.

SECTION 02265
FINISH GRADING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Place, level, and compact topsoil to finish grade all areas per Drawings.

B. Related work:
Section 01510: Site Access.
Section 01732: Selective Demolition.
Section 02000: Site Work.
Section 02100: Site Preparation.
Section 02210: Site Grading.
Section 02260: Planting Soils.
Section 02265: Finish Grading.
Section 02276: Silt Fence.
Section 02400: Storm Drainage Utility Piping.
Section 02751: Site Concrete.
Section 02810: Irrigation.
Section 02935: Sodding.
Section 02950: Trees, Shrubs, and Groundcover.
Section 03350: Concrete Finishing.
Section 07900: Joint Sealants.

1.2 PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, sidewalks, utilities, paving and curbs.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: See Section 02220 – Excavating, Backfilling, and Compacting.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify site conditions and note irregularities affecting work of this Section. Do not finish grade until drainage, utilities, and paving work have been completed.

B. Beginning work of this Section means acceptance of existing conditions.

3.2 SUBSOIL PREPARATION

A. Eliminate uneven areas and low spots. Remove debris, roots, branches, and stones, in excess of ½ inch in size. Verify that subsoil grades are correct to achieve finished elevations per Drawings.

3.3 PLACING TOPSOIL

A. Place topsoil to achieve grading and elevations per Drawings.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil, eliminating rough or low areas, to achieve elevations per plans, smoothly blended to meet existing grades. Maintain levels, profiles, and contours of subgrade. All areas are to have a smooth, even finished surface; free of depressions and uneven areas. Provide for positive drainage in all areas. Drag or rake to achieve a smooth surface.

D. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.

E. Manually spread topsoil around trees, plants, building, and concrete curbs to prevent damage. Where topsoil for lawns is adjacent to paving edges, bring finished grade to 1" below top of pavement (after compaction).

E. Remove surplus subsoil and topsoil from site.

G. Leave stockpile area and site clean and raked, ready to receive sod.

H. In all areas, provide a smooth transition to existing grades in surrounding areas. Add topsoil as required.

3.4 TOLERANCES

A. Top of Topsoil: plus or minus 1" for lawn areas.

3.5 ACCEPTANCE

A. Receive approval from Owner’s Representative that finished grading complies with Drawings and Specifications. Correct any problems identified by Owner’s Representative, at Contractor’s expense, prior to sodding operations.

END OF SECTION

SECTION 02276
SILT FENCE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers the requirements for a temporary barrier of siltation screen to trap sediment and debris in areas as needed to protect site from erosion. Contractor may use either a geotextile silt fence or hay bales, at his option.

B. Related work:Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these specifications.
Section 02000: Site Work.
Section 02100: Site Preparation.
Section 02210: Site Grading.
Section 02220: Excavating, Backfilling, and Compacting.
Section 02260: Planting Soils.
Section 02265: Finish Grading.
Section 02400: Storm Drainage Utility Piping.

PART 2 - PRODUCTS

2.1 SILT FENCE FABRIC

A. The fabric shall be geotextile filter cloth fabric and meet the following criteria.
Minimum Acceptable Fabric Properties Value Test Method
Grab Tensile Strength (lbs) 90 ASTM D1682
Elongation at Failure (%) 50 ASTM D1682
Mullen Burst Strength (PSI) 190 ASTM D3786
Puncture Strength (lbs) 40 ASTM D751
Equivalent Opening Size 40 - 80 US STD Sieve CW - 02215
Ultraviolet Radiation Stability % 90 ASTM - G - 26

2.2 FENCE POSTS

A. Steel T posts shall be 6' - 0" in length and painted green.

2.3 WIRE FENCE

A. Wire fence shall be a maximum of 14 gauge with a maximum 6-inch mesh opening.

PART 3 - EXECUTION

3.1 IMPLEMENTATION

A. Construct the silt fence in locations susceptible to erosion. Securely attach wire fence to the fence posts with wire ties. Filter cloth shall be secured to wire fence every 24 inches at top and mid section.

B. Siltation fences shall be kept free of debris that would damage the filtering material or impede the flow of water.

C. During construction, maintain silt fence to be in good condition and to effectively collect silt. Repair fencing as needed to keep fence upright and fully functional. Remove silt throughout construction to maintain full height of fence.

D. Remove all silt fences / dikes at conclusion of project.

END OF SECTION

SECTION 02400
STORM DRAINAGE UTILITY PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
   1. Drains.
   2. Precast concrete manholes.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene-monomer rubber.

B. HDPE: High density polyethylene.

C. LLPE: Linear low-density, polyethylene plastic.

D. PE: Polyethylene plastic.

E. PVC: Polyvinyl chloride plastic.

F. RCP: Reinforced concrete pipe.

G. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Joints shall be at least silt tight, unless otherwise indicated.

1.5 SUBMITTALS

A. Product Data: For the following:
   1. Drains
   2. Pipe
   3. Junction Boxes and Inlets

B. Shop Drawings: For the following:
   1. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.

C. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle junction boxes, catch basins, and stormwater inlets according to manufacturer's written rigging instructions.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.2 PE PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings NPS 10 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
   1. Silt tight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.

B. Corrugated PE Pipe and Fittings NPS 12 to NPS 48: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
   2. Silt tight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

C. Corrugated PE Pipe and Fittings NPS 56 and NPS 60: AASHTO MP7, Type S, with smooth waterway for coupling joints.
   1. Silt tight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

2.3 PVC PIPE AND FITTINGS

A. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 40 pipe, with plain ends for solvent-cemented joints with ASTM D 2466, Schedule 40, socket-type fittings.

B. PVC Sewer Pipe and Fittings, NPS 15 (DN 375) and Smaller: ASTM D 3034, SDR 35 with bell and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

C. PVC Sewer Pipe and Fittings, NPS 18 (DN 450) and Larger: ASTM F 679, T-[1] [2] wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

D. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

2.4 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, with bell-and-spigot or groove and tongue ends. Wall B.

B. ASTM C 76, with groove and tongue ends and gasketed joints with ASTM C 443, rubber gaskets, “Omni-flex” or equal. Class III, Wall A

2.5 NONPRESSURE-TYPE PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.6 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
   1. Top-Loading Classification(s): Extra-heavy duty.
   2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.7 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
   1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
   2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.8 CATCH BASINS

A. Standard Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
   1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
   2. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
   3. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
   4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
   5. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
   6. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and grate.
   7. Steps: Individual FRP steps, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches. 8. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

2.9 PIPE OUTLETS

A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.

2.10 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 02220.

2.11 PIPING INSTALLATION

A. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

2.12 PIPE JOINT CONSTRUCTION

A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

2.13 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

2.14 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

2.15 DRAINAGE SYSTEM INSTALLATION

A. Assemble and install components according to manufacturer's written instructions.

B. Install with top surfaces of components, except piping, flush with finished surface.

C. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.

D. Embed channel sections and drainage specialties in 4-inch (102-mm) minimum concrete around bottom and sides.

E. Fasten grates to channel sections if indicated.

F. Assemble channel sections with flanged or interlocking joints.

G. Embed channel sections in 4-inch (102-mm) minimum concrete around bottom and sides.

2.16 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
   1. Submit separate reports for each system inspection.
   2. Defects requiring correction include the following:
      a. Alignment: Less than full diameter of inside of pipe is visible between structures.
      b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Re-inspect and repeat procedure until results are satisfactory.

2.17 CLEANING

A. Clean interior of piping of dirt and superfluous materials.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 02220.

3.2 PIPING APPLICATIONS

A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
1. Use non-pressure-type flexible couplings where required to join gravity-flow, non-pressure sewer piping, unless otherwise indicated.
a. Shielded flexible couplings for same or minor difference OD pipes.
b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
2. Use pressure-type pipe couplings for force-main joints.

B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

C. Gravity-Flow, Non-pressure Sewer Piping: Use any of the following pipe materials for each size range:
1. NPS 3: Corrugated PE drainage pipe and fittings, silt tight couplings, and coupled joints.
2. NPS 3: NPS 4 PVC sewer pipe and fittings; gaskets; and gasketed joints.
3. NPS 4 and NPS 6: Corrugated PE drainage pipe and fittings, silt tight couplings, and coupled joints.
4. NPS 4 and NPS 6: PVC sewer pipe and fittings, gaskets, and gasketed joints.
5. NPS 8 to NPS 12: Corrugated PE drainage pipe and fittings in NPS 8 and NPS 10 and corrugated PE pipe and fittings in NPS 12 couplings, and coupled joints.
6. NPS 8 to NPS 12: PVC sewer pipe and fittings, gaskets, and gasketed joints.
7. NPS 8 to NPS 12: PVC profile gravity sewer pipe and fittings, gaskets, and gasketed joints.
8. NPS 8 to NPS 12: NPS 12 reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.
9. NPS 15: Corrugated PE pipe and fittings, silt tight couplings, and coupled joints.
10. NPS 15: PVC sewer pipe and fittings, gaskets, and gasketed joints.
11. NPS 15: PVC profile gravity sewer pipe and fittings, gaskets, and gasketed joints.
12. NPS 15: Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.

13. NPS 18 to NPS 36: Corrugated PE pipe and fittings, silt tight couplings, and coupled joints.
14. NPS 18 to NPS 36: Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.
15. NPS 42 to NPS 60: Corrugated PE pipe and fittings, silt tight couplings, and coupled joints.
16. NPS 42 to NPS 60: Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

F. Install gravity-flow, nonpressure drainage piping according to the following:
1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
3. Install piping with 36-inch minimum cover.
4. Install piping below frost line.
5. Install PE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
7. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.4 PIPE JOINT CONSTRUCTION

A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:
1. Join corrugated PE piping according to CPPA 100 and the following:
   a. Use silt tight couplings for Type 1, silt tight joints.
2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.

3. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
4. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints and proper tolerances for the Omni-flex gaskets.5. Join dissimilar pipe materials with nonpressure-type flexible couplings.

C. Join dissimilar pipe materials with pressure-type couplings.

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.
1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use extra-heavy-duty, top-loading classification cleanouts in roads areas.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.6 DRAIN INSTALLATION

A. Install type of drains in locations indicated.
1. Use light-duty, top-loading classification drains in earth or unpaved foot-traffic areas.
2. Use medium-duty, top-loading classification drains in paved foot-traffic areas.
3. Use heavy-duty, top-loading classification drains in vehicle-traffic service areas.
4. Use extra-heavy-duty, top-loading classification drains in roads areas.

B. Embed drains in 4-inch minimum depth of concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

3.7 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.8 STORMWATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Construct energy dissipaters at outlets, as indicated.

3.9 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.10 STORMWATER DISPOSAL SYSTEM INSTALLATION

A. Piping Systems: Excavate trenches of width and depth, and install piping system, filter fabric, and backfill according to piping manufacturer's written instructions and City of Tulsa standards.

3.11 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains as required.
   1. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

B. Connect to sediment interceptors as required.

3.12 IDENTIFICATION

A. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
   1. Use warning tape over piping and over edges of underground structures.

3.13 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
   1. Submit separate reports for each system inspection.
   2. Defects requiring correction include the following:
      a. Alignment: Less than full diameter of inside of pipe is visible between structures.
      b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
      c. Crushed, broken, cracked, or otherwise damaged piping.
      d. Infiltration: Water leakage into piping.
      e. Exfiltration: Water leakage from or around piping.
   3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
   4. Re-inspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
   1. Do not enclose, cover, or put into service before inspection and approval.
   2. Test completed piping systems according to authorities having jurisdiction.
   3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
    b. Option: Test plastic piping according to ASTM F 1417.
    c. Option: Test concrete piping according to ASTM C 924.
    d. Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing" Section.
    e. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.14 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water as required.

END OF SECTION

SECTION 02603
WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes water-distribution piping and related components for water distribution systems, fire-service mains, and water service connections.

B. The Contractor shall provide all labor, supervision, materials, equipment, supplies, incidentals and services; and shall perform all Work necessary for the installation and testing of the water distribution system.

C. The water distribution system shall be constructed in accordance with the Contract Documents and the applicable laws, rules, ordinances, standards, and regulatory agencies.

1.2 DEFINITIONS

A. ANSI: American National Standards Institute

B. ASTM: American Society for Testing and Materials

C. AWWA: American Water Works Association

D. CCS: Copper Clad Steel

E. CI: Cast Iron

F. CICL: Cast Iron Cement Lined

G. DI: Ductile Iron

H. DICL: Ductile Iron Cement Lined

I. DIPS: Ductile Iron Pipe Size

J. DR: Dimension Ration

K. EPA: Environmental Protection Agency

L. HDPE: High Density Polyethylene

M. IPS: Iron Pipe Size

N. KDHE: Kansas Department of Health & Environment

O. MJ: Mechanical Joint

P. NPDES: National Pollutant Discharge Elimination System

Q. NSF: National Sanitation Foundation

R. O&M: Operation and Maintenance

S. ODEQ: Oklahoma Department of Environmental Quality

T. OSHA: Occupational Safety and Health Administration

U. PCCP: Prestressed Concrete Cylinder Pipe

V. PSI: Pounds per Square Inch

W. PVC: Polyvinyl Chloride

X. RJ: Restrained Joint

Y. SJ: Slip Joint

1.3 ACTION SUBMITTALS

A. General: Submittals shall be made by the Contractor in accordance with the procedures set forth in Division 01.

B. Contractor shall provide manufacturer's catalog cuts, technical data, and/or shop drawings for the following system components (shop drawings shall be drawn to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the work):

1. Pipe
2. Tracer wire and marking tape
3. Fittings, sleeves and couplings
4. Hydrants
5. Pipe restraints
6. Bedding Material
7. Appurtenances - including water sampling stations, corporation stops, and service saddles
8. Meter boxes and meter setters
9. Meter vaults - including sump, ladders, steps, frame and cover, and rebar
10. Gauges

C. Provide pipe certifications and cut sheets for pipe and fittings.

D. Provide pipe laying schedule for pipe and fittings on large diameter piping (24 inches and greater), including laying lengths and corresponding pipe line stationing.

E. Shop Drawings:

1. Detail precast concrete structures/vault assemblies and indicate dimensions, method of field assembly, and components.

2. Wiring Diagrams: Power, signal, and control wiring for alarms.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.5 RECORD DRAWINGS

A. Contractor shall maintain a marked up set of as-built drawings and provide a copy to the Engineer after completion of the work.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with the requirements including proof of insurance, and other permit requirements for construction across or along railroads, highways, local or county roads, or drainage ways.
   2. Comply with the requirements for NPDES permitting, including best management practices for storm water discharges from the construction site.
   3. Comply with requirements of utility company supplying water. Includes tapping of water mains and backflow prevention.
   4. Comply with standards of authorities having jurisdiction for potable-water- service piping, including materials, installation, testing, and disinfection.
   5. Comply with standards of authorities having jurisdiction for fire- suppression water-service piping, including materials, hose threads, installation, and testing.
   6. Comply with all local, state and federal regulations.

B. Piping materials shall bear label, stamp, or other markings of specified herein.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Deliver materials to the Site to ensure uninterrupted progress of the Work.
   2. Upon delivery inspect pipe and appurtenances for cracking, gouging, chipping, denting, and other damage and immediately remove from Site and replace with acceptable material.
   3. No other pipe or material of any kind shall be placed inside of any pipe or fitting.
   4. Deliver piping with factory-applied end caps. Maintain end caps through shipping,

storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Storage:
   1. Use precautions for pipe and fire hydrants, according to the following:
      a. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
      b. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
   2. Store materials to allow convenient access for inspection and identification.
   3. Store material off ground using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.
   4. Do not remove end protectors or supports unless necessary for inspection; these should be reinstalled for storage.
   5. Pipe and fittings other than PVC may be stored outdoors without cover. Cover PVC pipe and fittings stored outdoors.
   6. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
   7. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
   8. Protect flanges, fittings, and specialties from moisture and dirt.
   9. Thoroughly protect PVC from high temperature and sunlight prior to installation.
   10. Use sling to handle fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts.
   11. Handle pipe, fittings and appurtenances carefully in accordance with pipe manufacturer's recommendations. Do not drop or roll material off trucks. Do not drop, roll or skid piping.
   12. Avoid unnecessary handling of pipe.
   13. The interior of all pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean during laying operations by means of plugs or other approved methods. In all cases water shall be kept out of the trench until the material in the joints has hardened. At all times when work is not in progress, all open ends of pipes and fittings shall be securely closed so that no trench water, earth or other substances will enter the pipe or fittings.
   14. Protect interior linings and exterior coatings of pipe and fittings from damage. Before lowering and while suspended, pipe shall be inspected for defects and cracks. Defective, damaged or unsound pipe shall be rejected.
   15. If coating becomes damaged, Contractor shall notify pipe and coating manufacturer to determine if repair of damaged area or re-coating is required. Perform repairs using recommended procedures and materials provided by manufacturer, as accepted by Engineer. Pipe and fittings requiring re-coating shall be removed from Site and returned to manufacturer's facility. Repaired or re-coated pipe and fittings shall meet all requirements of this section.

1.8 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only

after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify the Owner no less than 72 hours in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without the Owner's written permission.

1.9 COORDINATION

A. Coordinate connection to water main with water system personnel.

B. Review installation procedures under other Sections and coordinate the installation of items that must be installed with or before the water main construction. When it is necessary to take any water mains and/or fire hydrants out of service due to construction of the project, the Contractor shall notify the utility company, fire department at least 72 hours prior to initiation of construction. Notification must be made when those same mains and hydrants are returned to service.

C. The Contractor shall determine if any authorization to use water from the public fire hydrants for construction, testing and flushing is needed. If so, the Contractor shall apply for a permit at the appropriate utility company, City office to authorize usage of water for settlement of backfill where applicable, flushing and testing from public fire hydrants. The Contractor shall pay any required fees or costs associated with purchasing water to be used.

D. Coordinate connections to existing water mains with the utility company. Connections shall be made to minimize disruptions to utility customers.

E. Operation of existing valves shall be performed by the project Owner. Contractor may operate valves only if a utility company’s representative is on site coordinating the opening and closing of these valves.

1.10 WARRANTY

A. In addition to the requirements of the General Conditions and the Supplemental Conditions, the Contractor shall require the manufacturer to furnish a warranty valid through the warranty period to assure that any equipment specified herein which does not meet the performance requirements for the specifications, is repaired to the Owner’s satisfaction or replaced with equipment that does meet the performance requirements of the specification.

B. The Contractor and/or equipment manufacturer shall be responsible for all costs of warranty repair work including removal, shipping, reinstallation and restart-up during the warranty period.

C. The Contractor will be required to fill any areas of settlement and re- seed/sod/mulch. Also, all erosion protection measures shall be removed within the warranty period after an acceptable stand of grass is achieved.

PART 2 - PRODUCTS

2.1 GENERAL

A. Proprietary products: Whenever materials or equipment are described using a certain brand, make, supplier, manufacturer or by specification, such naming shall be regarded as a standard and be intended to convey function, design features, general style, type, materials of construction, character and quality of material or equipment, serviceability and other described essential characteristics.

B. Other materials may be considered by the Engineer in accordance with the General Conditions of this project manual.

C. All pipe, fittings, fire hydrants and appurtenances shall be new material unless otherwise specified. Nuts and bolts shall be stainless steel unless otherwise specified.

D. All pipe materials shall meet NSF 61 requirements.

E. All pipe installed by directional drilling shall be restrained joint pipe.

F. Written pre-approval from the Engineer is required for all use of proprietary restrained join (PRJ) pipe. Pre-approval must be obtained at least 15 days prior to the open of the bid.

G. The cost of restraints, stops, thrust blocks, couplings, harnesses, miscellaneous hardware or any other accessories needed for a completely functional pipeline shall be considered subsidiary to the cost of the pipe, valve, fitting or other quantified item on the bid form.

2.2 PIPE AND FITTINGS

A. Ductile Iron Pipe:
   1. General:
      a. DI pipe shall be furnished in 18 or 20 foot laying lengths.
      b. DI pipe shall conform to the requirements of ANSI/AWWA A21.51/C151.
      c. The manufacturer's mark, country where cast, year the pipe was produced, and the letters "DI" or words "Ductile Iron" shall be cast or stamped on the pipe.
      d. Handling, storage and installation of all 4-inch through 12-inch DR14 and above 14-inch DR18 PVC AWWA C900 pipe or Class 350 ductile iron pipe (DIP) shall be done in accordance with the manufacturer's requirements and installation guidelines only.
      e. Unless otherwise specified, the following pressure classes are required as a minimum:
         1) Pipe 3 inches through 24 inches: Pressure Class 350
         2) Pipe 30 inches through 48 inches: Pressure Class 250
         3) Pipe 54 inches and greater: Pressure Class 150
      f. Lining and coating:
         1) Pipe and fittings shall be cement lined in accordance with ANSI/AWWA A21.4/C104.
         2) Pipe and fittings to be buried shall be seal coated with an approved

bituminous seal coat in accordance with ANSI/AWWA A21.4/C104.

3) Pipe and fittings to be installed inside structures shall be provided without exterior bituminous coating and shall be coated with 100 percent solids, thermosetting, dry powder epoxy, such as Tnemec Series 66 High Build Epoxy or approved equal, in conformance with AWWA C116.

g. Encasement: All buried DI pipe, fittings, fire hydrants and appurtenances shall be encased in a minimum 8 mil low density polyethylene tube encasement in accordance with AWWA C105.

2. Joints:
   a. Buried joints:
      1) Unless otherwise specified, buried DI pipe may be bell and spigot or mechanical joint.
      2) Mechanical joints shall conform to ANSI/AWWA A21.11/C111.
      3) Restrained joints shall include the use of a pre-tensioned lock ring and shall be American Flex Ring, US Pipe TR Flex, Griffin Pipe Snap-lok or approved equal.
   b. Exposed joints:
      1) Unless otherwise specified, all exposed DI pipe shall be flanged. All flanges shall be American Standard B 16.1, Class 125, ASA flanges with full face red rubber gaskets.

3. Fittings:
   a. Fittings shall be cast iron or ductile iron, cement lined, conforming to AWWA C110 unless otherwise specified. PVC fittings are not allowed. No compact fittings shall be allowed
   b. Fittings shall have interior and exterior coatings as specified for DI pipe.
   c. Where approved or specified, grooved end fittings shall conform to ANSI/AWWA A21.10/C110 for center-to-end dimensions and ANSI/AWWA A21.1/C110 for wall thickness. Couplings shall be equipped with flush seal gaskets per ASTM D2000.
   d. All ductile iron fittings and glands shall be fusion bonded epoxy coated meeting the requirements of AWWA C116 (including certificate of compliance). Prior to installation, field holiday testing report (in accordance with the latest version of ASTM G62) shall be completed and submitted to the engineer for approval. All associated

      coatings and testing costs shall be considered subsidiary to the cost of the fitting.
   e. All ductile iron restraints, stops and couples shall be coated with a factory applied fusion bonded epoxy coating to no less than 3 mils in thickness. All restraint and stop bolts, washes, rods or any other incidental hardware shall be coated with a factory applied two (2) coat fluoropolymer coating to no less than 0.7 mils in thickness. Prior to installation, field holiday testing report(s) (in accordance with the latest version of ASTM D5162) shall be completed and submitted to the engineer for approval. All associated coatings and testing costs shall be considered subsidiary to the cost of the restraints, stops and couples.

B. PVC Pipe:
   1. General:
      a. PVC pipe shall be furnished in 13 to 20 foot laying lengths.
      b. The PVC pipe laying condition is for flexible pipe.
      c. PVC pipe, couplings and fabricated fittings shall be made from clean, virgin, NSF approved type 1, grade 1 polyvinyl chlorine resin conforming to ASTM D

1784-65T, and bearing the seal of approval by the NSF.

d. Pipe shall bear identification markings that will remain legible during normal handling, storage and installation. The markings shall be applied in a manner that will not reduce the strength of the pipe or coupling or otherwise damage either. Pipe markings shall be applied at intervals not to exceed 5 feet and shall include the nominal size and outside diameter, PVC, DR-18, AWWA Pressure Class, manufacturer's name or trademark and production record code, and the seal of the testing agency that verified the suitability of the pipe material for potable water service.

e. Unless otherwise specified, pipe must conform to the following requirements:
   1) Pipe smaller than 2 inches: ASTM D2241, NSF Schedule 40
   2) Pipe 2 inches to 3 inches in diameter: ASTM D-1784 and D-2241, NSF Schedule 80.
   3) Pipe 4 inches to 12 inches in diameter: AWWA C900, pressure class 235 (DR-18).
   4) Pipe 14 inches through 48 inches in diameter: AWWA C900, pressure class 235 (DR-18)

2. Joints:
   a. Unless otherwise specified, joints shall be push-on type with a flexible factory-assembled elastomeric ring in the integral bell end.
   b. Joint material including gaskets and lubricants shall conform to AWWA C900.
   c. Joint designs shall be submitted to the Engineer for approval.
   d. Where PVC restrained joint pipe is required, Certa-Lok restrained joint couplers as manufactured by Certainteed Corporation, or approved equal, shall be used.
   e. Joint adaptors will be provided for all gate valves, fittings or changes in pipe material.
   f. For PVC pipe, use EBAA Mega-Stop 5000 Series or approved equal in all locations identified on the plans.
3. Fittings:
   a. For pipe 2 inches and smaller, fittings shall conform to AWWA C900.
   b. For pipe 4 inches and larger, fittings shall be Ductile Iron or Cast Iron as specified in this section.
   c. Fittings shall have the same pressure ratings as specified for the PVC pipe.
   d. Fittings shall have the same coatings as specified for the PVC pipe.
   e. The dry fit of fitting sockets must be snug. If the fit is loose, the pipe and/or fittings will be rejected as faulty because of improper size. Building up the joint to overcome a loose fit will not be permitted.

C. Fusible Polyvinylchloride Pipe
1. General:
   a. Unless otherwise specified, fusible polyvinylchloride pipe shall conform to the following requirements:
      1) Pipe smaller than 2 inches: ASTM D2241
      2) Pipe 2 inches to 3 inches in diameter: ASTM D1785 and D2241
      3) Pipe 4 inches to 12 inches in diameter: AWWA C900
      4) Pipe 14 inches to 48 inches in diameter: AWWA C900

b. Testing shall be in accordance with the referenced AWWA standards for all pipe types. Pipe shall be marked verifying suitability for potable water service per NSF-61.

c. Fusible polyvinylchloride pipe for non-potable water or pressurized wastewater not conforming to AWWA C900 dimensionality shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standards.

d. Fusible polyvinylchloride pipe for non-potable water or pressurized wastewater conforming to AWWA C900 dimensionality shall conform to AWWA C900.

e. Fusible polyvinyl chloride pipe for non-pressure storm or wastewater not conforming to AWWA C900 dimensionality shall conform to ASTM D3034, ASTM F679, AWWA C900, ASTM D2241, or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the applicable standard used.

f. Fusible polyvinylchloride pipe for non-pressure storm or wastewater conforming to AWWA C900 dimensionality shall conform to AWWA C900.

g. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

h. Fusible polyvinylchloride pipe shall be manufactured in a standard 40 foot nominal length or custom lengths as specified.

i. Fusible polyvinylchloride pipe shall be blue in color for potable water use. Fusible polyvinylchloride pipe shall be purple in color for reclaim, reuse, or other non-potable use. Fusible polyvinylchloride pipe shall be green in color for wastewater use. Fusible polyvinylchloride pipe shall be white in color for surface or storm water use.

2. Joints: Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The fusion technician shall follow the pipe supplier's guidelines for this procedure. All fusion joints shall be completed as described in this specification.

3. Sweeps or Bends:

a. Fusible polyvinyl chloride sweeps or bends shall conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe being joined by the sweep or bend.

b. Fusible polyvinyl chloride sweeps or bends shall be manufactured from the same fusible polyvinyl chloride pipe being used for the installation, and shall have at least 2 feet of straight section on either end of the sweep or bend to allow for fusion of the sweep to the pipe installation. There shall be no gasketed connections utilized with a fusible polyvinyl chloride sweep.

c. Standard fusible polyvinyl chloride sweep or bend angles shall not be greater than 22.5 degrees, and shall be used in nominal diameters ranging from 4 inches through 16 inches.

D. HDPE Pipe

1. HDPE will be allowed only in locations specifically called for on the drawings.

2. General:

a. HDPE pipe 3 inches in diameter or less shall comply with AWWA C901 DR 11, pressure class 160, and shall have a nominal IPS (Iron Pipe Size) outside diameter unless otherwise specified.

b. HDPE pipe 4 inches to 16 inches in diameter shall be manufactured with premium, highly engineered PE4710 resin that conforms to ASTM D3350 with a

cell classification of 445574C/E, is listed with the plastic pipe institute TR4 and NSF Standard 61 approved. All piping must contain the manufacturer's logo, nominal size, OD base, material code, dimension ratio, pressure class, AWWA C906, ASTM D3350, NSF Standard 61, blue stripe continuous along the entire length of pipe and product date (day, month, year).

3. Joints:
   a. All joints for HDPE pipe shall be heat fusion welded. Jointing of pipe or fittings with adhesives or solvents is not acceptable.
   b. All joints for HDPE pipe shall be a complete homogenous heat fusion weld. Pipe joints shall only be heat fused by a qualified installer who can provide a completed certificate of training provided by the manufacturer of the pipe to be used for the project. Each person making heat fusion joints shall demonstrate proficiency by making test joints and testing the trial fusion by bent strap testing or ultrasonic testing. All trial joints must be allowed to cool completely prior to testing. At the beginning of each day, a trial heat fusion shall be completed and inspected to ensure complete fusion in accordance with the manufacturer's requirements prior to installation. The approved trial section shall be marked with the project name, date/ time, general contractor's name, installation company name, name of machine operator, resident project representative (RPR) name and results of the fusion testing. The approved trial section shall be submitted to the Owner and be retained by them thereafter. All heat fusion welding shall be performed in the presence of the RPR.
4. Fittings and Adaptors:
   a. Fittings for HDPE pipe shall be HDPE unless noted otherwise on the drawings.
   b. Fittings and Adaptors shall meet the material requirements of the pipe to which the fitting will be joined.
   c. Fittings and adaptors shall be equal or greater than the pressure class of the pipe to which it will be joined and shall be designed to operate at not less than the design pressure of the pipe system for which it is intended.
   d. All HDPE RJ, stops and couplings shall be coated with a factory applied fusion bonded epoxy coating to no less than 3 mils in thickness. All restraint and stop bolts, washes, rods or any other incidental hardware shall be coated with a factory applied two (2)

      coat fluoropolymer coating to no less than 0.7 mils in thickness. Prior to installation, field holiday testing report(s) (in accordance with the latest version of ASTM D5162) shall be completed and submitted to the Engineer for approval.

2.3 BURIED PIPE IDENTIFICATION

A. Underground warning tape:
   1. Tracer tape shall be aluminum foil encased in an impervious mylar plastic coating on both sides.
   2. Tracer tape shall be 5 mils thick and three inches in width.
   3. The tape shall be blue in color and the printed message shall be black in color.
   4. Message shall read, "CAUTION - BURIED WATER LINE BELOW" with bold letters approximately two inches high. Message shall be printed at maximum intervals of two feet.
   5. The color and printing shall be under the impervious mylar plastic coating.

B. Marking service lines:
   1. The Contractor shall provide the plastic flagging material used for marking the ends

of the service lines on water line projects.

C. Tracer wire for non-metallic pipe:
   1. Tracer wire shall be installed to locate PVC or any nonmetallic waterline pipes.
   2. The wire shall extend the entire length of the proposed pipe and shall be taped to the pipe. Snake bite locking wire connectors as manufactured by Copperhead or approved equal shall be used at splice locations.
   3. Electrical tape shall cover splice locations so that no bare wire is exposed.
   4. Test stations shall be installed adjacent to all fire hydrants along the waterline and at blowoff assemblies or valves near the ends of the waterlines. Any exceptions to locations of test stations shall be approved by the Engineer. At each test station, the tracer wire shall be connected to a one pound zinc or magnesium anode.
   5. Anodes shall also be attached to the tracer wire at both the beginning and end of the proposed waterline. Anodes shall be buried at the same elevation as the waterline at each test station. The anodes shall be connected to the CCS wire which shall be extended to the test station.
   6. The tracer wire shall be Blue No. 8 THHN annealed soft copper wire with thermal plastic insulation. The insulation shall be heat, oil and gasoline resistant as manufactured by Temple Electric or approved equal.
   7. To allow for grade adjustment, a minimum of 12 inches of excess wire shall be coiled at the bottom of the test station for all wires. The insulation sheathing shall be removed such that 1 inch bare copper wire is exposed

      at the connection. Contractor shall attach wire being installed with proposed water main to any tracer wire installed with adjacent waterline projects.
   8. Test stations:
      a. Tracer wire and anode wire shall be installed to allow 10 inches of wire within the test station. In concrete environments such as sidewalks, the contractor shall use flush style test stations.

2.4 SLEEVES, COUPLINGS AND CONNECTIONS

A. Sleeves:
   1. Mechanical joint sleeves shall be solid type, long or short body pattern as approved by the Owner, manufactured in accordance with ANSI/AWWA A21.10/C110. Sleeves shall have a minimum pressure rating of 350 psi. Glands, gaskets, bolts, and nuts shall be in accordance with ANSI/AWWA A21.11/C111.
   2. Sleeves shall not be machined in order to facilitate use with pipe of a class or type other than that for which the sleeve was manufactured.
   3. All miscellaneous bolts, nuts and washers shall be high strength low alloy steel that meets the requirements of AWWA C116 (including certificate of compliance). All miscellaneous hardware shall be coated with a two (2) coat fluoropolymer coating to no less than 0.7 mils in thickness. Prior to installation, field holiday testing report(s) (in accordance with the latest version of ASTM D5162) shall be completed and submitted to the Engineer for approval.

B. Couplings:
   1. The use of bolted steel couplings shall be restricted to joining pipes of different outside diameters, and joining pipes of dissimilar materials.
   2. Ferrous surfaces shall be coated with an epoxy coating; enamel coatings are not acceptable.
   3. Bolted steel transition couplings shall be Rockwell 413, Dresser style 162, or

approved equal.

4. Bolted steel reducing couplings shall be Rockwell 415, Dresser style 62, or approved equal.
5. Bolted steel couplings for joining pipes of the same outside diameter shall be Rockwell 411, Dresser style 38, or approved equal.
6. For all DIP and PVC connections, use Mega-Coupling 3800 Series or approved equal.

C. Connections:

1. For all HDPE and PVC connections 4 to 12 inches, use Mega-Coupling 3800 Series or approved equal. Where all connections to existing lines are made, all coupling connections between HDPE and PVC shall be done with like sized sufficient segments of PVC prior to any fittings. The cost of PVC segment, restraints, couples necessary shall be considered subsidiary to the cost of the HDPE pipe.
2. For all HDPE and PVC connections larger than 12 inches, use GF central plastics pipe and fabrication (formerly Independent Pipe Products) ductile iron mechanical joint anchor fittings and adapter as described in the details and as necessary to complete the connection.
3. Where HDPE and PVC connections occur, use restraint harnesses ROMAC 611 or EBAA 1900 Series or approved equal for 4” through 12” pipelines to restrain the PVC identified bell/ spigot pipe. Lengths identified are those for a 22.5 degree fitting equivalent unless up or down stream fittings control harness length.
4. For all AWWA C110 DIP fittings to AWWA C906 DR11 HDPE 4 to 12 inches connections a sufficient length of RJ AWWA C900 DR 18 PVC shall be used for linking between the fitting and HDPE. The cost of PVC segment, restraints, couples shall be considered subsidiary to the cost of the fitting.
5. For all HDPE connections, use an internal stainless steel stiffener (minimum 6-inch length unless otherwise approved by the manufacturer) in accordance with manufacturer’s specification. Where all connections to existing lines are made, all coupling connections between HDPE and PVC shall be done with like sized sufficient segments of PVC prior to any fittings. The cost of stiffener, PVC segment, restraints, couples necessary shall be considered subsidiary to the cost of the HDPE pipe.

2.5 WATER METERS AND SERVICES

A. Water meters will be furnished by Owner.

B. Manufacturer: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AMCO Water Metering Systems
2. Badger Meter, Inc.
3. Mueller Co.; Hersey Meters
4. Neptune Technology Group Inc.
5. Sensus Metering Systems

C. Meter settings shall include meter yoke, meter box, and all appurtenances necessary for providing customer water service at the location designated on the Drawings. Meter box shall be as shown on the drawings.

D. Service Saddles:

1. Service saddle shall be designed and sized for the water on which the saddle is

to be installed.

2. Stainless steel saddle bodies shall be 18-8, Type 304, stainless steel with all welds fully passivated to restore stainless steel characteristics.
3. Ductile iron saddle bodies shall conform to ASTM A-536 and have a fusion applied epoxy coating 12-mils dry thickness (D.T.). Straps shall be stainless steel, 18-8, Type 304 fully passivated for corrosion resistance.
4. Threads shall be AWWA C800 CC/Taper.
5. The saddle band shall be a minimum of 2 inches in width.
6. The saddle shall be provided with a Buna-N rubber gasket meeting ASTM D2000 to seal the saddle and the main pipe.
7. The nuts, washers, bands, and bolts shall be 18-8 stainless steel.
8. Acceptable manufacturers are
   a. The Ford Meter Box Co., Inc., Model FS202/FS303/FRS202
   b. JCM Model 406
   c. Romac Industries Inc., Style 202N
   d. Cascade Products Style CNS2

2.6 FIRE HYDRANTS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. American AVK Co.; Valves & Fittings Div.
   2. American Cast Iron Pipe Co.; American Flow Control Div.
   3. Clow Valve Co.
   4. Kennedy Valve Div.
   5. Mueller Co.; Water Products Div.

B. Description:
   1. Fire hydrants shall be of the dry-barrel type and shall conform to AWWA C502.
   2. Unless indicated otherwise on the drawings, all hydrants shall have 5-1/4 inch compression valve (opening against the water pressure) and shall be 3-way, traffic model type that shall remain closed if damaged in an accident, and be designed for 150 psig working pressure. Hydrants shall have two hose nozzles and one pumper nozzle that shall screw into the hydrant body. The Contractor shall verify with the local fire department the actual size and type of nozzles, size and shape of operating nut and direction of operation required before ordering hydrants. The Contractor shall submit certification of correct requirements along with the equipment submittal.
   3. The fire hydrant assembly shall include the following: the hydrant valve anchor tee, the 6 inch MJ gate valve, the 6 inch valve box, the variable length of 6 inch CICL SJ pipe, the fire hydrant, all hydrant barrel extensions required to bring the fire hydrant to grade, the gravel for drain, and all concrete thrust blocking required for the hydrant tee and fire hydrant.
   4. All threads and connectors to be reviewed with the local fire department.
   5. Fire hydrants shall be located and installed as shown on the drawings. Hydrants shall be set according to the requirements of AWWA C600 except as specifically amended on the drawings or specifications. Each hydrant shall be set to stand plumb and shall be oriented such that immediate access is provided.
   6. The pumper nozzle shall be a 5 inch Storz pumper nozzle of a one-piece design compatible with 5 inch Storz hose couplings. The Storz pumper nozzle shall be an integral part of the fire hydrant and must be furnished by the manufacturer. Storz

adapters will not be acceptable.

PART 3 - EXECUTION

3.1 GENERAL

A. All water mains shall have a minimum depth of bury of 30 inches from top of pipe, unless otherwise approved by the Engineer.

B. Installation of DI pipe shall be in accordance with AWWA C600.

C. Installation of PVC pipe shall be in accordance with AWWA C605.

D. Installation of HDPE pipe, fittings and any pipe bending shall be in accordance with AWWA C906 and AWWA M55 (PE Pipe - Design of Installation).

E. Any section of pipe already laid and found to be defective shall be taken up and replaced without additional expense to the Owner.

3.2 EARTHWORK

A. Refer to Division 31 for excavating, trenching, and backfilling.

3.3 PIPE INSTALLATION

A. Preparation:
   1. Cutting of pipe shall be done in a neat and workmanlike manner by a method which will not damage the pipe. Unless otherwise authorized, all

      cutting shall be done by means of mechanical cutters of an approved type. Wheel cutters shall be used whenever practicable.
   2. Prior to laying, the pipe bedding material shall be placed by slicing with a shovel or mechanical tamping, according to the type of material.
   3. Before jointing, all lumps, blisters and excess coating materials shall be removed from the bell and spigot ends of the pipes. The outside of the spigot and the inside of the bell shall then be wire brushed and/or wiped clean and dry. All oil or grease shall be removed. Flanged joints shall be faced true, and made up perfectly square and tight. Ductile iron wedges shall be used as needed to give proper slope or direction to the line.

B. Pipe Laying:
   1. Any pipe that has its grade or joint disturbed after laying shall be taken up and relaid.
   2. Pipe shall be laid to a true, uniform line and grade. High points, other than those indicated on the Drawings where an air vent assembly is to be placed, shall be avoided.
   3. Pipe laying shall be in accordance with the manufacturer's recommendations. Pipe laying shall proceed, bells ahead. Each section of pipe shall be laid to form a close concentric joint with the adjoining section and to prevent sudden offsets in the flow line. Each section of pipe, as it is laid, shall be backfilled as specified in the Contract Documents, at least up to the centerline, before the next joint is made.

4. As the work progresses, the interior of the pipe shall be cleared of dirt and superfluous material.
5. Trenches and other excavations shall be kept free of water until backfilled. Concrete or masonry work shall not be constructed in water, nor shall water be allowed to rise over the work until concrete or mortar has had ample time to set.
6. When work is not in progress, open ends of pipe and fittings shall be closed, to the satisfaction of the Owner, so that trench water, earth, and other substances will not enter the pipe or fittings.
7. Whenever a pipe requires cutting for the insertion of valves, fittings, closure pieces, or to bring it to the required location, the work shall be performed in a satisfactory manner so as to leave a beveled end in accordance with the manufacturer's instructions or recommendations. Cuts shall be made at 90 degrees with the centerline of the pipe so that a framing square placed against the side of the pipe will reveal not more than 1/4 inch variation across the diameter of the pipe in any direction. The pipe shall be cut with an abrasive wheel, rotary wheel cutter, guillotine pipe saw, milling wheel saw or other equipment specifically designed for that purpose. The Contractor shall grind smooth cut ends and rough edges and for push-on connections, the cut ends should be beveled slightly. Pipe damaged by the Contractor in cutting shall be replaced at the Contractor's expense.
8. Laying of the pipe shall commence immediately after the excavation is started, and every means must be used to keep pipe laying closely behind the trenching. No more than 300 feet of trench may be open ahead of the pipe laying operation, unless otherwise specified. Holes shall be scooped out where the bells occur leaving the entire barrel of the pipe bearing on the pipe bed.
9. Pipe joint assembly practices and joint assembly materials such as lubricants, primers and adhesives shall be in accordance with the manufacturer's recommendations and specifications, and in accordance with ANSI/AWWA A21.11/C111.
10. Pipe shall not be laid on frozen bedding.

C. Alignment and Grade:
1. The Contractor shall not deviate from the line and grade indicated on the Drawings, except with approval of the Owner.
2. Where it is necessary to deflect pipelines to avoid obstructions, the amount of deflection shall not exceed 1/2 of that recommended by the manufacturer of the pipe. Where necessary to maintain the required line, short sections of pipe and fitting shall be provided.
3. The Contractor shall investigate the proposed location of the main far enough in advance of the work to determine where conflicts will occur and to determine joint deflections necessary to clear any obstructions.
4. Deflection of C-900 PVC pipe shall not be permitted except at couplings and fittings. Deflection at couplings and fittings shall be limited to 4 degrees for 12 inches in diameter or smaller. To follow a curve, the C-900 PVC pipe may be cut to short lengths and additional couplings may be used. Short lengths shall be no shorter than 6 feet 6 inches unless approved by the RPR.
5. Deflection of any AWWA C900 pipe is not allowed. The maximum deflection at couples, fittings and joints shall only be allowed as the greater of the following: 1 degree or 1/2 the maximum recommended by the manufacturer. All coupling deflections and pipe to fitting angles (including those without intentional deflections) shall be measured through the use of an onsite laser and recorded by the contractor and verified by the resident project representative.
6. When assembling push on joints, use sufficient NSF and manufacturer's approved pipe lube to prevent gasket displacement. The spigot end of the pipe shall never be

inserted past the maximum insertion lines provided by the manufacturer. All pipe insertions shall be visually recorded by the Contractor and verified by the resident project representative.

D. Thrust Restraint:

1. Restrained Joints: The Contractor must utilize restrained joint methods of pipe installation as a means of thrust restraint.
2. Use mechanical restrained joint (RJ) for all areas identified on the plans. For all valves use EBAA MegaFlange 2100 Series with adaptor or approved equal and for all fittings use EBAA MegaLug 110 or 2000PV Series restrained joint or approved equal. Install all RJ in accordance with manufacturer's requirements and in a manner that does not create stress within the pipe.
3. Use restraint harnesses ROMAC 611 or EBAA 1900 Series or approved equal for 4" through 12" pipelines and ROMAC 611 or EBAA 2800 Series or approved equal for 14" through 24" PVC pipelines or EBAA MegaLug 1700 Series or approved equal for 4" through 24" DIP pipelines to restrain the identified bell/ spigot pipe lengths.
4. Where HDPE and PVC connection occur, use restraint harnesses ROMAC 611 or EBAA 1900 Series or approved equal to restrain the PVC identified bell/ spigot pipe. Lengths identified are those for a 22.5 degree fitting equivalent unless up or down stream fittings control harness length. Where reducers MJ fittings are used in conjunction with the HDPE to PVC connection, the restrained equivalent length is to that of a plug (dead end).
5. Reaction backing: Plugs, caps, tees, and bends deflecting 11-1/4 degrees or more on pipes 4 inches in diameter or larger shall be provided with reaction backing which shall be concrete Class II, unless a restrained joint system is designed for resisting thrust forces. Backing shall be placed between solid ground and the fitting to be anchored. The area of bearing shall be as shown or as directed. Unless otherwise shown or directed, the backing shall be so placed that the fitting joints will be accessible for repair.
6. Restrained joint with a precast or cast in place thrust block may be used where appropriate if approved in writing by the Engineer. For all cast in place thrust blocks, the Contractor is required to install with the correct geometry and in a workman like manner. Use EBAA MegaLug 110 or 1000PV Series or approved equal. Restraint harnesses are not required where acceptable thrust blocks have been used.

E. Warning Tape and Tracer Wire Installation:

1. For protection and identification of water mains, the Contractor shall install a detectable metallic warning tape in the trench over the water main at the time of backfilling. The warning tape shall be placed in the trench at a depth of one foot, but not exceeding three feet below the proposed final grade of the ground over the centerline of the water main.
2. The tape shall be spread flat with message side up before backfilling.

F. Tracer wire installation:

1. Conductive type pipe locator/tracer wire shall be installed to locate non- metallic waterline pipes. The wire shall extend the entire length of the proposed pipe.
2. The wire shall be attached every 10 feet to the piping system with plastic strapping and pulled with the pipe.
3. The wire shall terminate above ground at every valve box and air vent assembly.
4. Connectors shall be used at splice locations. Electrical tape shall cover all splices so no bare wire is exposed. The wire shall be installed adjacent to all fire hydrants along

the water line and at blowoffs or valves along the water line so as to provide an accessible location to the wire.

5. To allow for grade adjustment, a minimum of 12 inches of excess wire shall be coiled at the bottom of the valve boxes for all wires.
6. Contractor shall attach wire being installed with proposed water main to any tracer wire installed with adjacent water line projects.
7. For HDPE Directional Drill, tracer wire shall be attached to the pulling eye and the crown of the pipe with tape at 24 inch increments along the pipe and a minimum of two full wraps around the pipe. Contractor shall test tracer wire for continuity for each section before acceptance.

G. Fusion process for fusible PVC:

1. Installation guidelines from the pipe supplier shall be followed for all installations.
2. The fusible polyvinylchloride pipe will be installed in a manner so as not to exceed the recommended bending radius guidelines.
3. Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended maximum safe pulling force, established by the pipe supplier, shall not be exceeded.
4. Fusible polyvinylchloride pipe will be handled in a safe and nondestructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.
5. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians holding current qualification credentials for the pipe size being fused, as documented by the pipe supplier.
6. Pipe supplier's procedures shall be followed at all times during fusion operations.
7. Each fusion joint shall be recorded and logged by an approved electronic monitoring device (data logger) connected to the fusion machine, which utilizes a current version of the pipe supplier's recommended and compatible software.
8. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. This includes requirements for safety, maintenance, and operation with modifications made for PVC.

H. Directional Drilling

1. All HDPE heat fusion weld operations shall be performed by a trenchless pipe installation. Operations shall be performed by a qualified contractor

   with at least three (3) years of experience involving work of a similar nature to the work required for this project.
2. Contractor shall provide with their installation schedule, the manufacturer's catalog cuts, technical data, method of connection, information pertaining to pits, dewatering, method of spoils removal, equipment size and capacity, equipment capabilities including installing pipe on radius, type of drill bit, drilling fluid, method of monitoring line and grade and detection of surface movement, name plate data for drilling equipment and mobile spoils removal unit.
3. Entrance and exit pits shall be located to avoid conflicts with the public utilities, and other agencies. Provide sump areas to contain drilling fluids. Guide drill remotely from ground surface to maintain alignment by monitoring signals transmitted from drill but while monitoring depth, pitch, and position. Adjust drill head orientation to maintain correct alignment.
4. Inject drilling fluid into directional drill to stabilize hole, remove cuttings, and lubricate drill bit and pipe. The drilling slurry shall be in a homogenous/ flowable state serving

as an agent to carry the loose cuttings to the surface through the annulus of the drill hole. The volume of bentonite mud required for each pull back shall be calculated based on soil conditions, largest diameter of the pipe system component, capacity of the bentonite mud pump and the speed of pullback as recommended by the bentonite drilling fluid manufacturer. Bentonite slurry is to be contained at the entry or exit side of the drill pits or holding tanks. Slurry may be recycled for reuse in the opening operation or shall be hauled by the Contractor to an approved disposal/ dump site for proper disposal. The Contractor and RPR shall document all drilling fluid products being used, the pumping pressure, rate of pumping and details relative to drilling fluid circulation at the end points of the drill.

5. Continuously monitor drilling fluid pumping rate, pressure, viscosity, and removal of soil cuttings and stabilization of directional drill. Provide relief holes when required to relieve excess pressure. Minimize heaving during pullback. Calibrate and verify the accuracy of the electronic monitor in presence of the Engineer or resident project representative before proceeding with other drilling. When required accuracy is not met, adjust equipment or provide new equipment capable of meeting required accuracy. Readings shall be recorded after advancement of each successive drill pipe (no more than 10 feet). Access to all recorded readings and plan/ profile information shall be made available to the RPR at all times. At no time shall the deflection radius of the drill pipe exceed the deflection limits of the pipe.

3.4 The Right of Way and surrounding areas should be examined regularly for inadvertent returns. If inadvertent returns are discovered, they could be contained or cleaned up in accordance with federal, state or local regulations. These areas shall be monitored for continuing problems.

3.5 HYDRANT INSTALLATION

A. Hydrants shall be installed as indicated in the Drawings and Standard Details.

B. The hydrant shall be plumb with the pumper nozzle facing the curb (or roadway). Nozzles shall be set a minimum of 16 inches to 24 inches above the finished grade to the centerline of the nozzle, unless otherwise directed by the Owner.

C. Newly installed hydrants not yet in service shall be covered with a bag (or other Owner approved system), securely tied in place indicating that the hydrant is not usable.

D. Fire hydrants shall not be installed on water mains less than 6 inches in diameter.

3.6 INSTALLATION OF FITTINGS AND OTHER APPURTENANCES

A. All appurtenances (fittings and meter settings) shall be installed in accordance with the manufacturer's recommendations and as indicated on the Drawings and Standard Details.

3.7 RESTRAINTS

A. Horizontal Separation:
   1. Measure the separation distance edge to edge.
   2. Locate water mains at least 10 feet horizontally from any existing or proposed sewer lines.
   3. Locate water mains at least 5 feet horizontally from any existing or proposed storm sewers, raw water lines, petroleum product lines, natural gas lines, and other buried utility lines.

4. Locate cast iron waterlines at least 10 feet from any gasoline storage tank and lines and PVC water lines at least 50 feet horizontally from any gasoline storage tank and lines.
5. Locate water lines at least 15 feet from all parts of septic tanks and absorption fields, or other sewage treatment and disposal systems.

B. Vertical Separation:
1. Measure the separation distance from edge to edge.
2. Lay water lines crossing sewer lines to provide a minimum vertical distance of 24 inches between the water main and the sewer line. Arrange the piping so that joints in a 20 foot length of PVC or 18 foot length of cast iron sewer pipe will be equidistant from the water main. Where a water main crosses under a sewer, provide adequate structural support for the sewer to prevent damage to the water main.
3. Maintain a two foot vertical separation between water lines and any existing or proposed storm sewers, raw water lines, petroleum product lines, natural gas lines, and other buried utility lines.

C. Special Conditions: When it is impossible to obtain proper horizontal and vertical separation as stipulated above, design and construct the other line equal to water pipe, and pressure test it to assure water tightness of joints adjacent to the water line prior to backfilling.

3.8 FIELD QUALITY CONTROL AND TESTING

A. General:
1. The Contractor shall provide the Owner, utility company at least 72 hours notice prior to scheduled testing and inspection.
2. Only properly functioning and clean equipment shall be used for flushing, pressure testing and disinfecting water mains.
3. Where any section of a water main is provided with concrete reaction backing for fittings or hydrants, the hydrostatic pressure test shall not be made until at least five days after installation of the concrete reaction backing, unless otherwise approved.
4. Test shall be conducted in accordance with AWWA Standards or as required by ODEQ. Simultaneous pressure and leakage tests may be performed if permitted by the Engineer.
5. The Contractor shall submit the operator’s completed certificate of training, pipe, fittings, sleeves couplings and technical data for equipment used for joining of pipe.

B. Pressure Testing:
1. After the pipe is laid, the joints completed, fire hydrants permanently installed, and the trench backfilled, the newly laid piping or any valved section of piping shall, unless otherwise specified, be filled with clean water and subjected for one hour to a hydrostatic pressure test at the rated working pressure of the pipe.
2. Testing shall be performed on each section of pipe between main line valves. The pressure test shall be conducted at 100 psi.
3. Care must be taken not to exceed the pressure ratings of the pipes, valves, fittings, and other appurtenances.
4. The Contractor shall furnish all pumps, fittings, and gauges as necessary to fill the line with potable water, dispel air from the system, and pressurize the pipeline for the tests.

5. The Contractor shall provide all necessary temporary restraint and support, and will be responsible for providing proper safety measures during pressure testing operations.
6. Each valve shall be opened and closed several times during the test.
7. The pressure during the pressure test shall not vary by more than 5 psi from the designated test pressure.
8. Joints showing visible leakage shall be replaced or remade as necessary. Leaking rubber-gasketed joints shall be remade, using new gaskets if necessary. Cracked or defective pipe, mechanical joints, fittings, valves or hydrants discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory.
9. All pressure testing shall be completed in accordance with the waterline standard specifications.

C. Leakage Testing:
1. The duration of each leakage test shall be at least 2 hours, and during the test the main shall be subjected to the rated working pressure at the lowest point. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{SD(P)^{1/2}}{148{,}000}$$

2. In which L equal the allowable leakage in gallons per hour; D is the nominal diameter of the pipe, in inches; S is the length of pipe tested, in feet; and P is the average test pressure during the leakage test, in pounds per square inch. The pressure during the pressure or leakage test shall not vary by more than 5 psi from the designated test pressure.

D. Disinfection:
1. General:
   a. Disinfection of water mains shall be in accordance with ODEQ Requirements for disinfection.
   b. Before acceptance of the new water piping for domestic use by the Owner, the contractor shall flush and disinfect all newly completed piping as prescribed by AWWA Standard C651 and as required in these specifications.
   c. The Contractor shall provide plugs, chemicals, tests, and all materials, equipment, tools, and labor necessary for the satisfactory flushing and disinfection of the new water line as required in these specifications.
   d. All disinfection shall be completed in accordance with the waterline standard specifications.
2. Preventive Measures: The Contractor shall take precautions to protect all interiors, fittings, valves, and assemblies from contamination during work. When pipe laying is not in progress (for example, at the close of a working day), all openings in the installed pipeline shall be plugged watertight and all joints of pipe in the trench shall be completed before work is stopped.
   If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

3. The Contractor shall take reasonable measures in scheduling of material and equipment deliveries and in the prosecution of the work to minimize delay in completion of the work and to minimize exposure of the materials to possible contamination.
4. Flushing: The new water piping shall be flushed prior to disinfection, except when the Engineer has approved the use of tablets for disinfection. Piping shall be flushed at blow-off assemblies and at fire hydrants at terminal points of the piping.
5. Chlorination:
    a. After flushing has been completed, the water line shall be disinfected by the "continuous feed" method using an approved liquid chlorine solution.
    b. The disinfecting chemical shall be fed so as to maintain a chlorine concentration of at least 25 mg/l in the water throughout the new piping system.
    c. During disinfection, valves shall be manipulated to prevent backflow of the treated water into the existing water system and also to ensure that all valves and appurtenances are disinfected.
    d. The chlorinated water shall be retained in the pipe line for at least 24 hours. At the end of the 24 hour contact period, the treated water shall contain a free chlorine residual of not less than 10 mg/l.
    e. At the Contractor's request, use of the "tablet method" of disinfection will be given consideration. The Contractor shall submit in writing, for the Engineer's approval before using this method a description of the type and number of tablets and the proposed procedure to be used.
6. Dechlorination: neutralization of the chlorine residual remaining in the water can be accomplished by the use of a dechlorination chemical to the highly chlorinated water. Typical dechlorination chemicals employed are sulfur dioxide (SO2), sodium bisulfate (NaHSO3), sodium sulfite (Na2SO3) and sodium thiosulfate (Na2S2O3 5H2O). The amount of these chemicals required to neutralize the residual chlorine concentrations in 100,000 gallons of water as listed in the following table.

:

Residual Chlorine Concentration (mg/l)	Chemical Required			
	Sulfur Dioxide (lb)	Sodium Bisulfate (lb)	Sodium Sulfate	Sodium Thiosulfate
1	0.8	1.2	1.4	1.2
10	8.3	12.5	14.6	12.0
25	20.9	31.3	36.5	30.0
30	41.7	62.6	73.0	60.0

7. Final Flushing: After satisfactory disinfection of the water line, the heavily chlorinated water shall be flushed from the piping until the chlorine concentration in the water leaving the main is no higher than that generally prevailing in the water system, or less than 1.0 mg/l. Piping shall be flushed at blow-off assemblies and at fire hydrants at terminal points of the piping.
8. Disposal: Disposal of chlorinated water shall be in accordance with all local, state and federal requirements.
9. Bacteriological Testing: Following disinfection and final flushing, the contractor shall obtain two (2) samples within a 24 hour period from each section of completed pipeline and have those samples tested by a State approved Laboratory for compliance with the State requirements for bacterial contamination. At least one (1) sample shall be collected from every 1200 feet of new main, one (1) set from the end of the line and at least one (1) set from each branch. Testing shall conform to the requirements of AWWA C 651 and should provide the type, number, and frequency of samples for bacteriological tests. If tests fail then the Contractor shall repeat disinfection, flushing and testing procedures.

END OF SECTION

SECTION 02751
SITE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete formwork.

B. Concrete paving, curbs, and footings.

C. Concrete reinforcement.

D. Expansion and control joint devices and sealant associated with concrete work.

E. Concrete curing.

1.2 REFERENCES

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction anD Materials; American Concrete Institute International; 2006.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).

C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 1999.

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

E. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 1999.

F. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988 (Reapproved 2002).

G. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001.

H. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute International; 2004.

I. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bar for Concrete Reinforcement; 2007.

J. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003.

K. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2003.

L. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2003a.

M. ASTM C 150 - Standard Specification for Portland Cement; 2002a.

N. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2001.

O. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2008.

P. ASTM C 881/C 881M - Standard Specification for Epoxy-Resin-Base Bonding System for Concrete; 2002.

Q. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete; 2005.

R. ASTM D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); 1998 (Reapproved 2003).

S. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (non-extruding and Resilient Bituminous Types); 1999.

T. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004.

1.3 SUBMITTALS

A. Comply with provisions of Section 01340.

B. Product Data: submit manufacturer’s data in accordance with specifications indicating product compliance to these specifications.

C. Material Certifications: submit certifications showing compliance for each material to these specifications.

D. Submit shop drawings with construction joint locations and configurations—note if requirements are different than what is indicated in the drawings.

E. Concrete Mix: Submit plant concrete mix design for each concrete class. Indicate the following:
1. Proportions of cement, fine and coarse aggregates, and water.
2. Water-cement ratio, design strength, slump, and air content.
3. Type of cement and aggregates.
4. Type of dosage of admixtures.

F. Joints: Submit manufacturer's joint material and sealant. Provide manufacturer's standard colors for selection by Architect.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. Obtain cementitious materials from same source throughout.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347 to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   3. Form Ties: Taper removable bolt type that will leave no metal within 1-1/2 inches of concrete surface.
   4. For footings and foundations, use boards or planks secured to wood or steel stakes, substantially constructed to shapes indicated and to support the required loads.
   5. Side forms for footings may be omitted, and concrete may be placed directly against excavation only when requested by the Contractor and approved by the Owner's Representative. When omission of forms is accepted, provide additional concrete 1" on each side of the minimum design profiles and dimensions shown on the drawings.

2.2 STEEL REINFORCEMENT

A. Reinforcing Steel: ASTM A 615/A 615M Grade 60.
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished.

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Do not use wood, brick, or other non-complying material.
   4. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C 150, Type I - Normal portland type.
   1. Acquire all cement for entire project from same source.

B. Coarse Aggregates: ASTM C 33, washed and screened, consisting of hard, durable particles without adherent coating.
   1. Acquire all aggregates for entire project from same source.

C. Fine Aggregate: ASTM C 330, natural bank or river sand, washed and screened, consisting of hard durable, uncoated particles free of deleterious matter. Graded from coarse to fine to produce a minimum percentage of voids.

D. Fly Ash: not permitted.

E. Water: Clean, potable, and not detrimental to concrete.

2.4 CHEMICAL ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Calcium chloride shall not be permitted in concrete mixtures.

C. Air Entrainment Admixture: ASTM C 260 or CRD-C13.
   1. Acceptable Products by:
      a. Air-Tite Gifford-Hill Co.
      b. MB-VR, Master Builders Co.

D. Water Reducing and Accelerating Admixture: ASTM C 494/C 494M Type E.

E. Water Reducing and Retarding Admixture: ASTM C 494/C 494M Type D.

F. Water Reducing Admixture: ASTM C 494/C 494M Type A.

2.5 ACCESSORY MATERIALS

A. Non-Shrink Grout: ASTM C 1107/C 1107M; premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
   2. Minimum Compressive Strength at 28 Days: 7,000 psi.

B. Moisture-Retaining Cover: ASTM C 171; white burlap-polyethylene sheet.

2.6 BONDING, JOINTING, AND SEALANT PRODUCTS

A. Self-Leveling Polyurethane Sealant: ASTM C 920, Grade P, Class 25, Uses T, I, M, A, O; single component, chemical curing, non staining, non bleeding, capable of continuous water immersion, self-leveling type.
   1. Color: to be selected by Architect from Manufacturer's standards.
   2. Movement Capability: Plus and minus 25 percent.
   3. Service Temperature Range: -40 to 180 degrees F.
   4. Shore A Hardness Range: 20 to 35.

B. Epoxy Bonding System: Complying with ASTM C 881/C 881M and of Type required for specific application.

C. Joint Filler: Premolded, preformed, compressible asphalt mastic with felt facers, complying with ASTM D 994, 1/2 inch thickness and full depth of slab less 1/2 inch.

2.7 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
   1. Fibrous Concrete Reinforcement: polypropylene multi-filament fibers specifically engineered and manufactured for use in concrete for secondary reinforcement.

C. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 3500 psi.
   2. Fly Ash Content: none.

3. Minimum Cement Content: Cement content shall not be less than 470 lbs per cubic yard.
4. Water-Cement Ratio: Maximum 44 percent by weight.
5. Total Air Content: 5 percent, determined in accordance with ASTM C 173/C 173M.
6. Maximum Slump: 4 inches.
7. Maximum Aggregate Size: 3/4 inch.

2.8 MIXING

A. Transit Mixers: Comply with ASTM C 94/C 94M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

B. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Provisions for other trades:
1. Provide openings in concrete formwork to accommodate work of other trades.
2. Verify size and location of openings, recesses, and chases with the trade requiring such items.
3. Accurately place and securely support items to be built into the concrete.

C. Do not begin delivery of concrete material until formwork, reinforcement, and all items required to be embedded in the concrete are complete, properly positioned and secured in place:
1. Remove all ice, snow and debris from formwork.
2. Remove hardened concrete and foreign material from the inner surfaces of conveying equipment, formwork and reinforcing.
3. Position and secure expansion joints, anchors, dowels, etc.

D. Verify that forms are clean and free of rust before applying release agent.

E. Provide mock up for review and approval of concrete stamp pattern. Do not proceed with additional stamped paving until mock up is approved.

F. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

G. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

1. Use epoxy bonding system for bonding to damp surfaces, for structural loadbearing applications, and where curing under humid conditions is required.

H. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.3 INSTALLING REINFORCEMENT

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Provide and maintain all dimension locations shown on drawings to provide required concrete cover around reinforcing.

C. Use sufficient supports and spacers to maintain position of reinforcing during concrete placement.

D. Do not use bricks, concrete chunks, or other simpler material as reinforcing supports.

E. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

F. Provide sufficient numbers of supports and of strength to carry the reinforcement.

G. Arrange, space, and securely tie bars and bar supports together with the specified tie wire.

H. Set wire ties so twisted ends are directed away from exposed concrete surfaces.

I. Do not place reinforcing bars more than 2" beyond last leg of any continuous bar support.

J. Lap Splices:
1. Tie securely with the specified wire to prevent displacement of splices during placement of concrete.

K. Splice Devices:
1. Obtain the Owner's Representative approval prior to using splice devices.
2. Install in accordance with manufacturer's written instructions.
3. Splice in a manner developing at least 125% of the yielding strength of the bar.

L. Welding:
1. Perform in accordance with AWS D1.4-79.

M. Do not splice bars except at locations specifically approved by the Owner's Representative.

3.4 INSTALLING JOINTS

A. Align curb and sidewalk joints.

B. Place expansion joints where indicated on drawings or at a maximum of 36 foot intervals.

C. Place 3/8 inch wide expansion joints to separate paving from vertical surfaces and other components and in pattern indicated.

D. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.

E. Provide scored control joints:
   1. As indicated on drawings.

F. Saw-cutting:
   1. Primary Method: Soft-Cut System method, by Soff-Cut International, Corona, CA (800) 776-3328. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 2 hours after final finish at each saw cut location. Use 1/4 inch thick blade, cutting 1 inch into slab.
   2. Optional Method (Where Soft-Cut System Method Equipment is Not Available): Properly time cutting with the set of the concrete, Saw-cut control joints within 24 hours after finishing. Start cutting as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/4 inch thick blade, cutting 1 inch into slab.

G. Joints at Vertical Surfaces: Separate slabs on grade from vertical surfaces with bond breaker material.

3.5 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Notify Architect and Owner not less than 24 hours prior to commencement of placement operations.

C. Moisten base to minimize absorption of water from fresh concrete.

D. Add fibrous concrete reinforcement to concrete materials at the time concrete is batched in amounts in accordance with approved submittals for each type of concrete required.

E. Mix concrete in strict accordance with fiber reinforcement manufacturer's instructions and recommendations for uniform and complete distribution.

F. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

G. Install joint devices in accordance with manufacturer's instructions.

H. Apply sealants in joint devices in accordance with this section and with the drawings.

I. Place concrete continuously between predetermined expansion, control, and construction joints.

J. Do not interrupt successive placement; do not permit cold joints to occur.

K. Saw cut joints within 24 hours after placing.

L. Place stamped concrete pattern using tool specified in areas shown on drawings. Place stamp pattern in accordance with approved manufacturer's instruction.

3.6 CONCRETE FINISHING

A. Area Paving: Light broom, texture perpendicular to pavement direction, unless otherwise noted.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 3/8-inch radius.

C. Curbs: Light broom, texture parallel to pavement direction.

3.7 CURING AND PROTECTION

A. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

C. Do not permit pedestrian traffic over pavement until 75 percent design strength of concrete has been achieved.

D. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than 7 days.

E. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.
      a. Moisture-Retaining Cover: Seal in place with waterproof tape or adhesive.

3.8 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation from True Position: 1/4 inch.

3.9 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01400.
   1. Provide free access to concrete operations at project site and cooperate with appointed firm.

B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.

C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Owner and Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of the Owner for each individual area.

END OF SECTION

SECTION 02810
IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

A. Section Includes:
1. Piping.
2. Encasement for piping.
3. Manual valves.
4. Pressure-reducing valves.
5. Automatic control valves.
6. Automatic drain valves.
7. Miscellaneous piping specialties.
8. Sprinklers.
9. Quick couplers.
10. Drip irrigation specialties.
11. Controllers.
12. Boxes for automatic control valves.

1.3 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics and furnished specialties and accessories.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.

B. Qualification Data: For qualified Installer.

C. Zoning Chart: Show each irrigation zone and its control valve.

D. Valve Schedule: Indicate zone number, valve size, flow rate (gpm) head type and precipitation rate (in/hr) for each automatic controller zone.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sprinklers, controllers, automatic control valves to include operation and maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed.
   1. Rotor/Impact Sprinklers: Equal to 1 percent of amount installed for each type and size indicated, but no fewer than 2 units.
   2. Spray Sprinklers: Equal to 1 percent of amount installed for each type and size indicated, but no fewer than 5 units.
   3. Bubblers: Equal to 1 percent of amount installed for each type indicated, but no fewer than 5 units.
   4. Emitters: Equal to 1 percent of amount installed for each type indicated, but no fewer than 5 units.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers that include a properly licensed and insured irrigation contractor as well as a competent irrigation foreman to be on site at all times.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

B. Irrigation contractor is responsible for the safe keeping and security of tools and materials. This may include a locking portable storage unit or removing tools and materials nightly if security concerns are present.

1.11 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
   1. Notify owner no fewer than 2 days in advance of proposed interruption of water service.

2. Do not proceed with interruption of water service without owners written permission.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. PE Pipe with Controlled ID: ASTM F 771, PE 3408 compound; SIDR 11.5 and SIDR 15**.**
   1. Insert Fittings for PE Pipe: ASTM D 2609, nylon or propylene plastic with barbed ends. Include bands or other fasteners.

C. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedules 40 and 80.
   1. PVC Socket Fittings: ASTM D 2466, Schedule 80.
   2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
   3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.

D. PVC Pipe, Pressure Rated: ASTM D 2241, PVC 1120 compound, SDR 21 and SDR 26.
   1. PVC Socket Fittings: ASTM D 2467, Schedule 80.
   2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.2 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

E. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.3 MANUAL VALVES

A. Brass Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product the one of the following:
      a. Leemco Inc Piping Solutions.
      b. NIBCO INC.

      Description:
      c. Square Head style
      d. Standard: MSS SP-110.

e. SWP Rating: 150 psig (1035 kPa).
f. CWP Rating: 600 psig (4140 kPa).
g. Body Design: Two piece.
h. Body Material: Forged brass.
i. Ends: Threaded or solder joint if indicated.
j. Seats: PTFE or TFE.
k. Stem: Brass.
l. Ball: Chrome-plated brass.
m. Port: Full.

B. Bronze Ball Valves:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Zurn Industries, LLC; Wilkins; Model 975XL (Lead Free):
2. Description:
a. Square Head style
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded or solder joint if indicated.
g. Seats: PTFE or TFE.
h. Stem: Brass.
i. Ball: Chrome-plated brass.
j. Port: Full.

C. Bronze Gate Valves:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Zurn Industries, LLC; Wilkins; Model 480SYBR or comparable product by one of the following:
a. Leemco Inc Piping Solutions
2. Description:
a. Square Head style
b. Class: 125.
c. CWP Rating: 200 psig (1380 kPa).
d. Body Material: ASTM B 62 bronze with integral seat and screw-in bonnet.
e. Ends: Threaded or solder joint.
f. Stem: Bronze, Outside Stem & Yoke.
g. Disc: Solid wedge; bronze.
h. Packing: Asbestos free.
i. Handwheel: Malleable iron, bronze, or aluminum.

2.4 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:
1. Manufacturers: provide products by the following:
a. Weathermatic.
2. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.5 AUTOMATIC DRAIN VALVES

A. Description: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig (17 to 20 kPa) use:
1. King Drains

2.6 SPRINKLERS

A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

B. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by the following:
   a. Rain Bird Corporation.
3. Description:
   a. Body Material: ABS.
   b. Nozzle: ABS
   c. Retraction Spring: Stainless steel.
   d. Internal Parts: Corrosion resistant.
4. Capacities and Characteristics:
   a. Flow: up to 20 gpm
   b. Pop-up Height: 4 inches aboveground to nozzle.
   c. Arc: Full, Half, and Quarter circle.
   d. Radius: 30ft-60ft
   e. Inlet: **NPS 1/2 (DN 15)**.

C. Plastic, Pop-up Spray Sprinklers:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on drawings or comparable product by the following:
   a. Rain Bird Corporation.
3. Description:
   a. Body Material: ABS.
   b. Nozzle: ABS
   c. Retraction Spring: Stainless steel.
   d. Internal Parts: Corrosion resistant.
   e. Pattern: Fixed, with flow adjustment.
4. Capacities and Characteristics:
   a. Nozzle: ABS
   b. Flow: .26gpm-4gpm
   c. Pop-up Height: 12 inches aboveground to nozzle.
   d. Arc: Full, Half and Quarter circle.
   e. Radius: 8ft – 15ft
   f. Inlet: NPS 1/2 (DN 15).

D. Plastic Shrub Sprinklers:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by the following:
   a. Rain Bird Corporation
3. Description:
   a. Body Material: ABS or other plastic.
   b. Pattern: Fixed, with flow adjustment.
4. Capacities and Characteristics:
   a. Configuration:
   b. Flow: .26gpm – 4gpm

c. Arc: Full, Half and Quarter circle.
d. Radius: 2ft – 15ft
e. Mounting Height: 2ft - 4ft aboveground to nozzle.
f. Inlet: NPS 1/2 (DN 15)

2.7 QUICK COUPLERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by the following:
1. Rain Bird Corporation.

C. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
1. Locking-Top Option: Vandal-resistant locking feature. Include **(2)** matching key(s).

2.8 DRIP IRRIGATION SPECIALTIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Netafim USA.
2. Rain Bird Corporation.

B. Freestanding Emitters: Device to deliver water at approximately 20 psig (138 kPa).
1. Body Material: PE or vinyl, with flow control.
2. Riser to Emitter: PE or PVC flexible tubing.
3. Capacities and Characteristics:
a. Flow: 1/2 gph -2 gph (7.6 L/h) at approximately 20 psig (138 kPa).
b. Tubing: PE or PVC; 1/8-inch (3-mm) minimum ID.
c. Mounting Height: 6in aboveground to nozzle.

C. Manifold Emitter Systems: Manifold with tubing and emitters.
1. Manifold: With multiple outlets to deliver water to emitters.
a. Body Material: Plastic.
b. Outlet Caps: Plastic, for outlets without installed tubing.
c. Operation: Automatic pressure compensating.
2. Tubing: PE or PVC; 1/8-inch (3-mm) minimum ID.
3. Emitter: Device to deliver water at approximately 20 psig (138 kPa).
a. Body Material: PE or vinyl, with flow control.
4. Capacities and Characteristics:
a. Manifold:
1) Design Flow: 0.5gpm – 24gpm
2) Number of Outlets: 2,4,6, or 8
b. Emitter No. 2,4,6, or 8
1) Flow: 1/2 gph (1.9 L/h) - 2 gph (7.6 L/h) at approximately 20 psig (138 kPa).
2) Mounting Height: 6in above ground.

D. Drip Tubes with Direct-Attached Emitters:
1. Tubing: Flexible PE or PVC with plugged end.
2. Emitters: Devices to deliver water at approximately 20 psig (138 kPa).

a. Body Material: PE or vinyl, with flow control.
b. Mounting: Inserted into tubing at set intervals.

E. Drip Tubes with Remote Discharge:
1. Tubing: Flexible PE or PVC with plugged end.
2. Emitters: Devices to deliver water at approximately 20 psig (138 kPa).
a. Body Material: PE or vinyl, with flow control.
b. Mounting: Inserted into tubing at set intervals.
3. Capacities and Characteristics:
a. Tubing Size: NPS 1/2 (DN 15)
b. Length: N/A
c. Emitter Spacing: Per planting
d. Emitter Flow: 1/2 gph (1.9 L/h) - 2 gph (7.6 L/h).
e. Branch Tubing Size: NPS 1/4 (DN 8) with button-type outlet.
f. Branch Tubing Length: 12 – 18 inches.

F. Off-Ground Supports: Plastic stakes.

G. Application Pressure Regulators: Brass or plastic housing, NPS 3/4 (DN 20), with corrosion-resistant internal parts; capable of controlling outlet pressure to approximately 20 psig (138 kPa).

H. Filter Units: Brass or plastic housing, with corrosion-resistant internal parts; of size and capacity required for devices downstream from unit.

I. Air Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.

J. Vacuum Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.

2.9 CONTROLLERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings:
1. Rain Bird Corporation.

C. Description:
1. Controller Stations for Automatic Control Valves: Each station is variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each station.
2. Exterior Control Enclosures: Steel enclosure on pedestal to be provided by the City. Contractor to provide concrete pad, conduit through pad, attachment of pedestal to pad and installation of controller in metal enclosure.
a. Body Material: Painted-steel sheet metal.
b. Mounting: Freestanding type for concrete base.
3. Control Transformer: 24-V secondary, with primary fuse.
4. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate two or more times daily.
a. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
b. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.

c. Surge Protection: Metal-oxide-varistor type on each station and primary power.

5. Moisture Sensor: Adjustable from one to seven days, to shut off water flow during rain.

6. Wiring: UL 493, Type UF multiconductor, with solid-copper conductors; insulated cable; suitable for direct burial.
   a. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
   b. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
   c. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

7. Concrete Base: Reinforced precast concrete not less than 36 by 24 by 4 inches (900 by 600 by 100 mm) thick, and 6 inches (150 mm) greater in each direction than overall dimensions of controller. Include opening for wiring.

2.10 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:
   1. Manufacturers: Subject to compliance with requirements, provide products by available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Rain Bird
      b. Highline
   2. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
      a. Size: As required for valves and service.
      b. Shape: Round or Rectangular.
      c. Sidewall Material: PE, ABS, or FRP
      d. Cover Material: PE, ABS, or FRP
         1) Lettering: "IRRIGATION"

B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4-inch (19 mm) minimum to 3 inches (75 mm) maximum.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 02220.

B. Install warning tape directly above pressure piping, 12 inches (300 mm) below finished grades, except 6 inches (150 mm) below subgrade under pavement and slabs.

C. Provide minimum cover over top of underground piping according to the following:
   1. Irrigation Main Piping: Minimum depth of 24 inches (607 mm) below finished grade, or not less than [18 inches (457 mm) below average local frost depth, whichever is deeper.
   2. Circuit Piping: 12 inches (305 mm).
   3. Drain Piping: 12 inches (305 mm).
   4. Sleeves: 24 inches (607 mm).

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

3.3 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Lay piping on solid subbase, uniformly sloped without humps or depressions.

G. Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C). Allow joints to cure at least 24 hours at temperatures above 40 deg F (5 deg C) before testing.

H. Install piping in sleeves under parking lots, roadways, and sidewalks.

I. Install sleeves made of Schedule 40 PVC pipe and socket fittings, and solvent-cemented joints.

J. Install transition fittings for plastic-to-metal pipe connections according to the following:
   1. Underground Piping:
      a. NPS 1-1/2 (DN 40) and Smaller: Plastic-to-metal transition fittings.
      b. NPS 2 (DN 50) and Larger: AWWA transition couplings.
   2. Aboveground Piping:
      a. NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings.
      b. NPS 2 (DN 50) and Larger: Use dielectric flange kits with one plastic flange.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.

F. Copper-Tubing Brazed Joints: Construct joints according to CDA's "Copper Tube Handbook," using copper-phosphorus brazing filler metal.

G. Copper-Tubing Soldered Joints: Apply ASTM B 813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

H. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

I. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
   3. PVC Non-pressure Piping: Join according to ASTM D 2855.

3.5 VALVE INSTALLATION

A. Pressure-Reducing Valves: Install in boxes for automatic control valves.

B. Drain Valves: Install in underground piping in boxes for automatic control valves.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and 2 inches (50 mm) from other boundaries unless otherwise indicated.

3.7 DRIP IRRIGATION SPECIALTY INSTALLATION

A. Install freestanding emitters on pipe riser to mounting height indicated.

B. Install manifold emitter systems with tubing to emitters. Plug unused manifold outlets. Install emitters on off-ground supports at height indicated.

C. Install multiple-outlet emitter systems with tubing to outlets. Plug unused emitter outlets. Install outlets on off-ground supports at height indicated.

D. Install drip tubes with direct-attached emitters on ground.

E. Install drip tubes with remote-discharge on ground with outlets on off-ground supports at height indicated.

F. Install off-ground supports of length required for indicated mounted height of device.

G. Install application pressure regulators and filter units in piping near device being protected, and in control-valve boxes.

H. Install air relief valves and vacuum relief valves in piping, and in control-valve box.

3.8 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

A. Equipment Mounting: Install exterior freestanding controllers on precast concrete bases.
   1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   2. Install anchor bolts to elevations required for proper attachment to supported equipment.

B. Install control cable in same trench as irrigation piping and at least 2 inches (51 mm) below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.9 CONNECTIONS

A. Comply with requirements for piping specified in Section 221113 "Facility Water Distribution Piping" for water supply from exterior water service piping, water meters, protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

C. Connect wiring between controllers and automatic control valves.

3.10 IDENTIFICATION

A. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches.

3.11 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Any irrigation product will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with finish grade.

3.13 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.14 PIPING SCHEDULE

A. Install components having pressure rating equal to or greater than system operating pressure.

B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.

C. Above-ground irrigation main piping, NPS 4 (DN 100) and smaller shall be one of the following:
   1. Galvanized-steel pipe and galvanized-steel pipe nipples; galvanized, gray-iron threaded fittings; and threaded joints.
   2. Type L (Type B) hard copper tube, wrought- or cast-copper fittings, and brazed joints.

D. Underground irrigation main piping, NPS 4 (DN 100) and smaller shall be the following:
   1. Schedule 40 PVC pipe and socket fittings, and solvent-cemented joints.
   2. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.

E. Underground Branches and Offsets at Sprinklers and Devices: Schedule 80, PVC pipe; threaded PVC fittings; and threaded joints.
   1. Option: Plastic swing-joint assemblies, with offsets for flexible joints, manufactured for this application.

F. Risers to Aboveground Sprinklers and Specialties shall be one of the following:
   1. Galvanized-steel pipe and galvanized-steel pipe nipples; galvanized, gray-iron threaded fittings; and threaded joints.
   2. Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.

END OF SECTION 02810

SECTION 02830

RETAINING WALLS & POND WALLS

PART 1: GENERAL

1.1 Description

A. Work shall consist of furnishing materials, labor, equipment and supervision to install retaining walls & pond walls in accordance with plans and specifications and in reasonably close conformity with the lines, grades, design and dimensions shown on plans or established by Owner or Owner's Engineer.

1.2 Reference Standards

A. Retaining Wall and Pond Wall Stone

1. See specification section 04400 Stonework.
2. See specification section 044313 Anchored Stone Masonry Veneer

B. Geosynthetic Reinforcement

1. **ASTM D 4595** – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
2. **ASTM D 5262** – Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
3. **ASTM D 5321** – Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear
4. **ASTM D 5818** – Standard Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics
5. **ASTM D 6706 –** Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil

C. Soils

1. **ASTM D 698** – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
2. **ASTM D 2487** – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
3. **ASTM D 422** – Standard Test Method for Particle-Size Analysis of Soils
4. **ASTM D 4318** – Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
5. **ASTM G 51** – Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing

D. Drainage Pipe

1. **ASTM F 758** – Standard Specification for Smooth-Wall Polyvinyl Chloride (PVC) Plastic Underdrain Systems for Highway, Airport and Similar Drainage
2. **ASTM F 405** – Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings

E. Engineering Design

1. As designed and approved by structural engineer.

F. Where specifications and reference documents conflict, the Wall Design Engineer shall make the final determination of applicable document.

1.3 Submittals

A. Materials Submittals: The Contractor shall submit manufacturers' certifications two weeks prior to start of work stating that the limestone and geosynthetic reinforcement meet the requirements of Section 2 of this specification.

1.4 Delivery, Storage and Handling

A. Contractor shall check materials upon delivery to ensure that the specified type and grade of materials have been received.

B. Contractor shall store and handle materials in accordance with manufacturer's recommendations and in a manner to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping or other causes.

C. Contractor shall prevent excessive mud, wet concrete, epoxies and similar materials that may affix themselves from coming in contact with materials.

D. Contractor shall protect materials from damage; no damaged material shall be incorporated into the retaining wall.

E. Geosynthetic shall be protected from UV exposure and the protective covering on geosynthetic shall remain until immediately before installation and shall be stored at temperatures above -10 degrees F.

PART 2: MATERIALS

2.1 Retaining Wall and Pond Wall Stone

A. See specification section 04400 Stonework.

B. Stone shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the structure. Any cracks or chips observed during construction shall fall within the guidelines outlined in ASTM C 1372.

C. Stone shall be capable of providing overlap of units on each successive course so that walls meeting at corner are interlocked and continuous.

D. Stones shall be capable of providing a natural-face, textured surface for all vertical surfaces that will be exposed after completion of wall, including any exposed sides and backs of stones.

2.2 Retaining Wall and Pond Wall Connection Pins

A. Where Stone is to be connected to concrete provide #4 x 12" dowel or continuation of footing rebar 6" into stone. Treat dowel with asphaltic mastic around entire rod and 1" either side of joint. Where Stone is to be connected to stone horizontally provide 12" #4 rebar, two per stone. For stone caps use #4 x 6" rebar at 30" on center, two min. per cap stone, and grouted into a 2" diameter max hole top and bottom. Where geogrid is to be attached to stone provide 3/8" x 3" stainless steel tapcon with washer, 16" on center. See details for each application.

2.3 Geosynthetic Reinforcement

A. Geosynthetic reinforcement shall consist of high-tenacity PET geogrids, HDPE geogrids, or

geotextiles manufactured for soil reinforcement applications. The type, strength and placement of the geosynthetic reinforcement shall be determined by procedures outlined in this specification and the "NCMA Design Manual for Segmental Retaining Walls," (3rd Edition, 2009), and materials are as specified on plans.
Geosynthetic types currently approved for this project are:

VERSA-Grid® Geogrids or approved equal.

B. The type, strength and placement of the reinforcing geosynthetic shall be VERSA-Grid VG 3.0, 6' wide roll and be placed as shown on the details.

2.4 Leveling Pad

A. Material for leveling pad shall consist of Type A aggregate base minimum of 8 inches in depth for retaining walls and 12" depth for pond walls. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost stone.

2.5 Drainage Aggregate

A. Drainage aggregate shall be angular, clean stone meeting the following gradation as determined in accordance with ASTM D 422:

Sieve Size	Percent Passing
1 inch	100
3/4 inch	75-100
No. 4	0-60
No. 40	0-50
No. 200	0-5

The drainage aggregate shall be fully wrapped with a geotextile to function as a filter. Provide one foot of overlap on geotextile.

2.6 Drainage Pipe (for use only behind Retaining Walls)

A. The drainage collection pipe shall be a perforated or slotted corrugated HDPE pipe.

B. Drainage pipe shall be manufactured in accordance with ASTM F 405 or ASTM F 758.

2.7 Reinforced Backfill Soil

A. The reinforced soil material shall be free of debris. Unless otherwise noted on the final, P.E.-sealed, retaining wall plans prepared by the Wall Design Engineer, the reinforced material shall consist of the inorganic USCS soil types GP, GW, SW, SP and SM, meeting the following gradation, as determined in accordance with ASTM D 422:

Sieve Size	Percent Passing
1 inch	100
No. 4	20-100
No. 40	0-60
No. 200	0-35

B. The maximum particle size of poorly-graded gravels (GP) (no fines) should not exceed 3/4 inch unless expressly approved by the Wall Design Engineer and the long-term design strength (LTDS) of the geosynthetic is reduced to account for additional installation damage from particles larger

than this maximum.

C. The plasticity of the fine fraction shall be less than 20.

D. The pH of the backfill material shall be between 3 and 9 when tested in accordance with ASTM G 51.

PART 3: DESIGN PARAMETERS

3.1 Soil

A. The following soil parameters, as determined by the Owner's Geotechnical Engineer, shall be used for the preparation of the final design:

Refer to the Geotechnical Report section 4.3 Shallow Foundation Design.

B. Should the actual soil conditions observed during construction differ from those assumed for the design, design shall be reviewed by the Wall Design Engineer at the Owner's Geotechnical Engineer's direction.

3.2 Design

A. The design analysis for the final, P.E.-sealed retaining wall plans prepared by the Wall Design Engineer shall consider the external stability against sliding and overturning, internal stability and facial stability of the reinforced soil mass, and shall be in accordance with acceptable engineering practice and these specifications. The internal and external stability analysis shall be performed in accordance with the “NCMA Design Manual for Segmental Retaining Walls,” (3rd Edition, 2009), using the recommended minimum factors of safety in this manual.

B. External stability analysis for bearing capacity, global stability, and total and differential settlement shall be the responsibility of the Owner and the Owner's Geotechnical Engineer. The Geotechnical Engineer shall perform bearing capacity, settlement estimates, and global stability analysis based on the final wall design provided by the Wall Design Engineer and coordinate any required changes with the Wall Design Engineer.

C. While vertical spacing between geogrid layers may vary, it shall not exceed 2.0 feet maximum in the wall design.

D. The geosynthetic placement in the wall design shall have 100% continuous coverage parallel to the wall face. Gapping between horizontally adjacent layers of geosynthetic (partial coverage) will not be allowed.

PART 4: CONSTRUCTION

4.1 Inspection

A. The Owner's Representative is responsible for verifying that the Contractor meets all the requirements of the specification. This includes all submittals for materials and design, qualifications, and proper installation of wall system.

B. Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

4.2 Excavation

A. Contractor shall excavate to the lines and grades shown on the project grading plans. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Engineer/Architect, at the Contractor's expense.

B. Contractor shall verify location of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures and trees to remain are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor.

4.3 Foundation Preparation

A. Following the excavation, the foundation soil shall be examined by the Owner's representative to assure actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting the required strength shall be removed and replaced with infill soils, as directed by the Owner's Geotechnical Engineer.

B. Foundation soil shall be proof-rolled and compacted to 95% standard Proctor density and tested by the Owner's Geotechnical Engineer prior to placement of leveling pad materials.

4.4 Leveling Pad Construction

A. Leveling pad shall be placed as shown on the final, P.E.-sealed retaining wall plans with a minimum thickness of 8 inches. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost stone.

B. Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of stone. Well-graded sand can be used to smooth the top 1/4 inch to 1/2 inch of the leveling pad. Compaction will be with mechanical plate compactors to achieve 98% of maximum standard Proctor density (ASTM D 698).

4.5 Stone Installation

A. All stone shall be installed at the proper elevation and orientation as shown on the wall plans and details.

B. First course of stone shall be placed on the leveling pad. The units shall be leveled side-to-side, front-to-rear and with adjacent units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important to ensure accurate and acceptable results. Gaps between natural stones shall be kept to a minimum only due to the uneven surface of the natural stone. Alignment may be done by means of a string line or offset from base line to the front of the stone. Due to the uneven nature of natural stone the front face of the walls should align per each layer and the back of the stone will vary. Provide a batter on each wall layer per the details.

C. Each layer of stone shall have type M mortar placed from mid-width of stone toward back leaving gaps on the back for water drainage between the stones. The purpose being to cement stones together while having the appearance of a dry stacked wall. Do not use mortar on rows that have geogrid placement.

D. All excess debris shall be cleaned from the top of stones and the next course of stones installed on top of the stones below.

F. Lay out of curves and corners shall be installed in accordance with the plan details. Walls meeting at corners shall be interlocked by overlapping successive courses.

G. The above procedures shall be repeated to the extent of wall height.

H. The wall face shall not differ more than 2” per layer.

4.6 Geosynthetic Reinforcement Placement

A. All geosynthetic reinforcement shall be installed at the proper elevation and orientation as shown on the final P.E.-sealed retaining wall plan profiles and details, or as directed by the Wall Design Engineer.

B. At the elevations shown on the final plans, (after the units, drainage material and backfill have been placed to this elevation) the geosynthetic reinforcement shall be laid horizontally on compacted infill and on top of the stone, to within 1 inch of the front face of the unit below. Embedment of the geosynthetic in the stone shall be consistent with geosynthetic manufacturer’s recommendations. Correct orientation of the geosynthetic reinforcement shall be verified by the Contractor to be in accordance with the geosynthetic manufacturer’s recommendations. The highest-strength direction of the geosynthetic must be perpendicular to the wall face.

C. Geosynthetic reinforcement layers shall be one continuous piece for their entire embedment length. Splicing of the geosynthetic in the design-strength direction (perpendicular to the wall face) shall not be permitted. Along the length of the wall, horizontally adjacent sections of geosynthetic reinforcement shall be butted in a manner to assure 100% coverage parallel to the wall face.

D. Tracked construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum of 6 inches of backfill is required prior to operation of tracked vehicles over the geosynthetic. Turning should be kept to a minimum. Rubber-tired equipment may pass over the geosynthetic reinforcement at slow speeds (less than 5 mph).

E. The geosynthetic reinforcement shall be free of wrinkles prior to placement of soil fill. The nominal tension shall be applied to the reinforcement and secured in place with staples, stakes or by hand tensioning until reinforcement is covered by 6 inches of fill.

4.7 Drainage Aggregate and Drainage Material Placement

A. Drainage aggregate shall be installed to the line, grades and sections shown on the final P.E.-sealed retaining wall plans. Drainage aggregate shall be placed to the minimum thickness shown on the construction plans between and behind units (a minimum of 1 cubic foot for each exposed square foot of wall face unless otherwise noted on the final wall plans).

B. Drainage collection pipes shall be installed to maintain gravity flow of water outside the reinforced-soil zone. The drainage collection pipe shall be installed at the locations shown on the final construction drawings. The drainage collection pipe shall daylight into either the ponds or the creek.

4.8 Backfill Placement

A. The reinforced backfill shall be placed as shown in the final wall plans in the maximum compacted lift thickness of 8 inches and shall be compacted to a minimum of 95% of standard Proctor density (ASTM D 698) at a moisture content within -1% to +3% points of optimum. The backfill shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geosynthetic reinforcement and the stones.

B. Only hand-operated compaction equipment shall be allowed within 3 feet of the back of the wall units. Compaction within the 3 feet behind the wall units shall be achieved by at least three passes of a lightweight mechanical tamper, plate, or roller.

C. At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing and reinforced backfill to direct water runoff away from the wall face.

D. At completion of wall construction, backfill shall be placed level with final top of wall elevation. If final grading, paving, landscaping and/or storm drainage installation adjacent to the wall is not placed immediately after wall completion, temporary grading and drainage shall be provided to ensure water runoff is not directed at the wall nor allowed to collect or pond behind the wall until final construction adjacent to the wall is completed.

4.9 Construction Adjacent to Completed Wall

A. The Owner's Representative is responsible for ensuring that construction by others adjacent to the wall does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of 3 feet behind the back of the wall face. Equipment with wheel loads in excess of 150 psf live load shall not be operated within 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the General Contractor to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.

END OF SECTION

SECTION 02935

SODDING

PART 1 GENERAL

1.1 SECTION REQUIREMENTS

A. Scope: All areas shown on plan shall be fine graded and lawn materials furnished and installed as specified. Maintenance and protection shall be accomplished as specified. The U-3 Bermuda grass turf sod and any Bermuda seeding required for temporary erosion control will be planted in the specified planting period.

B. Description: This section specifies providing topsoil, fine grading, seeding, and sodding.

1.2 RELATED WORK

A. Section 02260 – Planting Soils

B. Section 02810 – Irrigation

C. Section 02995 – Trees, Shrubs, and Ground Covers

1.3 REFERENCES

A. Reference Codes and Standards
1. State of Oklahoma Highway Commission Standard Specification for Highway Construction, most current edition.
2. USDA - SCS

1.4 SUBMITTALS

A. Seed: Submit with each seed bag a Certification tag, an Analysis tag, and a Treatment tag.

B. Sod: Each sod delivery bearing a certification tag and label, as required by law.

C. Topsoil and sandy loam: See Planting Soil: Section 02260-Part 1.04 (Submittals).

D. Fertilizer: Labeled with manufacturer’s name and address, guaranteed analysis, including nutrient and its derived source, listing of potential acidity, and any toxic materials.

E. Herbicide: Submit source including manufacturer’s name, address, and chemical analysis.

F. Mulch: Labeled with manufacturer’s name and address, material components, trademark, chemical analysis, species, age, and source.

G. Compost: See Planting Soil: Section 02260-Part 1.04 (Submittals).

H. Tackifier and hydromulch: Submit manufacturer’s literature.

1.5 INSPECTIONS

A. Turf material may be inspected by the Landscape Architect at the growing site and approved for delivery. Such inspection does not preclude rejection at the project site due to damage in transit or storage.

B Topsoil: The source of topsoil may be inspected by the Landscape Architect after test report submittal to determine the acceptability of the topsoil.

C. Contractor shall inspect rough grading to insure proper drainage. The contractor shall notify the Landscape Architect immediately if areas with inadequate drainage are observed.

1.6 TESTING

A. See Planting Soil: Section 02260-Part 1.07 (Testing) and 1.08 (Sampling for Testing).

1.7 DELIVERY, HANDLING AND STORAGE

A. Delivery: Notify the Landscape Architect of the delivery schedule two (2) working days in advance to allow sod and seed to be inspected upon arrival at the job site. Unacceptable sod or seed shall be removed from the site immediately. Fertilizer, lime, and peat shall be delivered to the site in the original, unopened containers bearing the manufacturer's guaranteed chemical analysis, name, trade name or trademark. Do not allow seed, sod, fertilizer, straw, or other agrinomic materials or supplies on the Site other than those for the project.
   1. Seed: Deliver with labels and tags with each seed bag bearing the following upon delivery: seed type / species, source, analysis of purity and germination tag, and Certification tag.
   2. Sod: Prior to and after delivery during wet weather, allow sod to dry to the extent that it will prevent tearing during handling and laying. During dry weather, water sod to ensure its vitality and prevent dropping of soil in handling. Deliver sod within 12-hours after being cut.

B. Handling: Sod shall be loaded into the transportation vehicle immediately upon harvesting. Sod shall be wet thoroughly with water and covered with heavy canvas or other approved cover to minimize moisture loss. Sod shall not be transported in a vehicle with open sides.

C. Storage: Sod shall be kept moist and covered from the time it is harvested until planted. Sod shall be planted within forty-eight (48) hours of harvesting.
   1. Seed, fertilizer, lime, and peat shall be kept in a dry storage area away from contaminants.
   2. Storage of materials shall be in areas designated or approved by the Landscape Architect.

1.8 ENVIRONMENTAL PROTECTION

A. All work and contractor operations shall comply with the requirements of the local, state, or federal Environmental Protection Agencies.

PART 2 PRODUCTS

2.1 SEED FOR GRASS

A. Shall be free of thistle, quack grass, bentgrass, clover, dock, cheat, chess, chickweed, dallisgrass, plantain, black medic, red fescue, tall fescue, and plants listed by the Oklahoma Department of Agriculture Seed Law as “Prohibited Noxious” or “Restricted Noxious”.

B. Shall match the specified mix on the Stormwater Pollution Prevention Plan.

C. Shall be dated material from last available crop, with date of test not more than nine months before date of sowing.

2.2 SOD

A. Bermuda sod to be used as source material shall be a thick stand of U-3 Bermuda growing on fertile topsoil and at least 18-months old. Where Bermuda grass is used, the vegetative parts (rhizomes, stolons, and roots) of shall be viable as indicated by a dense, deep-rooted stand.

B. The source for sod and sprigs shall be free of reproducing parts of weeds classified as “Prohibited Noxious” and shall be as free of other legally “Restricted Noxious” plant materials as required by the Oklahoma Department of Agriculture Seed Law.

C. The proposed source of sod or sprigs will be approved by the Landscape Architect before the beginning of sodding operations. Prior to approval, the area shall not be tilled or mowed. After approval, all vegetative growth exceeding 3-inches (75-mm) in height shall be mowed and the residue removed prior to harvesting the sod. The sod or sprigs shall be moist when excavated from the source and shall be kept moist until planted. Sod in storage which becomes dry, shall not be re-moistened and used, but shall be discarded.

2.3 TOPSOIL

A. Topsoil of sodding is intended to come from the existing site topsoil and shall be defined in the Section 02260-Part 2.4 (Lawn Soil).

B. If imported topsoil is required, it shall be furnished by the Contractor obtained from a loam topsoil borrow area, and shall be a natural, friable soil representative of productive soils in the vicinity. It shall be obtained from well-drained areas and shall be free of admixture of subsoil and foreign matter or objects larger than one-inch (1") in any dimension, toxic substances, and any material or substances that may be harmful to plant growth. The pH range shall be 6.5 to 7.3 and have organic content between 0.5 and 2.0 percent.

2.4 FERTILIZER

A. After core aeration has been completed, Microlife Ultimate 8-4-6 fertilizer shall be surface applied over the soil at a rate of 12 lbs of fertilizer per 1,000 square feet. Do not install fertilizer until one month after sod is installed per Park Staff request.

2.5 HERBICIDE

A. Contractor to apply selective, non-selective, pre-emergent herbicide to provide a turf grass stand that is acceptable.

B. Contractor to apply Fusilade II Turf & Ornamental Herbicide post-emergent herbicide to provide a turf stand that is acceptable.

2.6 EROSION CONTROL MEASURES

A. Wood Cellulose Fiber: The material shall be composed of natural wood fiber produced from wood by-products. It shall contain no growth or germination inhibiting factors and shall contain a water soluble, nontoxic coloring agent

B. Straw: Wheat, barley, oat or rye straw, threshed, air-dried, and free from Canada thistle, dock, Johnson grass, and other foreign matter.

C. Mulch blanket: Knitted construction of biodegradable yarn with uniform openings.
   1. 180-foot lengths or greater.
   2. U-shaped staples: As standard with mulch blanket manufacturer

PART 3 EXECUTION

3.1 SOD/SEED BED PREPARATION

A. During operations, keep walkway and roadway surfaces clean. Promptly remove topsoil or other material. After completion of construction work in the area, prepare surface of subsoil. Finish to lines shown and parallel to proposed finished grade, as approved.

B. Finish grade shall be such that all mature grass shall be level with all adjoining sidewalks and ground level planting areas. Top of newly laid sod shall be flush with adjacent walkways. Top of seeded areas shall be approximately 1” below adjacent walkways. The addition or removal of topsoil shall be accomplished, if necessary, to achieve finish grade.

C. Soil test: Prior to planting, test topsoil in areas to be planted in accordance with Section 1.5 Testing.

D. Soil amendments: apply within seven days before planting and work into the upper two-inches (2”) of existing topsoil. If fertilizer is applied dry, it shall be immediately incorporated into the soil with water.

E. Weed Removal in areas to be sodded:
   1. If no existing trees are in the location, the area scheduled to be sodded shall be treated with a pre-emergent designated or approved by the Landscape Architect and applied at the manufacturer's recommended rate.
      Do not apply herbicides in areas to be seeded.
      Do not apply synthetic herbicides under the dripline of existing trees. Provide a written authorization from a certified Arborist to the Landscape Architect if a herbicide application is planned under any tree dripline.
      a. If site has been freshly graded, water site for minimum two weeks to encourage weed germination and growth.
      b. If site was graded more than four (4) weeks prior, watering is not needed to encourage weed growth.
   2. If existing trees are located within the area scheduled to be sodded, lightly scarify the soil to remove seedlings and other ground vegetation to a depth not to exceed 2-inch. If exposed tree roots are on the surface of the soil, DO NOT SCARIFY.

F. Place and spread LAWN SOIL (per Section 022660-Part 2.4A (Lawn Soil) over areas to be seeded and sodded to depth of two-inches which will conform to finish lines, grades and elevations after natural settlement.

H. When placing topsoil on slopes, work topsoil into subsoil to minimum depth of 4-inches to eliminate slip-plane between two materials. Leave topsoil at surface to ensure germination of seed.

I. Prepared surface shall be floated smooth and free of bumps and depressions. Remove stones and foreign matter over two inches (2") in diameter from top two inches (2") of sod/seed bed. Planting shall be done immediately thereafter, provided the bed had remained in a friable condition and has not become muddy or hard. If it has become hard, it shall be cultivated to a friable condition again.

J. Apply 1-1/2 to 2 inches of LAWN SOIL. Till or disk to 5-inch minimum depth into existing subsoil to eliminate slip-plane between the three materials and to prepare an acceptable bed for sod. Make a minimum of one pass to break up clods and integrate compost evenly into the existing soil. Penetration of soil to a depth of 5-inch is desired to encourage dormant seed grass and weed growth. Do not till if soil is wet.

K. Fine grade for level, smooth seed bed.

L. Second weed and grass removal in areas scheduled for sodded grass: Water tilled and fine graded areas to receive grass 3 weeks prior to sodding to encourage additional disturbed weed and native grass germination and growth. Remove all grasses and weeds, unless directed otherwise by Landscape Architect.

M. If weeds should germinate prior to sodding, re-apply herbicide to eradicate weeds, but do not injure grass.

O. Maintain specified depth of topsoil from time placed until specified seed or sod is established.

Q. If soil or weather conditions are unsuitable, cease topsoil operations. Resume topsoil operations when proper conditions prevail.

R. Where a cool season grass cover is used, apply a pre-emergent herbicide prior to sodding.

S. Keep walkway and roadway surfaces clean. Promptly remove topsoil or other material. After completion of construction work in the area, prepare surface of subsoil. Finish to lines shown and parallel to proposed finished grade, as approved.

3.2 SODDING OPERATIONS

A. Sodding shall be done in areas as shown on planting plan and after preparation of soil as outlined in Section 3.1 Sod/Seed Bed Preparation.

B. Time frame for laying sod is year-round if needed. Extend or reduce specified period as approved and as necessitated by weather and soil conditions.

C. Do not lay sod when sodding area is muddy or frozen or when sod is frozen. When soil surface is hot or dry, wet soil to a depth of 2-inches, six to eight hours prior to sodding.

D. Lift sod from trucks or storage piles and place by hand with no visible joints and no overlapping.

E. Lay first row of sod in straight line. Place subsequent rows parallel to and tightly against each other with no visible joints and no overlapping. Stagger lateral joints. Do not stretch sod.

F. On slopes sod shall be laid perpendicular to the direction of the slope / parallel to contours with alternate joints.

G. Peg sod placed on slopes 2:1 or greater. Peg each strip or section of sod with at least two stakes not more than 2 feet apart. Use stakes 1/2 inch by one inch by 12 inches driven flush with top of sod so that roots are in contact with topsoil.

H. Roll entire area as sodding is completed in one section so that all finished sod areas are smooth and free of lumps and depressions.

I. All sodded areas and 1-inch of soil immediately beneath the sod shall be watered immediately after final rolling with a fine spray to prevent wilting during installation.

3.3 SEEDING OPERATIONS

A. Seeding shall be done for temporary erosion control as indicated on the Stormwater Pollution Prevention Plan and in Section 3.1 Sod/Seed Bed Preparation.

B. Hydraulic equipment used to apply the seed shall be factory designed and built with sufficient pump capacity to apply specified quantities. The tank shall hold a minimum of 1000 gallons (4 kiloliters) and be equipped with a mechanical agitation system with an operating capacity sufficient to suspend and homogeneously mix the seed and water. The distribution hoses shall be large enough to prevent clogging and be equipped with spray nozzles that will provide even distribution on designated areas. The equipment shall be mounted on a traveling unit which may be either self-propelled or pulled, capable of getting the tank and nozzles within sufficient proximity of the area to be seeded without the wheels operating on the areas to be seeded.

C. Place the seed in water in the spray tank of a hydraulic seeder. Distribute the seed uniformly by power spraying through a suitable nozzle. If specified, place inoculant for legumes in the spray tank with the seed in accordance with approved methods. When seed is loaded into 1000 gallons (3.8 kiloliters) of water in the spray tank, do not exceed the quantity specified for 2 acres (0.80 hectares). If less than 1000 gallons (3.8 kiloliters) of water is used, reduce (1) the amount of seed, (2) other specified materials, and (3) the area seeded per load in proportion to the water. When seed and fertilizer are to be distributed as a water slurry, apply the mixture to the area to be seeded within 30 minutes after all components have been placed in the equipment.

D. The hydraulic equipment used to apply wood cellulose fiber mulch shall be factory designed and built with sufficient pump capacity to apply specified quantities. The slurry tank shall hold a minimum of 1000 gallons (3.8 kiloliters) and be equipped with a mechanical agitation system with operating capacity sufficient to suspend and homogeneously mix the mulch and water. The slurry distribution hoses shall be large enough to prevent clogging and be equipped with spray nozzles that will provide even distribution of the slurry on designated areas. The equipment shall be mounted on a traveling unit which may be either self-propelled or pulled and is capable of getting the tank and nozzles within sufficient proximity of the area without tracking into the mulching area.

E. Apply wood cellulose fiber mulch at the rate of not less than 1200 pounds per acre (1345 kg per hectare) of air dry material. The quantity of water used in dispersing, suspending and applying the material shall be at the rate 3.3 gallons of water to one pound (27.5 liters of water to one kilogram) of material. Apply the cellulose fiber to form an evenly distributed layer over the area.

3.4 COMPLETION OF WORK / ESTABLISHMENT PERIOD:

A. The establishment period for seeding and sodding shall commence during installation and continue for a period of 100 days for work performed in the spring and summer, and for a period of 90 days of active growing weather for work performed in the fall and winter.

B. Maintain seeding, sodding, and incidental work by performing care necessary for promotion of growth so that work is in an approved condition throughout establishment period; uniform in color, quality, and coverage; and free of weeds, insects, diseases, surface damage, and other imperfections:
   1. All lawn areas shall have no bare areas or unacceptable cover larger than one (1) square foot.
   2. All grass must be vigorous, thick, and deep-rooted. Weeds shall not exist in sufficient number to damage appearance.
   3. The Owner will be responsible for all maintenance from the time the entire installation is complete and approved except for the first mowing which shall be by the contractor. The contractor shall be responsible for all maintenance to ensure livability until the complete installation is approved.
   4. After one (1) mowing and when all above conditions are met, the Contractor, Landscape Architect, and Owner will inspect the lawn areas for final accept

2.5 CLEAN-UP

A. Daily removal of rubbish and debris caused by this work from the site.

B. Keep site clean during establishment period

2.6 FINAL ACCEPTANCE

A. Due to seasonal requirements, final acceptance of this section may not coincide with that of the remaining contract work.

B. Request inspection for final acceptance at least 10 calendar days before the end of the establishment period.

C. Final acceptance shall be considered the time at which sodding and seeding, cleanup, and establishment period are 100% completed. Final acceptance shall be considered the time at which warm season turfgrass areas and seed mix areas are 100% established, and weed, pest and disease free with complete lush cover and no exposed soil areas showing. Weeds shall not occupy more than 5% of any 40’x40’ test area.

D. Replace rejected seeded and sodded areas as specified so that repair or replacement is rooted and established prior to approval.

END OF SECTION

SECTION 02950
TREES, SHRUBS, AND GROUND COVERS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. As called for in the drawings. Provide all labor, materials, and equipment to properly install trees, shrubs, ground cover, bed preparation, staking, and warranty for one year.

B. This section includes:
1. Provide complete landscape as shown
2. Excavate plant pits
3. Eliminate weeds with minimal two treatments
4. Provide plant material and related items
5. Create finished grade within planted areas
6. Stockpile existing topsoil
7. Provide imported topsoil
8. Provide compost
9. Provide mulch
10. Provide edging
11. Provide warranty and replacement material

1.2 RELATED WORK

A. Section 022660 – Planting Soils

B. Section 02810 – Irrigation

C. Section 02930 – Sodding

1.3 REFERENCES

A. The following publications listed below, but referred to hereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:
1. American National Standards Institute (ANSI) Publications: Z60.1—2014. American Standard for Nursery Stock
2. Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada, Staff of L. H. Bailey Hortorium, Cornell University: First Edition—1976, Third Printing

B. Observation at growing site does not preclude right of rejection at the Worksite. Plants damaged in transit or at the Worksite shall be rejected. Plants that do not meet specifications shall be rejected.

C. Personnel: Perform work only with qualified personnel familiar with required landscape methods and materials.

1.4 DEFINITION

A. Weed: Any plant not specified on the drawings or not approved as a substitute.

1.5 SUBMITTALS

A. Provide to the Landscape Architect samples of representative quantities no less than 60 days prior to installation. Samples shall be approved by Landscape Architect prior to installation.
Attach product name, address of manufacturer and/or supplier and appropriate literature to each sample. Literature or Product Data shall consist of manufacturer's current specifications, with catalog cuts, data sheets and installation instructions. Additionally, samples shall include:
1. Imported topsoil: 1-gallon plastic bag or container sample, test results
2. Compost: 1-gallon plastic bag or container sample, Solvita test results, analysis test results
3. Mulch: 1-gallon plastic bag or container sample
4. Tree Staking Material: staking method with complete material specification.
5. Insecticide: manufacturer's literature or cut sheets.
6. Herbicide: manufacturer's literature or cut sheets.
7. Edging: manufacturer's literature.
8. Root stimulator: manufacturer's literature.
9. Anti-dessicant: manufacturer's literature.
10. Planting soil: ref Section 02260-Part 1.4 (Submittals)

B. Plant Material Samples: Submit documentation within sixty (60) days after award of Contract that all plant materials have been located and are ready to be secured. Arrange specific review procedure of plant materials at time of submission:
1. Preliminary Review: Submit representative photographs of plant material for review in the required sizes and in available quantity at least ninety (90) working days prior to shipment to the site.
2. Submittals shall include two color digital images on a white background per each plant species. The image must include the name and address of the supplier, size of the plant in the picture, and the scientific and common name of the plant represented. Images shall include a person and device to determine scale and shall include two photographs of each tree type or group. The two photographs shall be taken at approximately 90 degrees from each other.
3. Poor quality photographs, photographs that are not in color and not labeled or which do not adequately represent the plant material will be rejected.
4. Photograph Acceptance and Nursery Review: Acceptance of material through photographs does not preclude rejection of unsatisfactory material upon delivery. The Landscape Architect reserves the right to refuse review plant material based on the photographs or at the grower if, in his judgment suitable material or sufficient quantities are not available. Contractor shall ensure sufficient plants will be available whenever trips are arranged to a nursery for the purposes of tagging material.
5. Unavailable Material: If proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. Substantiate such proof in writing no later than fifteen (15) days after award of contract.

C. Delivery: Within at least sixty (60) days prior to delivery to site, the Owner and Landscape Architect shall be notified in writing of source of plant material and bed preparation materials required for the project.

D. Special Warranty: Submit written special warranty registered with manufacturer as specified in this Section.

E. Maintenance Instructions: Submit 2 copies of instructions with recommended procedures to be established by the Owner for the maintenance of landscape work for one-year.

Submit one set of instructions to Landscape Architect for approval. Submit two copies of revised instructions, to the Owner and Landscape Architect, prior to the beginning of the Warranty Period.

1.6 TESTING

A. Reference Planting Soils Section 02260-Part 1.5 through Part 1.8.

1.7 PROJECT CONDITION OR SITE CONDITIONS

A. Verify and examine site conditions with the Owner's Representative. Proceed when official notice is given to the Contractor that the Work site is ready. Complete the landscape work as rapidly as portions of the site become available.

B. Planting Restrictions:

1. Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.
2. Do not install plant life when ambient temperatures may drop below 35 degrees F or above 100 degrees F.
3. Commence landscaping work when the site is free of rocks and debris.
4. All planting areas to be left approximately 5-inches below finished grade by others for landscape contractor to add soil amendments.
5. All turf areas to be left approximately 1-1/2-inches below finished grade by others for landscape contractor to add soil mix. All grass seeded areas to be left approximately 1-inches below finished grade by others for landscape contractor to add soil mix.

C. Protection:

1. Do not move equipment over existing or newly placed paving without approval of Landscape Architect.
2. Provide board-roading to protect paving.
3. Protect paving, structures, and any other site improvement from damage, with protection boards, ramps, and protective sheeting.

D. Utilities:

1. Determine locations of underground utilities and perform work in a manner which is intended to avoid possible damage. Hand-excavate, where required, to minimize possibility of damage to underground utilities.
2. Coordinate work with Landscape Architect to prevent damage to underground sprinkler (irrigation) system. Where an existing irrigation system is to remain, coordinate work with Owner's Representative to prevent damage to underground sprinkler (irrigation) system.
3. Water is available on-site.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Notify the Landscape Architect of the delivery schedule 48 hours in advance so the plant material may be inspected upon arrival at the job site. Unacceptable plant material shall be removed from the job site immediately.
2. Protect plant material in transit and at the site. Material not properly protected, and which is damaged will be rejected.
3. Plants should bear label from the grower certifying genus and species. Labels should be securely attached and waterproof, bearing legible designation of scientific and common name. Plants not labeled may be rejected.

4. Damaged or diseased plants will be rejected and must be removed from the site immediately.
5. Fertilizer shall be delivered to the site in the original, unopened containers bearing the manufacturer's guaranteed chemical analysis, name, trade name, or trademark.
6. Pesticide material, including soil fumigants, shall be delivered to the site in original unopened Containers. Containers that do not have a legible label that identifies the Environmental Protection Agency registration number and the manufacturer's registered uses will be rejected and immediately removed from the site.
7. Compost shall be delivered to site per Section 02260.

B. Handling
1. Do not deliver plants until the site conditions are ready for planting. If planting is delayed, heel-in bare rooted or freshly dug plants in a bed containing adequate mulch to keep roots moist. Separate bundles and trim roots, if long or damaged, using sharp pruning shears. Place plants in flats, pots, or other containers in a sheltered spot protected from sun, wind and mechanical damage and keep roots moist. Storage is at Contractor’s risk.
2. Care shall be taken to avoid damaging plants being moved from the nursery or other storage areas to the planting site.
3. Do not bind or handle plants with wire or rope at any time. Use extreme caution when handling trees. Use a strap cradle, adequate for weight and size for tree and root ball, attached to the root ball to unload and move trees. Never move, lift, or handle by attaching to or by putting pressure on the trunk or stems. Do not damage or scar trunks or branches. Damaged trees will be rejected.
4. Cracked or mushroomed plant balls will be rejected. A suitable method of handling shall be employed to preclude cracked or mushroomed plant balls at the point of delivery.
5. Plants shall be protected from freezing or drying out by a covering of burlap, tarpaulin, or mulching material during transportation from the heeling-in bed to the planting site.

C. Storage: Plants not installed on the day of arrival at the site shall be stored and protected as follows:
1. Outside storage shall be provided to protect plant material from adverse climatic conditions. If no such area exists, the Contractor shall be required to construct a suitable structure which provides protection for the plants.
2. Prior to unloading, proper moisture in root balls shall be verified. Trunks shall be staged in the shade prior to unloading. Unloading time shall be no more than two (2) hours per trunk.
3. Immediately after unloading but no more than one hour after unloading, stand the trees up to reduce risk of sun scald. Properly staged trees shall be standing, untied and spaced.
4. All plants stored on the project shall be protected from drying out at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss or other similar mulching material. During cold weather periods, root balls must be protected from freezing temperatures.
5. Remove cardboard trunk protector within forty-eight (48) hours of trees being stood upright to reduce the risk of damage.
6. Monitor moisture in the root ball while the tree is stored by probing the soil with a soil probe and manage supplemental irrigation accordingly. Be careful not to over or under irrigate.
7. Plants, including those in containers, shall be kept moist until planted.
8. Storage is at Contractor’s risk.

1.9 SEQUENCING

A. Coordinate rough and landscape grading, soil preparation, irrigation, and other related units of Work specified in other Sections to ensure that plant material can be supported and installed as indicated.

1.10 ENVIRONMENTAL PROTECTION

A. All work and Contractor operations shall comply with the requirements of the local, state or federal Environmental Protection Agencies.

1.11 WARRANTY

A. General: Warranties specified in this Section shall not deprive the Owner of other rights they may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. In accordance with the General Provisions, warranty for plants and trees, including transplanted trees, shall be warranted for one (1) year.

C. Replace plants, including trees, which have completely or partially died and are not in vigorous, thriving condition as soon as weather permits. The opinion of the Landscape Architect as to what constitutes a dead or partially dead plant shall be final.

D. Warranty excludes replacement of plants after final acceptance whose injury was the result of storm, drought, drowning, hail, freeze, insects, or diseases.

E. Replacements: As soon as weather conditions permit, replace, without cost to Owner all dead plants and all plants not in a vigorous, thriving condition, as determined by Owner's Representative during and at the end of Warranty Period.

1.12 REPLACEMENTS

A. General:
   1. Replacement plants and trees must be of the same species and size as originally planted at no cost to the Owner. Provide one year warranty on replacement plants.
   2. Replacement trees should be replaced at beginning of next planting or digging season. In such cases, remove dead trees immediately.
   3. Plants will be guaranteed to be true to species, variety or cultivar as specified.
   4. Protect irrigation system, other piping conduit, or other work during plant replacement. Repair any irrigation system damage immediately.

B. Replacement Quantities: Contractor shall be held responsible for one (1) replacement for each failed tree and shrub, and same area of groundcover planting after the beginning of the Warranty Period.

1.13 INSURANCE

A. Contractor shall have Workman's Compensation and General Liability Insurance

PART 2 PRODUCTS

2.1 PLANTS

A. General: Provide healthy, nursery-grown container plants, well-formed No. 1 grade, unless otherwise note on the Plant List, from a recognized, local nursery, and of the species and variety specified in the plant list and be true to the scientific name. Listed plant heights are from tops of root balls to nominal tops of plants. Where the drawings or specifications are in conflict with ANSI Z60.1, the drawings and specifications shall prevail.

B. Vigor: Planting stock shall be well-branched and well-formed, sound, vigorous, healthy, and free from disease, sun scald, windburn, abrasion, and harmful insects or insect eggs, and shall have healthy, normal, and unbroken root systems.

C. Plants of the same species shall be matching in height, spread, and branching habit unless otherwise indicated.

D. Plants shall have been grown or acclimatized under climatic conditions similar to the locality of the project.

E. Shade Trees: Shall be symmetrically developed; their structure and habit of growth shall be typical of the species or variety and shall have straight boles or stems free from objectionable disfigurements.
   1. Trunk flare must be above ground and visible at nursery before harvest and after transplanting into the landscape.
   2. There shall be a strong central leader to the top of the canopy. The tip of the leader on the main trunk must be intact and its terminal bud must be in the highest part of the tree. Trees with co-dominant leaders will be rejected.
   3. The tree crown shall be structurally uniform. Branches shall be evenly distributed around the trunk. The crown shall be full of foliage which is evenly distributed around the tree.

F. Ornamental Trees and Smaller Plants: Verify that all container stock has been grown in the containers in which delivered for at least six (6) months, but not over two (2) years. Samples must prove to be free of kinked, circling or girdling roots and with no evidence of a pot-bound condition. Do not install container plants that have cracked or broken balls of earth when taken from container. Field grown plants recently transplanted into containers will not be accepted. The root flare of plant material shall be visible. Removal all weeds and other invasive plants from the base of the nursery plant's root container prior to delivery to site.

G. Ground Covers and Vines: shall be vigorous, have the number and length or runners and clump size specified, and be the proper age for the grade of plants specified. Only vines and ground cover plants well established in removable containers, integral containers, or formed homogenous soil sections shall be used.

H. The minimum acceptable sizes of all plants, measured before pruning and with branches in normal position, shall conform to the measurements indicated in the plant material list. Plants larger in size than specified may be used with the approval of the Landscape Architect with no change in the contract price. If larger plants are used, the ball of earth or spread of roots shall be increased in accordance with ANSI Z60.1.

I. The Contractor shall facilitate inspection and identification by labeling trees and bundles or containers of the same shrub, ground cover, or vine with a durable, waterproof label and weather-resistant ink. Labels shall state the correct plant name and size as specified in the list of required plants. Labels shall be securely attached to plants, bundles, and containers of plants, and shall be legible for 60 days after delivery to the planting site.

J. Rootballs:
1. Balled and burlapped (B & B) shall have ball sizes and ratios conforming to ANSI Z60.1.
   a. Plants shall be dug and prepared for shipment in a manner that will not cause damage to branches, shape, and future development after planting.
   b. Plants shall be balled with firm, natural balls of soil and be wrapped and tied firmly with burlap or strong cloth. The wrapping material shall be capable of rotting in the ground and shall not be of permanent material.
   c. Plant material shall be well-healed in for a minimum of thirty (30) days with a flush of new roots at the edge of the burlap prior to shipping. Recently dug plants will not be accepted. Trees shall have been root pruned within the past three (3) years, have no girdling roots, have no “J” shaped roots, and the trunk flare shall be visible. Removal all weeds and other invasive plants from the base of the nursery plant’s root ball prior to delivery to site.
2. Container grown plants shall have sufficient root growth to hold the earth intact when removed from containers but shall not be root bound.

K. Pruning: Do not prune plants before delivery

2.2 STOCKPILED TOPSOIL

A. Reference Planting Soil Section 02260-Part 2.2 (Planting Soil Mix) and Part 3.3 (Soil Stripping and Stockpiling)

2.3 LAWN SOIL

A. Reference Planting Soil Section 02260-Part 2.4a (Lawn Soil).

2.4 PLANTING SUBSOIL AND PLANTING SOIL

A. Reference Planting Soils Section 02260-Part 2.3 (Planting Subsoil) and Part 2.4B (Imported Garden Planting Soil).

2.5 COMPOST

A. Reference Planting Soils Section 02260-Part 2.2C (Compost).

2.6 FERTILIZER

A. Shall be a commercial grade and uniform in composition and shall conform to applicable federal regulations.

B. Microlife Ultimate 8-4-6 or pre-approved substitute.

2.7 MULCH

A. Shall be free from deleterious materials and shall be stored to prevent inclusion of foreign materials.

B. Organic mulch materials shall be shredded pine bark free of any reproducing plant parts or deleterious materials.

2.8 WATER

A. Shall not contain elements toxic to plant life. It shall be obtained from the water meter to be installed under this contract. Prior to installation of the water meter, the contractor will be responsible for providing a water source.

2.9 STAKING AND GUYING

A. Stakes shall be eight-foot (8') T-Posts.

B. Guy wire shall be twelve gauge annealed galvanized steel.

C. Chafing guards shall be reinforced garden hose.

D. Turnbuckles shall be galvanized metal and have a three inch (3") minimum lengthwise opening fitted with screw eyes.

2.10 LANDSCAPE BED EDGING

A. Shall be Steel landscape edging by Colmet. Edging shall be 3/16” x 6” x 10’ installed per manufacturer’s instructions with accompanying 3/16” steel stakes OR APPROVED EQUAL. Color shall be brown.

2.11 LANDSCAPE FABRIC (NOT USED)

2.12 ANTI-DESICCANT

A. Anti-desiccants for retarding excessive loss of plant moisture and inhibiting wilt shall be sprayable, water insoluble vinyl-vinyledine complex which will produce a moisture retarding barrier not removable by rain.

B. Wilt-pruf Formula NCF as manufactured by Nursery Specialty Products, Greenwich, Connecticut, or equivalent product as approved by Landscape Architect.

PART 3 EXECUTION

3.1 SITE PREPARATION

A. Examine subgrade and verify conditions under which work is to be performed. Do not proceed with work until all grading and related work is completed in a satisfactory manner so that the landscape installation can proceed. All lumps, clods, and debris over two inches (2”) in diameter shall be removed from the Worksite.

3.2 PLANTING SEASONS AND CONDITIONS

A. Planting shall be done between the dates of September 15th through May 15th.
B. Specific requested planting times per City Park Staff are as follows:
   1. Spring bulbs: October 15th through December 15th.
   2. Trees and shrubs: Late fall is desired. Late February to the end of March is acceptable but will need to be watered more frequently to establish roots during the warmer periods.

3. Perennials: In fall they should be planted in late September though November. In Spring they should be planted in March through April.

C. Planting shall be done with the approval of the Landscape Architect only when the ground is not frozen, snow covered or in an unsuitable condition for planting.

D. If special conditions exist that may warrant a variance in the above planting dates or conditions, a written request shall be submitted to the Landscape Architect stating the special conditions and proposed variance.

3.3 LAYOUT

A. Planting beds and shrub and tree locations shall be staked by the Contractor and approved by the Landscape Architect before any plant pits or beds are dug. The Landscape Architect may adjust plant material locations to meet field conditions.

B. After layout is approved, all weeds shall be removed from beds.

3.4 INSTALLATION OF PLANTING SUBSOIL AND PLANTING SOILS

A. Reference Planting Soils Section 02260-Part 3.7 (Installation of Planting Subsoil and Planting Soils) and Part 3.8 (Treatment of Amended Existing Soils).

B. Prior to preparing plant beds, the area shall conform to the lines and grades shown on the plans and the location of any underground utilities shall be verified on site by the Contractor.

C. Rocks and other underground obstructions shall be removed to a depth necessary to permit proper planting according to plans and specifications.

D. Damage to utility lines shall be repaired at the Contractor's expense. If underground utilities, construction, or solid rock ledges are encountered, the Landscape Architect shall be immediately notified so that other locations may be selected. The Contractor cannot relocate plant material without the authorization of the Landscape Architect.

E. Bermuda grass and weed treatment:
1. Weed-eat Bermuda grass to the ground.
2. Apply Fusilade II Turf and Ornamental Herbicide per manufacturer's instructions.
3. Heavy Rake all vegetation after its death to remove debris.

3.05 STOCKPILED TOPSOIL

A. When specified on the Drawings, existing topsoil shall be stockpiled for re-use.

B. Reference Planting Soils Section 02260-Part 3.3 (Soil Stripping and Stockpiling).

3.06 EXCESS TOPSOIL

A. When not specified for stockpiling and re-use, excess topsoil shall be removed from the project site, or as directed by the Landscape Architect.

3.07 SETTING PLANTS

A. Place landscape fabric on planting mix. Cut x’s in fabric where plants will be planted. Pin fabric down at corners and overlaps. Overlaps should be 6” minimum. (NOT USED)

B. Shrubs, Groundcover, Ornamental Grass, and Vines:
   1. Landscape Architect must approve bed layout before plants are installed. The Landscape Architect reserves right to interchange or shift plant locations.
   2. Remove the plant from its container and score the root ball vertically at four (4) equal points around the edge prior to planting.
   3. Plant shrub such that top of the root ball at the flare of the shrub is one inch (1") above finished grade.
   4. Plants shall be set plumb and be held in position until sufficient soil has been firmly placed around roots or ball
   5. Backfill to depths of root balls with planting media. Carefully settle by watering to prevent air pockets. Water in thoroughly.
   6. Carefully prune plants to remove dead or broken branches and hand-rake bed areas to smooth even surfaces.
   7. If rock or aggregate subbase materials are encountered on this site:
      a. Contractor shall perform a twenty-four (24) hour percolation test for the planting pit(s) prior to planting.
      b. If planting pit does not drain within twenty-four (24) hours the Contractor shall notify the Landscape Architect.

C. Ornamental and Shade Trees:
   1. Stake locations for approval by Landscape Architect.
   2. Percolation test: After approval of tree locations, excavate pit and perform percolation test if the soil appears to have an impervious layer such as, but not limited to clay, rock, or a buried pavement. Pits should be the same depth as the height of the root ball if the root flare is exposed or slightly less so that the root ball sits no more than one inch (1") above surrounding grade. Pit should be dug so that they are 12-inches or greater in diameter than root balls for trees in planter beds or two times the diameter of the root ball for trees in lawn areas. Fill excavated pits with water and wait until next day. If the water level has not fully drained within 12 to 24 hours, then notify the Landscape Architect. The tree may be relocated to another location on-site that passes the percolation test OR a change order may be requested to install tree drainage system. If the water level drops more than 6-inches, a tree drainage system may not be required. A video recording with time and date stamp must be sent to the Landscape Architect. If a drainage system is required, receive approval from the Landscape Architect for extent and layout of proposed system. A tree drainage system will be considered a change order to the bid.
   3. Do not till under existing trees.
   4. Handling trees: reference 1.8 this section.
   5. Remove any plastic or synthetic wrap and any circling roots from the root ball. Verify that the root flare is exposed and visible.
   6. Plant tree directly into excavated pit such that the trunk flare will be one (1") inches above surrounding finished grade. Refer to planting details for cross-section of tree planters.
   7. Maintain tree in a straight and plumb position while backfilling with planting media consisting of native stockpiled or imported topsoil to not more than one-half (1/2) the depth of the root ball.
   8. Saturate the planting hole with water after backfilling is one-half (1/2) complete to aid removal of air from the backfill.
   9. After initial backfill, watering, and the tree is plumb, then add backfill to just below the top horizontal wire ring, saturate planting hole and adjust root ball, if necessary, to make tree straight and plum.

10. After above items have been completed, remove synthetic wrap, cardboard packaging, and cut / remove the top portion of the wire basket down to and including the first horizontal ring. Remove the burlap from the top portions of the root ball.
11. Complete the backfill with native stockpiled / imported topsoil and thoroughly saturate with water to aid removal of air from backfill. Incorporate root stimulator into the backfill for even distribution to the root system.
12. After backfill has substantially settled and the tree is straight and plumb, stake tree to provide stability until root system is thoroughly established. Check staking as needed to make sure that trunk damage does not occur, and that tree and root ball are stable.
13. Remove all remaining straps, tags, ties, stakes and other items from the trunk and canopy of the tree.
14. If rock is encountered:
    a. Landscape Architect may select alternative location.
    b. Rock shall be removed to a minimum of 6-inches below the plant if an alternative location cannot be selected and tree drainage pits shall be installed.

3.08 TREE SAUCERS

A. Form a watering saucer around each new tree. Keep root flare exposed and watering saucer at edges of tree root ball. Saucer shall be no higher than three inches (3”) above top of adjacent mulch elevation over root ball. Contractor is responsible for deep watering trees a minimum of once per week until final acceptance and as needed to promote growth.

3.09 STAKING AND GUYING

A. Stake trees, when needed, immediately following planting operation. Take precautions during staking operation to prevent damage or injury to roots or trunk. Orient all stakes within a cluster or row in the same direction.

B. Trees shall be guyed as shown on planting details.

C. Guys shall allow slight movement of the tree and shall not constrict or cause bruising to the trunk.

D. Staking system shall be removed after the 1-year Warranty Period and shall not be allowed to remain on the tree.

3.10 TREE WRAPPING

A. Do not wrap trees.

3.11 FERTILIZATION

A. All bed areas shall be top-dressed with Microlife Ultimate 8-4-6 fertilizer at a rate of 12 lbs of fertilizer per 1,000 square feet. If any fertilizer adheres to plants, it shall be carefully flushed off.

3.12 TOPDRESSING

A. Compost shall be spread to a uniform depth of two inches (2”) in planting areas where soil was not disturbed.

B. Mulch shall be spread to a uniform thickness of three-inches (3").

C. Compost and mulch shall be kept 6-inches away from tree trunks and out of the crowns of shrubs and off buildings, sidewalks, light standards and other structures.

3.13 PRUNING

A. Sucker growth, dead, broken and crossed branches shall be removed.

B. Typical growth habit and natural character of individual plants shall be retained.

C. Branches over 1-inch in diameter shall pruned using the 3-Cut Method and shall not damage the branch collar and not be flush with trunk or adjacent branch. Trees where pruning has damaged the branch collar will be rejected: these trees will not be counted toward the replacement quantity but will be replaced at the expense of the Contractor. "Headback" cuts at right angles to line of growth shall not be permitted.

D. Trees shall not be poled or the leader removed.

E. Do not tip prune.

F. Do not cut back terminal branches.

G. Trimmings shall be removed from the site.

H. Do not remove any top growth to compensate for diminished root ball size.

I. Cuts shall be made with clean, sharp instruments.

3.14 WATERING

Deep root water all existing trees to remain within the construction limits of the project once every two weeks during the summer and once a month during the winter, during the duration of the project and until final acceptance. This should be adjusted with the amount of rain. However, unless it has rained at least one-half inch (1/2”) since the last watering, continue to deep root water. Complete deep root watering by filling each tree saucer three times and letting it percolate dry. Consult a certified arborist.

3.15 RESTORATION AND CLEAN-UP

A. Excess and waste material shall be removed daily.

B. When planting in an area has been completed, the area shall be cleaned of all debris, spoil piles, and containers.

C. At least one paved pedestrian access route to the building shall be kept clean at all times. Other paving shall be cleaned when work in adjacent areas is completed.

3.16 MAINTENANCE DURING INSTALLATION

A. Maintenance operations shall begin immediately after each plant is planted and shall continue as required until acceptance.

B. Plants shall be kept in a healthy, growing condition by watering, pruning, spraying, weeding, and any other necessary operations of maintenance.

C. Trees shall be continuously and routinely inspected for distress caused by construction activities. Consult a certified arborist and notify Landscape Architect at first sign of distress.

D. Trees: Pruning will be carried out by experienced pruning personnel:
1. Receive approval from the Landscape Architect in the field for extent of pruning.
2. Sterilize pruning tools between individual plants, especially in the genus Quercus. Do not paint tree wounds.
3. Prune trees in the *Quercus* genus only between November 1 to March 31.
4. Raise limbs to seven foot height for trees within 10-feet of sidewalk.
5. No weed-eaters or edgers are to be used within 15-inches of any tree. Should the need for trimming be necessary within 15-inches of any tree, it shall be done so by hand trimming only.
6. Remove dead wood, broken branches, mistletoe, and suckers from trees as needed.
7. Thin prune by removing no more than 20 percent of growth.

E. Plant water basins and beds shall be kept free of weeds, grass and other undesired vegetation.

F. The Contractor shall be held solely responsible for plant loss due to the application of organic herbicides. Any loss of plant material shall be replaced at Contractor's sole expense and all plant replacements shall be of the same species and size of the existing plant materials.

G. Plants shall be inspected at least once per week by Contractor, and needed maintenance performed promptly.

3.17 BEGINNING OF THE WARRANTY PERIOD

A. The Warranty period shall begin on the date that an inspection by the Landscape Architect shows that all plants are acceptable, in place, and have been installed in accordance with the specifications and plans.

3.18 DURING THE WARRANTY PERIOD

A. All plants shall be guaranteed for a period of one-year from the date of the beginning of the Warranty Period. Warranty Period does not begin until the Landscape Architect provides a written notification with the date of the beginning of the Warranty Period.

B. During the Warranty Period, the Contractor shall be responsible for making periodic visits to determine if the plants require any additional maintenance, provided by the Owner.

C. The Contractor shall make written recommendations of any additional maintenance needed and submit these to the Landscape Architect and the Owner. If no recommendations are received, the Landscape Architect and the Owner will assume that the maintenance provided meets with the Contractor's approval.

END OF SECTION

SECTION 03350
CONCRETE FINISHING

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section includes specifications for the finishing and curing of formed and unformed concrete surfaces, including the repair of surface defects.

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials (AASHTO):
   1. M182 Burlap Cloth Made from Jute or Kenaf

B. American Concrete Institute (ACI):
   1. 117 Specification for Tolerances for Concrete Construction and Materials
   2. 301 Specifications for Structural Concrete
   3. 308 Standard Practice for Curing Concrete
   4. 503.4 Specification for Repairing Concrete with Epoxy Mortars

C. ASTM International (ASTM):
   1. C33 Specification for Concrete Aggregates
   2. C150 Specification for Portland Cement
   3. C171 Specifications for Sheet Materials for Curing Concrete
   4. C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
   5. C881 Specification for Epoxy-Resin-Base Bonding Systems for Concrete

1.3 SYSTEM DESCRIPTION

A. Finishing of formed concrete surfaces shall conform to applicable requirements of ACI 301.

B. Finishes for slabs and flatwork shall conform to applicable requirements of ACI 301.

C. Special architectural finishes for formed concrete surfaces shall conform to applicable requirements of ACI 301.

1.4 SUBMITTALS

A. Product Data: Submit manufacturers' product data for manufactured products.

B. Samples: Review by the Engineer will be for color and texture only. Approved samples will become the Engineer's control samples.
   1. Submit samples not less than 12 inches by 12 inches in size of each type of finish, indicating materials and methods used to produce the finishes.

1.5 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with air pollution regulations of governing authorities for sandblasting activities and operations.

B. Site Mock-Ups:

1. Exposed Finishes: Provide site mock-ups, at least 3 feet by 4 feet in size, of finishes of formed surfaces in exposed locations and of exposed slab finishes for the Engineer's approval.
2. Architectural Concrete: Provide site mock-ups of architectural concrete, at least 8 feet by 10 feet in size, showing finish texture and pattern of exposed formed concrete surfaces for Engineer's approval. Mock-ups may be smaller in size if approved by the Engineer.
3. Provide the number of mock-up panels required necessary to obtain the Engineer's approval of pattern, texture, and color of panel.
4. Maintain approved mock-ups and use as the standard for the aesthetic quality of the surface finish for work represented by mock-ups. Remove mock-ups when permitted by the Engineer.

PART 2 – PRODUCTS

2.1 REPAIR AND FINISHING MATERIALS

A. Portland Cement: ASTM C150, Type I or II, of same brand as used in the work. Furnish white Portland cement where required to produce color matching color of surrounding concrete.

B. Aggregate:
1. For Bonding Grout: ASTM C33, washed clean sand passing a No. 30 sieve.
2. For Patching Mortar: ASTM C33, washed clean, graded fine aggregate of suitable size for areas to be repaired. Clean coarse aggregate up to Size No. 8 may be added for repair of larger pockets and voids.
3. For Washed Aggregate Finish: Washed clean, match approved sample.

C. Commercial Patching Mortar: A structural repair mortar may be furnished if appropriate for the use and approved by the Engineer.

D. Epoxy Patching Mortar: As specified in ACI 503.4 for Epoxy Mortar.

E. Epoxy Adhesive: ASTM C881, Type II or Type V, epoxy-based bonding agent.

F. Color Hardener: As specified in the Contract Documents.

2.2 REPAIR MIXES

A. Bonding Grout: 1 part Portland cement to 1 part No. 30 mesh sand, mixed to the consistency of a thick cream,

B. Patching Mortar: Make the patching mortar of the same materials and of approximately the same proportions as used for the concrete, except omit the coarse aggregate. Use not more than 1 part Portland cement to 2-1/2 parts sand by damp loose volume and substitute white Portland cement for a portion of the regular gray Portland cement to produce patching mix matching the surrounding concrete in color when dry. Determine the proportion of white Portland cement by trial mixes and test areas, prior to repair of actual defective areas.

2.3 CURING MATERIALS

A. Damp Curing Materials: Non-staining.
1. Waterproof Sheet Materials: ASTM C171, waterproof paper with white paper face, polyethylene film pigmented white, or white burlap polyethylene sheeting.

2. Burlap: AASHTO M182, of class or weight suitable for the use and location. Do not use burlap where concrete is exposed to direct sunlight.

B. Curing Compound: ASTM C309, liquid membrane-forming curing compound, Type I, Class A or B, as appropriate for the use or location.
1. Where concrete surfaces will receive architectural finishes, such as resilient floor coverings, paint, or membrane waterproofing, membrane-forming curing compound shall not leave a coating or residue which will impair bond of adhesives, paints, and coatings with concrete.

C. Curing Compound for Colored Concrete: For concrete colored with color hardener, use curing compound recommended by the manufacturer of the color hardener material. For integrally colored concrete, refer to Section 03335, Colored Concrete, for curing compound.

PART 3 – EXECUTION

3.1 REPAIR OF SURFACE DEFECTS

A. Repair Standards: Repair of surface defects shall conform to applicable requirements of ACI 301. When using epoxy mortar, conform to applicable requirements of ACI 503.4.

B. Surface Defects:
1. Begin repair of surface defects immediately after form removal. For repair with epoxy mortar, concrete shall be dry.
2. Surface defects are defined to include: form-tie holes, air voids and pockets, bug holes with a nominal diameter or depth greater than 1/4- inch, honeycombed areas, rock pockets, visible construction joints, fins and burrs.
3. Repair of surface defects shall be tightly bonded and shall result in concrete surfaces of uniform color and texture, matching adjacent surfaces, and free of shrinkage cracks.

C. Repair Work:
1. Remove honeycombed and other defective concrete down to sound concrete. Saw-cut the edges perpendicular to the surface or slightly undercut. Feather-edges will not be permitted. Dampen the area to be patched and an area at least 6 inches wide surrounding it to prevent absorption of water from the patching mortar.
2. Where rock pockets or similar defects or voids expose steel reinforcement, cutout to solid surface behind the reinforcing steel to provide suitable key-lock for patching mortar. Envelop exposed reinforcing bar with patching mortar.
3. Bond patching mortar to concrete with bonding grout or epoxy adhesive. Brush bonding grout well onto the concrete. Bond commercial patching mortar to concrete in accordance with the manufacturer's instructions.
4. After surface water has evaporated from the area to be patched, brush the bond coat well into the surface. When the bond coat begins to lose the water sheen, apply the patching mortar. Compact the mortar into place and strike off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, leave the patch undisturbed for at least 1 hour before being finally finished. Keep the patched area damp for 7 days.
5. Neatly finish patched surfaces to match adjacent surrounding surface texture of concrete. Grind or fill surfaces to produce level and plumb, true planes.
6. For walls exposed in the finish work, form tie holes shall be patched and finished flush with adjacent surface. For holes passing entirely through walls, use a plunger type injection gun or other suitable device shall be used to completely fill the holes.

7. In order to patch honeycombed areas or rock pockets which are too large and unsatisfactory for mortar patching, cut out to solid surface, key, and pack solid with matching concrete to produce firm bond and flush surface. Patching shall match texture of adjacent surfaces where exposed in the finished work.
8. Remove repair work in exposed locations which does not match the texture and color of surrounding adjacent surfaces or which was not well performed and perform again until the repair work conforms to specified requirements.
9. Remove fines and loose materials from surfaces to receive membrane waterproofing, and patch voids and cracks flush with adjacent surfaces.
10. Cure completed repairs as specified herein under Curing.

3.2 FINISHING OF FORMED SURFACES

A. Unexposed Surfaces:
   1. Concrete which will not be exposed in the completed structure shall be any form finish as specified in Section 03100, Concrete Formwork, and ACI 301 for rough form finish.
   2. Concrete to receive membrane waterproofing shall receive a "smooth form finish" in accordance with ACI 301.

B. Exposed Surfaces: Unless indicated otherwise, concrete which will be exposed in the completed structure shall receive the following finishes as indicated:
   1. Smooth Form Finish: Conform to ACI 301.
   2. Smooth Rubbed Finish: Conform to ACI 301.
   3. Grout Cleaned Finish: Conform to ACI 301.
   4. Unspecified Finish: When finish is not indicated, provide "smooth form finish" as specified above.

C. Sand Blast Finish:
   1. Blasting Operations and Requirements:
      a. Apply sandblasted finish to exposed concrete surfaces where indicated.
      b. Perform sand blasting at least 72 hours after placement of concrete. Coordinate with formwork construction, concrete placement schedule, and formwork removal to ensure that surfaces to be blast finished are blasted at the same age for uniform results.
      c. Determine type of nozzle, nozzle pressure, and blasting techniques required to match the Engineer's control samples.
      d. Abrasive blast corners and edge of patterns carefully, using back-up boards, to maintain uniform corner or edge line.
   2. Depths of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surface to match the Engineer's control samples as follows:
      a. Brush Sand Blast Finish: Remove cement matrix to expose face of fine aggregate; no reveal.
      b. Light Sand Blast Finish: Expose fine aggregate with occasional exposure of coarse aggregate; maximum 1/16-inch reveal.
      c. Medium Sand Blast Finish: Generally expose coarse aggregate; 3/16-inch to 1/4-inch reveal.
   3. Surface Continuity: Perform sand blast finishing in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish on each surface or area of work. Maintain patterns of variances in depths of cuts as indicated.
   4. Construction Joints: Use technique acceptable to the Engineer to achieve uniform treatment of construction joints.
   5. Protection and Repair:

a. Protect adjacent materials and finishes from dust, dirt, and other surface or physical damage during abrasive blast finishing operations. Provide protection as required and remove from site at completion of the work.
b. Repair or replace other work damaged by finishing operations.

6. Clean-up: Maintain control of concrete chips, dust, and debris in each area of the work. Clean up and remove such material at the completion of each day of operation. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containing devices.

3.2 SLABS AND FLATWORK

A. Placement and Finishing Standards: Place, consolidate, and finish slabs and flatwork in accordance with applicable requirements of ACI 301. Coordinate with Section 03300, Cast-In-Place Concrete, as applicable.

B. Placement:
1. Place slabs and flatwork and finish monolithically. Strike off and screed slabs to true, plane surfaces at required elevations, and thoroughly compact concrete with vibrators, floats, and tampers to force coarse aggregate below the surface. Finish slab within four hours of concrete placement.
2. Whether indicated or not, in areas where drains occur, slope finished slab to drains. Slope shall be a minimum of 1/8-inch per foot unless otherwise indicated.

C. Slab Finishes: Unless indicated otherwise, slabs and flatwork shall receive the following finishes as indicated:
1. Scratched Finish: Conform to ACI 301. Provide "scratched finish" for slab substrates to receive cementitious toppings or finishes, such as terrazzo or mortar setting bed for ceramic tile.
2. Floated Finish: Conform to ACI 301. Provide "floated finish" for track slabs and mud slabs and for slabs and flatwork to receive roofing and membrane waterproofing.
3. Troweled Finish: Conform to ACI 301. Provide "troweled finish" for interior slabs and flatwork to be exposed in the completed structure, for slabs to receive resilient floor coverings, and for flatwork to receive elastomeric bearing pads.
4. Broom Finish: Conform to ACI 301. Exact texture and coarseness of the broom finish shall match the approved site mock-up. Provide fine or medium-coarse "broom finish" as indicated for exterior sidewalks and paving, garage floors (other than parking garages), exterior ramps, equipment and transformer pads, and subway invert slab.
5. Unspecified Finish: When finish is not indicated or specified, provide finishes as specified in ACI 301.
6. Washed Aggregate Finish: Evenly distribute seeded aggregate over a floated finish. Tamp surface to bring fines to surface completely covering seeded aggregate. Apply troweled finish. Apply surface retarder according to manufacturer’s instructions and recommendations. Wash surfaces with water and finish with stiff bristle brush until seeded aggregate is uniformly exposed.
7. Swirl Pattern Finish: After basic floating operations have been completed, hand float slabs using wood float to produce a continuous swirl patterned surface, free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidentally disturbing particles of coarse aggregate embedded near the surface. Use natural arm circular motion to produce rows of approximately 1-foot radius swirl pattern covering approximately half of the preceding row with each successive row. Provide swirl pattern finish for parking garage floors.

D. Surface Tolerances and Finishes: Refer to Tolerances specified herein.
   1. Flat Tolerance: Slabs and flatwork with "troweled finish" and with "nonslip finish."
   2. Straightedge Tolerance: Slabs and flatwork with fine "broom finish" or medium-coarse "broom finish."
   3. Bullfloated Tolerance: Slabs and flatwork with "scratched finish," with "floated finish," and with coarse "broom finish."

E. Joints:
   1. Construction, expansion, isolation, and contraction joints shall be located as indicated. Construction joints shall act as contraction joints. Where additional contraction joints are required to prevent shrinkage cracks, saw-cut such joints. All joints shall be straight and true to line.
   2. Mark-off lines or edges at formed construction and expansion joints shall be finished with 1/4-inch radius curved edging tool, neat and true to line, uniform throughout.

3.3 TOLERANCES

A. Formed Surfaces: Conform with applicable requirements of ACI 117.
   1. Where elastomeric bearing pads are indicated, the level plane upon which bearing pads are placed shall not vary more than 1/16-inch from a 10-foot straightedge placed in any direction across the area and the area shall extend a minimum of 1 inch beyond the limits of the pads.
   2. Bearing surfaces of girders on a slope or girders with a camber shall be finished on a horizontal/level plane so that loads are uniformly distributed over the entire surface of the elastomeric bearing pads.
   3. The finished plane shall not vary more than 1/8-inch from the elevation indicated.

B. Slabs and Flatwork: Conform to applicable classification requirements of ACI 117, as follows:
   1. Very Flat Tolerance: True plane with maximum variation of 1/8-inch in 10 feet when measured with a 10-foot straightedge placed anywhere on the slab in any direction.
   2. Flat Tolerance: True plane with maximum variation of 3/16-inch in 10 feet when measured with a 10-foot straightedge placed anywhere on the slab in any direction.
   3. Straightedge Tolerance: True plane with maximum variation of 5/16- inch in 10 feet when measured with a 10-foot straightedge placed anywhere on the slab in any direction.
   4. Bullfloated Tolerance: True plane with maximum variation of 1/2 inch in 10 feet when measured with a 10-foot straightedge placed anywhere on

3.4 CURING

A. Curing Standards: Cure concrete in accordance with applicable requirements of ACI 301 and ACI 308, except that the duration of the curing period shall be ten days. Curing of concrete shall also conform to Section 03300, Cast in Place Concrete.

B. Curing Requirements:
   1. Cure concrete with waterproof sheet materials, damp burlap, or curing compounds.
   2. Do not use curing compounds on surfaces when their use may be detrimental to bonding of concrete, mortar, membrane waterproofing, calking and sealants, adhesives, plaster, paint, or the specified surface finish or coating.
   3. Cure color-hardener finished slabs and flatwork as recommended by the color-hardener material manufacturer.

4. Cure integrally colored concrete as specified in Section 03335, Colored Concrete, and as specified herein.
5. At the expiration of the curing period, clean concrete surfaces of all curing media.

C. Damp Curing:
1. Vertical surfaces shall be cured by keeping the forms wet at all times and by leaving the forms in place as long as possible as specified in Section 03100, Concrete Formwork. After removal of forms, concrete shall be kept continuously damp by fog spraying or otherwise washing down the concrete in an accepted manner until ten days after placing. Protect exposed surfaces by covering with sheet materials or burlap kept continuously moist.
2. Horizontal surfaces shall be cured and protected by covering the finished surfaces with waterproof sheet materials or damp burlap, left in place for a minimum of ten days and kept continuously moist.
3. Fog spray freshly placed slabs until finishing operations commence. Allow no slabs to become dry until finishing operations are complete.

D. Curing Compound: Non-structural concrete, such as slabs-on-grade, may be cured by membrane curing compound in lieu of wet curing specified above. Apply curing compound in accordance with applicable requirements of ACI 308 and manufacturer's instructions. Apply without delay on newly finished surface.
Protect integrity of membrane and touch up damaged spots immediately.

3.5 PROTECTION

A. Protect exposed concrete surfaces, including flatwork, as required to prevent damage from impact or strains.

END OF SECTION

SECTION 04400
STONEWORK

PART 1: GENERAL

1.1 References

A. American Society for Testing and Materials (ASTM).

B. Indiana Limestone Institute (ILI).

1.2 Related Work

Section 02830 Retaining Walls & Pond Walls
Section 044313 Anchored Stone Masonry Veneer

1.3 Submittals

A. General - Submit in accordance with Contract Documents.

B. Samples - The contractor shall submit two samples for approval by the Architect. The samples shall, in general range, be typical of the texture, color and finish applied.

C. Provide pictures taken at quarry of several stones showing a good cross section of what is being proposed.

1.4 Quality Assurance

A. Obtain each variety of stone from a single quarry with an adequate supply and annual rate of production to deliver stone to the job site on schedule as established by the landscape architect as required to assure no delay in the progress and completion of the work.

PART 2: PRODUCTS

2.1 Requirements

These requirements are for stone that is required to be purchased, not existing stone that is stockpiled for re-use.

A. Match landscape architect's sample for variety, grade, color and finish.

B. Meet Limestone Boulders Standards: ASTM C568
1. Class II - Medium density.
Or
2. Class III - High density.

2.2 Manufacturer

A. Not applicable, natural stone

2.3 Stone: LIMESTONE SLABS/BOULDERS

A. Stone Type –Limestone natural to Northeastern Oklahoma region similar in look to existing boulders on site.

SECTION 044313
ANCHORED STONE MASONRY VENEER

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stone masonry anchored to concrete backup.

B. Related Requirements:
   1. Section 02830 Retaining Walls & Pond Walls
   2. Section 04400 Stonework

1.2 SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Samples for Verification:
   1. For each stone type indicated. Include at least two Samples in each set and show the full range of color and other visual characteristics in completed Work.
   2. For each color of mortar required. Label Samples to indicate types and amounts of pigments used.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 FIELD CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Sizes / Shape
   1. Retaining Wall Boulders approximately 2'-8" wide minimum x 5'-6' long x 9"-12" thick. See photo on sheet A/62. 2'-8" width is for structural integrity so that geogrid is not required in stone layers.
   2. Pond Wall Boulders approximately 2'-8" wide minimum x 5'-6' long x 9"-12" thick. 2'-8" width is for structural integrity so that geogrid is not required in stone layers.
   3. Stair Boulders 2.5' wide x 5' long x 6" thick (recommended range 4"-7" thick)
   4. Limestone Stepping Stones at weir and boulders at base of weir shall be 2'-9" wide x 2'-0" long x 9" tall.

C. Finish
   1. Natural look
   2. Natural finish
   3. Chopped, not cut

D. Color - It is understandable if the boulders are darker initially if dug from subsurface. Color shall weather to be gray to match existing boulders on Woodward site near pond 1 and grotto area.

E. Provide pictures of stone proposed to be used for approval followed up by actual samples.

4.1 Stone Selection

A. General - Select stones in sizes and shapes required to comply with requirements indicated on contract drawings.

4.2 Storage and Handling

A. Deliver materials to project site in an undamaged condition.

B. Do not pinch or use wrecking bars.

C. Store and handle stone to prevent damage due to moisture, contaminants, breakage, chipping or other causes.

D. Store stone away from contact with the ground on wood skids or pallets that do not contain resin, chemical treatment or tanning.

E. Protect stone from weather with waterproof, non-staining covers or enclosures.

2.6 Mortar

A. Type S mortar or mortar with a minimum 1800 psi.

B. Mixed with potable water in as stiff a consistency as can be worked into joints.

2.7 Anchors

A. Anchors and Dowels –
   1. 3/8" x 3" Stainless Steel Tapcon with washers for geogrid attachment.
   2. #4 Rebar grouted or attached with adhesive. See details for specific applications.
   3. 1/2" x 6" Stainless Steel rods.

PART 3: EXECUTION

3.1 Preparation and Setting

A. Examine surfaces to receive stone, for compliance with requirements for installation tolerances.

B. Stone shall be free of dust, foreign matter and stains.

C. Stone shall be soaked thoroughly before setting.

D. Execute dimension stonework by skilled mechanics, and employ skilled stone fitters at site to do necessary field cutting, with power saws, as stones are set.

E. Set stones to comply with requirements indicated on drawings and final shop drawings. Install anchors, fasteners, supports and other attachments as indicated or necessary to secure stonework in place.

3.2 Adjusting and Cleaning

A. Repair of stone is an accepted practice and will be permitted. Some chipping is expected; repair of small chips is not required if it does not detract from the overall appearance of the work. The criteria for acceptance of chips and repairs will be per standards and practices of the industry unless the limestone supplier and the architect mutually agree upon other criteria.

B. Remove and replace stonework of the following description:
1. Stones so damaged that repair is impossible.
2. Defective joints.
3. Stones and joints not in conformance with approved samples and field-constructed mock-ups.

D. Keep stonework as clean as possible during construction. Prevent staining from mortar, grout, sealants and other sources. Upon completion of setting stones, clean stone thoroughly with water or soap & water and stiff bristled brushes. Thoroughly rinse when done.

SECTION 044313
ANCHORED STONE MASONRY VENEER

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stone masonry anchored to concrete backup.

B. Related Requirements:
   1. Section 02830 Retaining Walls & Pond Walls
   2. Section 04400 Stonework

1.2 SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Samples for Verification:
   1. For each stone type indicated. Include at least two Samples in each set and show the full range of color and other visual characteristics in completed Work.
   2. For each color of mortar required. Label Samples to indicate types and amounts of pigments used.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 FIELD CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.
   1. Protect base of walls from rain-splashed mud and mortar splatter using coverings spread on the ground and over the wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.7 COORDINATION

A. Advise installers of other work about specific requirements for placement of reinforcement, veneer anchors, flashing, and similar items to be built into stone masonry.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

A. Not applicable, natural stone

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

2.2 WALL VENEER

A. Stone – Shall be gray limestone similar in nature to the Rose Garden walls at Woodward Park. See photo on detail D/60. Layup shall be similar to the example given in the photo.

B. Material Standard: Comply with ASTM C 568.

C. Source:
   1. For the Contractor to procure and provide submittals in photos and samples.
      a. Depth: approximately 4 inches.
      b. Height: Random.
      c. Length: Random.

D. Match stone at Woodward Park for color, finish, and other stone characteristics relating to aesthetic effects.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated. **Color to be standard gray.**

B. Hydrated Lime: ASTM C 207, Type N.

C. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

D. Mortar Cement: ASTM C 1329.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in stone masonry mortar.

F. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight. (not used)

G. Aggregate: ASTM C 144 and as follows:
   1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 sieve.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

2.4 VENEER ANCHORS

A. Materials:
   1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2.

B. Size: Sufficient to extend at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inch cover on exterior face.

C. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Heckmann Building Products, Inc; Pos-I-Tie.
   2. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
   3. Anchor Section: Zinc-alloy barrel section with flanged head with eye and corrosion-resistant, self-drilling screw. Eye designed to receive wire tie and to serve as head for drilling fastener into framing. Barrel length to suit sheathing thickness, allowing screw to seat directly against framing with flanged head

covering hole in sheathing.

4. Wire Ties: Triangular, rectangular, or T-shaped wire ties fabricated from 0.188-inchdiameter, hot-dip galvanized steel wire.

2.5 EMBEDDED FLASHING MATERIALS (Not applicable on this project)

A. Flexible Flashing: For flashing unexposed to the exterior, use the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive, rubberized-asphalt compound, bonded to a high-density, cross-laminated, polyethylene film to produce an overall thickness of not less than 0.030 inch.

B. Application: Unless otherwise indicated, use the following:

1. Where flashing is partly exposed and is indicated to terminate at wall face, use flexible flashing with a metal drip edge.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Weep/Vent Products: Use the following unless otherwise indicated: (Not applicable on this project)

1. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity behind stone masonry. Use only for weeps.

B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity. (Not applicable on this project)

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Advanced Building Products Inc.; Mortar Break II.
   b. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
   c. Mortar Net USA, Ltd.; Mortar Net.

2. Provide one of the following configurations:
   a. Strips, full depth of cavity and 10 inches wide, with dovetail-shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.
   b. Strips, not less than 1-1/2 inches thick and 10 inches wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.

2.7 CAVITY-WALL INSULATION (Not applicable on this project)

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, closed-cell product extruded with an integral skin.

B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

2.8 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride.
2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.

3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.
1. Mortar for Setting Stone: Type S.
2. Mortar for Pointing Stone: Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of mortar cement by weight.

PART 3 -EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.

B. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, flashing, and other items installed in substrates and required for or extending into stone masonry are correctly installed.

C. Examine wall framing, sheathing, and weather-resistant sheathing paper to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 SETTING STONE MASONRY

A. Perform necessary field cutting and trimming as stone is set.
1. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.

2. Pitch face at field-split edges as needed to match stones that are not field split.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication or that is otherwise unsuitable for intended use.

C. Arrange stones in three-course, **random-range ashlar pattern** with random course heights, random lengths (interrupted coursed), and uniform joint widths.

D. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

E. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

F. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch at narrowest points or more than 1/2 inch at widest points.

G. Provide sealant joints of widths and at locations indicated.
1. Keep sealant joints free of mortar and other rigid materials.

H. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. (Not applicable on this project)
1. At concrete backing, extend flashing through stone masonry, turned up a minimum of 8 inches.
2. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches into masonry at each end.
3. At sills, extend flashing not less than 4 inches at ends.
4. At ends of head and sill flashing, turn up not less than 2 inches to form end dams.
5. Install metal drip edges beneath flexible flashing at exterior wall face. Stop flexible flashing ½ inch back from exterior wall face and adhere flexible flashing to top of metal drip edge.

I. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.
1. Use wicking material to form weep holes.
2. Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes formed from wicking material 16 inches o.c.
4. Trim wicking material used in weep holes flush with exterior wall face after mortar has set.

J. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.4 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40

feet or more.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.

D. Measure variation from level, plumb, and position shown in plan as a variation of the average plane of each stone face from level, plumb, or dimensioned plane.

E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.5 INSTALLATION OF ANCHORED STONE MASONRY

A. Anchor stone masonry to concrete with screw-attached veneer anchors.

B. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inch cover on exterior face.

C. Space anchors to provide not less than one anchor per 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.

D. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.

E. Provide 2-inch cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.
1. Slope beds toward cavity to minimize mortar protrusions into cavity.
2. Do not attempt to trowel or remove mortar fins protruding into cavity.

F. Rake out joints for pointing with mortar to depth of not less than 1/2 inch before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.6 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch deep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
1. Joint Profile: Concave.

3.7 ADJUSTING AND CLEANING

A. Remove and replace stone masonry of the following description:
1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if

methods and results are approved by Architect.

2. Defective joints.
3. Stone masonry not matching approved samples and mockups.
4. Stone masonry not complying with other requirements indicated.

B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
   3. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.

END OF SECTION

SECTION 07900
JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:

B. This Section includes sealants for the following applications:
   1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
      a. Repair joints in unit masonry and exterior materials.
      b. Joints between metal panels.
      c. Joints between different materials.
      d. Perimeter joints between exterior materials listed above and frames of doors and windows.
      e. Control and expansion joints in ceiling and overhead surfaces.
      f. Other joints as indicated.
   2. Exterior joints in the following horizontal traffic surfaces:
      a. Joints between buildings and new or existing paving.
      b. Concrete pavement expansion and control joints.
   3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints of exterior openings where indicated.
      c. Vertical control joints and cracks on exposed surfaces of interior unit masonry and concrete walls and partitions.
      d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
      e. Other joints as indicated.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
   1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
   2. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of Part 3.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule at the end of Part 3, provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
   1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.6 PREFORMED JOINT SEALANTS

A. Preformed Foam Sealants: For each product of this description indicated in the Preformed Joint- Sealant Schedule at the end of Part 3, provide manufacturer's standard preformed, precompressed, impregnated, open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; factory produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following:
   1. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
   2. Impregnating Agent: Manufacturer's standard.
   3. Density: Manufacturer's standard.
   4. Backing: Pressure-sensitive adhesive, factory applied to one side with protective wrapping.

2.7 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
   1. Type C: Closed-cell material with a surface skin.
   2. Type O: Open-cell material.
   3. Type B: Bicellular material with a surface skin.
   4. Type: Any material indicated above

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated ton promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

      Porous joint surfaces include the following:
      a. Concrete.
      b. Masonry.
      c. Unglazed surfaces of ceramic tile.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
      a. Metal.
      b. Glass.

c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

F. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, to produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient

temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant to comply with sealant manufacturer's written instructions.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE

A. Single-Component Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
   1. Products: Available products include the following:
      a. Vulkem 116; Mameco International.
      b. Vulkem 230; Mameco International.
      c. Sikaflex - 1a; Sika Corporation.
      d. NP 1; Sonneborn Building Products Div., ChemRex Inc.
   2. Type and Grade: S (single component) and NS (nonsag).
   3. Applications:
      a. Exterior and interior horizontal wearing surfaces subjected to pedestrian or vehicle traffic.

END OF SECTION

SECTION 16050
GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
   1. The Contract Documents attached hereto represent portions of the Project, which have been identified by the Owner for the purpose of dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.
   2. The limits of each separate portion are determined by and are the responsibility of the Contractor who will provide direction, coordination, and resolution of disputes between separate Contractors, Subcontractors and trades in order to integrate the separate parts into the total construction of the Project.
   3. These extents, limits, and determinations are not the responsibility of the Architect/Engineer of Record.

B. Drawings are schematic and diagrammatic. Use judgment and care to install all electrical work in a practical manner to function properly and fit the building construction and finishes. Electrical conductors, conduit, components, etc., not shown or specified which are required of any device or system to produce a complete and operative system are a requirement of this specification.

C. Cooperate with other subcontractors/installers/suppliers in laying out work so that the Electrical Phase of the work will properly fit the building construction and finishes. Wall thickness, space requirements, etc., other than that shown on the Drawings, required to facilitate the electrical construction are to be directed to the Architect's and Owner's attention prior to commencing any work so that proper action may be taken to remedy this.

D. Exact location of outlets are determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined on the job. Do not scale Drawings for exact location of any outlet. Verify all mounting heights by project conditions prior to rough-in.

E. Owner reserves the right to change the location of any outlet, device, or system improperly installed to fit equipment and/or finish and to change the exact location of any outlet, switch, device, etc., up to 10 feet (10') prior to rough-in with no additional cost.

F. Provide the proper number of conductors and conduits or cables to produce an operative system as specified herein.

G. No two ungrounded conductors will be connected to the same circuit breaker/fused switch in any panel. No splicing of branch circuit conductors in any panels, safety switches, or non-automatic circuit breakers in separate enclosures is allowed.

H. All materials are new. Conform to the latest requirements of Underwriter's Laboratories, National Electrical Code, National, State or local agency having jurisdiction, and National Fire Protection (NFPA) Codes.

I. Install, test, and connect all materials, devices, equipment, wiring systems, etc., in strict compliance with industry standards, manufacturer's recommendations, and as specified herein.

J. Install all materials, equipment, devices, etc., in a neat and workmanlike manner.

K. Protect from damage all apparatus and equipment furnished on this project. Equipment and materials shall be handled, stored, and protected in accordance with the manufacturer's recommendations. Store electrical conduit to provide protection from the weather and accidental damage. Store plastic conduit on even supports and in locations not subject to direct sun rays or excessive heat. Seal, store, and handle cables carefully to avoid damage to the outer covering of insulation and damage from moisture and weather. Repair, repaint, and/or replace any piece of equipment or material marred or damaged to the complete satisfaction of Owner.

L. Any new piece of equipment, switch, device, etc., shown mounted on and/or adjacent to any equipment which if installed, would impair the proper operation of that existing equipment, will be removed and relocated by the Contractor with no cost to Owner as required in order that equipment will function properly.

M. Preparation, handling, and installation shall be in accordance with the manufacturer's written instructions and data. Coordinate work and other suppliers in furnishing and placing of work. Review shop drawings of other trades to confirm measurements as necessary to properly perform work.

1.2 DISCREPANCIES

A. Should the Contractor find discrepancies or omissions in the Contract Documents, or be in doubt as to the intent, he shall immediately obtain clarification from the Architect/Owner before proceeding with work or purchasing.

B. It is the Contractor's responsibility to review the Drawings and Specifications prior to submitting his bid, for compliance with the local regulations of the inspection agency, fire inspection agency and the local electric and telephone utilities.

1.3 RECORD DRAWINGS

A. Furnish to the Owner at job acceptance and completion one (1) set of drawings, showing an accurate location of the work actually installed related to the original Drawings. Include all approved and installed Change Orders, field condition changes, and other variations from the original Drawings and Specifications. Drawings shall be the record drawing sets that are updated on a daily basis and kept at the project site until the project has been completed.

1.4 POSTED OPERATING INSTRUCTIONS

A. Operating instructions approved by Owner shall be provided for each system and each principal piece of equipment for the use of operation and maintenance personnel. Operating instructions shall include such instructions as start-up, proper adjustment, operating, lubrication, shut-down, safety-precautions, procedure in the event of equipment failure, and any other necessary items of instruction as recommended by the manufacturer of the unit.

B. A copy of the one-line diagram with revisions shall be stored near the main distribution panel.

1.5 INSPECTIONS

A. The complete job shall, during actual construction, and for the warranty provision period, have the following performed.
   1. Upon written notice, furnish labor and tools to assist and be directed by Owner for a reasonable amount of time to make such tests and observations as are requested by the Architect and Owner pertaining to the safety and operation of any device or system installed.
   2. Inspection by any Federal, State, or local authority having jurisdiction of the project.

1.6 CODES, PERMITS, AND FEES

A. References to codes, standards, and specifications of technical societies, trade organizations, and governmental agencies shall mean latest editions.

B. This electrical installation shall comply with:
   1. Local authorities.
   2. National Electrical Code (NEC).
   3. The regulations of the servicing Electrical Utility Company.
   4. Americans with Disabilities Act Guidelines (ADA).
   5. International Building Code (IBC).
   6. National Fire Protection Association (NFPA).

C. The Contractor shall obtain and shall pay for all applications and permits required by the local authorities.

D. Where, in any specific case, different sections of any of the aforementioned codes and regulations or Drawings and Specifications each specify different materials, methods of construction, or other requirements, the most restrictive shall govern. In the case of any conflict between a general provision and a special provision, the special provision shall govern.

E. Contractors proposing to undertake work under this division shall review the Drawings and Specifications subsequent to the approval for permit by the local authorities, noting any and all comments, changes or additions to the work herein described, and immediately notify the Owner for proper coordination with his work and that of other divisions. The same shall apply for any similar circumstance arising during construction, prior to the completion of work.

1.7 GUARANTEE

A. Guarantee work performed and all equipment installed under this contract shall be free from defects in workmanship and materials for a period of one year from date of final written acceptance by Owner unless a longer guarantee is specified in the various sections.

B. Defects shall be corrected arising during this period at the contractor's own expense, upon written notice of Owner.

C. Guarantee all lamps as follows:
   1. All fluorescent and high intensity discharge (H.I.D.) lamp burn-outs occurring during the first one hundred-eighty (180) days after final acceptance. Replacements for these burn-outs shall be furnished and installed upon written notice from Owner.

1.8 MANUFACTURER'S RECOMMENDATIONS

A. Manufacturer's recommendations for installation shall be followed for the installation of all equipment.

1.9 DELIVERY, STORAGE, HANDLING AND SCHEDULING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Protect stored equipment and materials from damage.

C. Do not install damaged equipment; remove from site and replace damaged equipment with new.

1.10 REMOVAL OF SALVAGE MATERIAL AND DEBRIS

A. All trash, salvage material, etc. shall be removed from the site at all times during construction on a regular basis.

1.11 TRENCHING AND BACKFILLING

A. Comply with OSHA Standards for all trenching.

1.12 CUTTING, PATCHING, FINISHING, AND PAINTING

A. Paint all exposed conduit, piping, wireways, boxes, cabinets, etc., where exposed in any space other than listed herein. Conduit, piping, etc., in mechanical rooms and electrical rooms shall be painted to match to the satisfaction of the Owner.

B. Structural members shall in no case be drilled, bored, or notched in such a manner that will impair the structural value. Coordinate any cutting required.

1.13 CORROSION PROTECTION

A. All joints, connections, etc., exposed to climatic conditions to be completely watertight

1.14 SITE VISIT AND FAMILIARIZATION

A. Contractors proposing to undertake work shall:
   1. Visit the site of the work, and fully familiarize themselves of all conditions that affect the work or cost thereof.
   2. Examine the Drawings and specifications as related to the site conditions.
   3. Acquaint themselves with all utility companies from whom services shall be supplied; verify locations of utility service points, demarcations and interfaces and determine exact requirements.

B. Consideration will not be granted for any alleged misunderstanding of the amount of work to be performed.

1.15 COORDINATION OF UTILITIES

A. It is the responsibility of the Contractor to coordinate all utilities location both overhead and underground and verify their locations with the various utilities prior to commencing any work. Special connection requirements shall be included.

1.16 MOTORS AND MOTOR CONTROLS FOR MECHANICAL EQUIPMENT

A. The interconnecting power wiring and conduit, control wiring and conduit, magnetic and manual motor starters, push-button stations, and 120 volt and above electrical power circuits shall be furnished and installed under Division 16.

1.17 SUBMITTALS

A. Provide submittal data bound in 8-1/2” x 11” folder with specification section referenced. Submittals shall consist of catalog datasheets containing physical dimension data and electrical characteristics complete enough to comfirm operational compliance. Where a fire alarm system is required refer to the fire alarm specification for specific submittal requirements.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials, equipment, and devices shall meet the requirements of UL where UL standards are established for those items, and the requirements of NFPA.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment locations shall be as close as practical to locations shown on the Drawings and subject to such revisions as may be found necessary or desirable at the time the work is installed. Verify all dimensions by field measurements.
   1. Minor relocations may be made where required, provided that such work is coordinated with all other work and that there will be no impairment of system operation as a result.
   2. Major relocation shall not be made without prior approval

B. All penetrations by electrical raceways or equipment through roofs, ceilings, walls or floors shall be sealed and made permanently water tight. Penetrations in fire rated assemblies and designated smoke barriers shall be sealed with UL listed fire retardant material.

C. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with the National Electrical Code.

D. The National Electrical Contractors Association publication Standard of Installation shall be used as a reference as to the minimum quality of workmanship required.

E. Surface mounted equipment, devices, and raceway is only allowed in mechanical equipment areas.

F. After work is complete clean light fixtures, panelboards, switchboards, and electrical equipment to remove dust, dirt, grease, or other marks and leave work in clean condition.

3.2 COORDINATION

A. Interferences and clearances shall be coordinated and corrected with other Trades before proceeding with the work.

B. The electrical work shall be coordinated with the work of the other trades. Obtain appropriate information of equipment prior to connection. Coordinate connection requirements, locations, etc.; some equipment may require multiple connections.

C. Coordinate the cutting and patching with other Trades of the building components to accommodate the installation.

D. Lay out the work on the premises and make proper provision for the work of other trades. The exact location of each item shall be determined by reference to the Drawings, by measurements on the site and in cooperation with other contractors. Accurately locate all openings required.

E. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

F. Electrical equipment and devices shall be installed to operate without objectionable noise and vibration being transmitted to occupied portions of the building or to any part of the building structure. Provide absorption pads, shear pads, and spring isolators as required or recommended by manufacturer of equipment.

G. Install equipment and materials to provide required maintenance and code working clearance for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

3.3 EQUIPMENT IDENTIFICATION

A. Provide nameplates for the following as a minimum requirement:
1. Switchboards, starters, disconnects, panelboards.
2. Individual Breakers, Disconnect Switches and Motor Starters, Contactors and Relays.
3. National Electrical Code Requirement: Other equipment and installations required to be identified or provided with warning or caution signs shall be so treated in a manner to comply with the National Electrical Code (NFPA 70) requirements and as contained herein.

B. Provide complete warranty information for each item. Include date of beginning of warranty or bond, duration of warranty or bond, and names, addresses, telephone numbers and procedures for filing a claim to obtain warranty services.

3.4 PAINTING OF EQUIPMENT

A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA.

B. Field Applied: Paint electrical equipment as required to match finish or to meet safety criteria. Touch-up paint of all equipment shall be required where equipment has become

damaged as a result of handling, rusting, etc. Paint shall match completely the existing finish.

3.5 TESTING

A. Perform tests as specified to prove installation is in accordance with contract requirements. Tests shall be conducted during the construction period and at completion to determine conformity with applicable codes and with these Specifications. Typed records of all the following tests shall be included in maintenance instructions. Tests, in addition to specific system test described elsewhere, shall include:

1. Circuit Continuity: Test feeder and branch circuits for continuity. Test neutrals for improper grounds.
2. Equipment Operations: Test motors for correct operation and rotation.
3. Circuit Numbering Verification: Select on a random basis, various circuit breakers in the panelboards and cycle them on and off to verify compliance of the typed panel directories with actual field wiring.
4. Product Failure: Products which fail during the tests or are ruled unsatisfactory by the Architect shall be replaced, repaired or corrected as prescribed by the Architect at the expense of the Contractor. Tests shall be performed after repairs, replacements or corrections until satisfactory performance is demonstrated.
5. Miscellaneous: Include test results in the maintenance manual. Cost, if any, for all tests shall be paid by the Contractor.
6. Insulation Resistance: Perform 1000-volt D.C. tests for one minute on all equipment (i.e. panelboards, switchboards, distribution panels, motors) rated 300 volts and higher for feeder and branch circuit conductors, including the neutral. Repair or replace circuits showing less than 10 megohms resistance to ground.

END OF SECTION

SECTION 16110
RACEWAY SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Conduits, cable trays, ducts, boxes, etc.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. National Electrical Contractors Association (NECA):
   1. NECA "Standard of Installation."

C. National Electrical Manufacturers Association (NEMA):
   1. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
   2. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   3. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
   4. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

D. National Fire Protection Association (NFPA):
   1. ANSI/NFPA 70 - National Electrical Code.

E. Design Requirements
   1. ANSI/NFPA 70 (N.E.C.), unless noted otherwise on the Drawings.
   2. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.3 PROJECT CONDITIONS

Routing shown on drawings is diagrammatic only, determine exact routing and lengths required.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

A. Minimum size conduit as follows:
   1. 3/4" for power and controls.
   2. 3/4" for all below grade/in-slab conduit or exposed.

B. Install in accordance with the following schedule
   1. In exposed locations: Galvanized rigid steel (GRC codes.
   2. Conduit in earth: Schedule 40 PVC as noted.

2.2 FITTINGS

A. Use insulated throat connector fittings listed for the raceway on which they are used.

2.3 CONDUIT STRAPS AND HANGERS

A. Two (2) hole push on stamped steel straps. Use on surface areas such as concrete, masonry, wide flange beams, columns and wood.

B. Where conduits are grouped together, use trapeze hangers consisting of all thread rods sized as required 1/2" x 1-7/8" (12 gauge) with single bolt channel pipe straps and rolled strut.

2.4 CONDUIT

A. Rigid Galvanized Steel Conduit (GRC): ANSI C801. UL6.
B. Nonmetallic Conduit NEMA TC 2: Schedule 40 PVC.

2.5 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported.
   2. Receptacle and Switch Boxes – sized for the appropriate number of conductors.

B. Cast Boxes: NEMA FB 1, Type FD. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.6 PULL AND JUNCTION BOXES

A. Traffic rated, flush in grade Quazite polycrete or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all raceway in accordance with manufacturer's instructions.

B. Size all raceway in accordance with NEC.

C. Group related conduits; support using conduit rack. Construct rack using approved steel channel.

D. Do not support conduit with wire or perforated pipe straps in any type structure. Remove wire used for temporary supports. Steel tie wire may be used to anchor conduit down to reinforcing rods in concrete encasement only. Do not attach conduit to ceiling support wires.

E. Arrange conduit to maintain headroom and present neat appearance. Route all conduit whether exposed or concealed parallel and perpendicular to walls, ceilings, building structures, etc. Maintain adequate clearance between conduit and piping. Cut conduit square; de-burr cut ends and ream. Bring conduit to shoulder of fittings; fasten securely.

F. Use conduit hubs or locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

G. Use conduit bodies to make sharp changes in direction. Telephone and computer system conduit bends shall not exceed three (3) 90 degree turns prior to installing pull box. Comply with NFPA 70 on all bends. Make conduit bends only with bending tools.

H. Avoid moisture traps; provide junction box at low points in conduit system.

I. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.

J. Provide suitable nylon pull string in each conduit except sleeves and nipples.

K. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

L. Ground and bond conduit.

M. Install knockout closures in unused box openings.

N. Support boxes independently of conduit.

O. Cap all upturned conduits during construction rough-in to prevent moisture or debris from entering. Swab to remove any and all moisture.

P. Support conduits as required by NFPA 70 (N.E.C.)

Q. Minimum buried depth of raceway shall be 24” in lawn and landscaped areas and 18” under concrete or paving.

END OF SECTION

SECTION 16120
WIRES AND CABLES

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. Wire and cable.
   2. Wiring connectors and connections.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

A. National Fire Protection Association (NFPA):
   1. ANSI/NFPA 70 - National Electrical Code.

B. Regulatory requirements
   1. Conform to requirements of ANSI/NFPA 70.

1.3 PROJECT CONDITIONS

A. Routing shown on Drawings is diagrammatic only. Determine exact routing and lengths required.

B. Determine required separation between cable and other work.

C. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.1 WIRE AND CABLE

A. Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 Volts.

D. Insulation: ANSI/NFPA 70, Type THHN/THWN. (Feeders may be XHHW.)

E. Insulation Temperature Rating 90 degrees C.

F. UL Listed. Minimum size #12 for power circuits and #14 for control circuits unless noted otherwise.

PART 3 - EXECUTION

3.1 GROUPING OF CONDUCTORS

A. Maximum three hots, three neutral, and three ground may be contained in one raceway. Provide dedicated neutral for each hot.

B. Mixing of conductors from different voltage classes is prohibited.

3.2 INSTALLATION

A. Swab raceway before installing wire.

B. Install products in accordance with manufacturer's instructions.

C. Use stranded conductors for control circuits and final connections to all vibration equipment.

D. Use #10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

E. Use #10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

F. Pull all conductors into raceway at same time.

G. Protect cable from damage.

H. Clean conductor surfaces before installing lugs and connectors.

I. Make splices, taps, and terminations to carry full ampacity of conductors.

J. Use only compression connectors for copper conductor splices and taps, #6 AWG and larger.

K. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, #8 AWG and smaller 90 degrees C rated.

L. Inspect wire and cable for physical damage and proper connection.

M. Verify continuity of each branch circuit conductor.

N. Install a properly sized grounding conductor in all raceways containing power circuits.

O. Comply with the following color code or as required by local authority:

<u>208Y/120 Volt System</u>
Phase A - Black
Phase B - Red
Phase C - Blue.
Neutral - White.
Equipment Ground - Green.

<u>480Y/277 Volt System</u>
Phase A - Brown
Phase B - Orange.
Phase C - Yellow
Neutral - Grey.
Equipment Ground - Green/with Yellow stripe.

P. Electrical Tests:
1. Perform insulation resistance test on each feeder and branch circuit conductor with respect to ground and adjacent conductors. Applied potential: 1000 volts dc for 1 minute.

2. Perform continuity test to insure proper cable connection.
3. Minimum insulation resistance values: two megohms.

END OF SECTION

SECTION 16140
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall switches.
   2. Receptacles.
   3. Device plates and box covers.
   4. Photocells.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

A. National Electrical Contractors Association (NECA):
   1. NECA - Standard of Installation.

B. National Electrical Manufacturers Association (NEMA):
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

C. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories, Inc. (UL):

E. Regulatory Requirements:
   1. Conform to requirements of NFPA 70, Underwriters Laboratories.
   2. Provide Products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hubbell, GE, Leviton, Pass and Seymor, Tork, Intermatic

2.2 MATERIALS

A. Color: Ivory or as required by Architect. All devices commercial grade.

B. Receptacles shall be 3 wire, grounding type, side and backwired, 20A. Ground-fault receptacles shall have feed-through. All receptacles for circuits other than 125V shall be standard NEMA configuration.

C. Switches shall be 20A, 120-277V, snap type. Switches used for mechanical equipment shall have pilot lights.

D. Cover plates shall be stainless steel. Weatherproof where exposed to elements. Where equipment in a weatherproof area is to be continuously engaged the weatherproof covers shall allow closure with the plug installed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of existing conditions prior to beginning work.

B. Verify that outlet boxes are installed at proper height.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install receptacles with grounding pole on bottom.

E. Clean exposed surfaces to remove splatters and restore finish.

F. Operate/test that all devices are energized and work properly.

G. Clean all devices.

END OF SECTION

SECTION 16400
SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Service entrance switchboard and associated items of equipment, panelboards, and transformers.

B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

A. Work under this Section shall comply with the following:
   1. Latest edition of the National Electrical Code (NFPA-70), and interim amendments in effect. Comply with local and state, utility regulations and laws.

1.3 SYSTEM DESCRIPTION

A. Electrical System Voltages: As indicated on drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Items of electrical distribution system, including switchboards, panelboards, safety switches, etc. manufactured by one of the following, unless otherwise indicated on Drawings.
   1. General Electric.
   2. Square D.
   3. Siemens
   4. Eaton

B. Equipment will bear name and trademark of manufacturer as listed above.

2.2 SERVICE ENTRANCE EQUIPMENT

A. In general, service entrance equipment will be as indicated and/or scheduled on Drawings. Service entrance equipment will be U.L. labeled as suitable for use as service equipment. Coordinate interrupting rating with utilities available fault current level.

B. Install service entrance rated switchboard assembly as indicated on Drawings. Configure switchboard as scheduled on Drawings, including voltage, amperage, bus bracing and interrupting ratings. Install main lugs only (MLO), main circuit breaker (MCB), or main fusible switch (MFS) and branch devices as indicated on Schedule. Switchboard will be of same manufacturer as downstream distribution equipment.

C. Equip main fusible switches or fusible switch type branch devices with rejection type fuse holders and current limiting fuses.

2.3 PANELBOARDS

A. Panelboards: Install as scheduled on Drawings, including voltage, amperage, bus bracing, and interrupting ratings.
   1. Main lugs only (MLO), main circuit breaker (MCB), or main fusible switch (MFS) panelboard and branch devices as indicated on Schedule. NEMA PB1, Tin plated aluminum or copper.
   2. Branch Circuit Protective Devices: Bolted type thermal magnetic center-trip circuit breakers for alternating current, each with single-handle common trip. Tandem or half-sized circuit breakers or load center type construction not permitted. Circuit breaker Amp Interrupting Capacity (AIC) no less than values indicated on Drawings.
   3. Cabinets: Zinc-coated sheet steel with knock-outs, UL listed and labeled. Trims and doors to have manufacturer's standard color. Trims to be fitted with hinged doors having combined lock and latch. Locks will be keyed alike and furnished with two keys for each panelboard.
   4. Directory Holder: Provide typewritten circuit directory identifying load(s) on each circuit under clear plastic cover.

2.4 ENCLOSED SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class R fuses.

B. Nonfusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

2.5 CONTACTORS

A. Description: NEMA ICS 2, AC general purpose magnetic contactor. Coil Voltage: 120 volts, 60 Hertz or as required by control systems. Poles: As required. Size: As required. Enclosure: Appropriate for the environment, NEMA 1 minimum. Contact Rating: 20 amperes.

B. Accessories required:
   1. Selector Switch in cover: ON/OFF/AUTOMATIC.
   2. Indicating Light: RED.
   3. Auxiliary Contacts: Two normally open field convertible.

2.6 FUSES

A. Manufacturers: Bussman, Gould-Shawmet

B. Description: Dual element, current limiting, time delay, 250 or 600 volt as required, UL 198E, Class RK 1.

C. Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install materials in accordance with manufacturer's recommendations, power company requirements, and as indicated on Drawings.

B. Install service in accordance with utility company's requirements, necessary to provide complete electric service as indicated on Drawings.

C. Required items include, but are not limited to, trenching and backfilling, primary and secondary conduits, service conductors (including primary conductors where required), C.T. cabinet, bussed enclosure, other associated metering hardware, and grounding system per local utility or codes.

D. Perform Work in strict compliance with local utility's requirements, with any applicable local codes and latest edition of NFPA 70.

F. Install panelboards in accordance with NEMA PB 1.1. Height: 6 ft to top of panelboard; install panelboards taller than 6 ft with bottom no more than 4 inches above floor. Top breaker maximum height not to exceed 6’-8".

G. Provide filler plates for unused spaces in panelboards.

H. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads. The branch circuit directory shall clearly indicate load served.

I. Tighten accessible bus connections and mechanical fasteners after placing switchboard. Tighten bolted bus connections in accordance with manufacturer's instructions.

J. Adjust circuit breaker trip and time delay settings as required.

K. Install disconnect switches and fuses where indicated on drawings or where required by equipment and NFPA 70.

L. Provide permanent label on inside door of each switch indicating UL fuse class and size for replacement.

M. Install enclosed controllers where indicated, and in accordance with manufacturer's instructions.

N. Height: 5 ft to operating handle.

O. Provide engraved plastic nameplates on all panelboards indicating name; and on all disconnects, starters, etc. indicating load name.

P. Provide neatly typed permanent label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

END OF SECTION

BID ITEM	SPEC NO.	DESCRIPTION	UNIT	QTY	DATA INPUT UNIT PRICE	TOTAL EACH ITEM
		ADD ALTERNATE #1 - GROTTO IMPROVEMENTS / REPAIRS				
053		GROTTO IMPROVEMENTS / REPAIRS	SYSTEM	1		$ -
		TOTAL ADD ALTERNATE #1				$ -
		ADD ALTERNATE #2 - HAMMOCK VILLAGE				
054		HAMMOCK VILLAGE (REQUIRES ACCEPTANCE OF ADD ALT #3)	SYSTEM	1		$ -
		TOTAL ADD ALTERNATE #2				$ -
		ADD ALTERNATE #3 - EXISTING PLANTING BEDS IN HILLTOP GARDEN				
055		CLEAN UP OF EXISTING PLANTING BEDS (SEE EXISTING PLANTING CLEAN-UP ADD ALT #3 SHEET FOR LOCATIONS)	LOT	1		$ -
		TOTAL ADD ALTERNATE #3				$ -
		ADD ALTERNATE #4 - EXISTING PLANTING BEDS				
056		PLANTING FOR EXISTING HILLSIDE GARDEN PLANTING BEDS (SEE "PLANTING PLANS (11)-(16) FOR LOCATIONS & PLANTING SCHEDULE (02) FOR QUANTITIES)	LOT	1		$ -
		TOTAL ADD ALTERNATE #4				$ -
		ADD ALTERNATE #5 - IRRIGATION 4" WATER METER & BACKFLOW				
057		IRRIGATION WATER SERVICE CHANGE TO (1) 4" WATER METER & 4" BACKFLOW PREVENTER. COST GIVEN SHOULD BE FOR ADDITIONAL COST FOR UPGRADE ABOVE AND BEYOND THE BASE BID 2-2" METERS AND BACKFLOWS AND ALL THAT IS REQUIRED TO PERMIT AND INSTALL THEM.	LOT	1		$ -
		TOTAL ADD ALTERNATE #5				$ -
		ADD ALTERNATE #6 - IRRIGATION				
058		4" HDPE BUTT-FUSION WELDED FOR ALL IRRIGATION MAINLINE. COST GIVEN SHOULD BE FOR ADDITIONAL COST FOR UPGRADE ABOVE AND BEYOND THE BASE BID MAINLINE MATERIALS AND INSTALLATION COST.	LOT	1		$ -
		TOTAL ADD ALTERNATE #1				$ -
		ADD ALTERNATE #7 - 2 PRESSURE REGULATORS				
059		ADD TWO PRESSURE REGULATORS TO IRRIGATION SYSTEM IF THE STATIC PRESSURE EXCEEDS 80 PSI AS CONFIRMED DURING DESIGN.	EA	2		$ -
		TOTAL ADD ALTERNATE #7				$ -
		TOTAL BASE BID plus ALTERNATES 1 thru 7				$ 100,000.00

TECHNICAL

SPECIFICATIONS