

SPECIFICATIONS, SPECIAL PROVISIONS AND CONTRACT DOCUMENTS

**NORTH SIDE UTILITIES WATER PROJECT
7420 NE 36TH ST, MIDWEST CITY, OK 73141**



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THESE SPECIFICATIONS MUST BE READ AND CONSTRUED AS A WHOLE

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SECTION A
SPECIAL PROVISIONS

1. GENERAL DESCRIPTION OF WORK

The work to be performed under the provisions of these contract documents consists of the following: furnishing all materials, equipment, tools and plans; the performance of all necessary labor; and the complete construction of facilities, including all work appurtenant thereto.

2. GENERAL CONDITIONS

The General Conditions are general in scope and may refer to conditions not encountered on the work covered by this contract. Any provision of the General Conditions which pertains to a nonexistent condition and is not applicable to the work to be performed hereunder, or which conflicts with any provision of the Special Conditions, shall have no meaning in the contract and shall be disregarded.

3. SPECIFICATIONS

Hereinafter, the City of Midwest City may be referred to as "City" and the Midwest City Municipal Authority as "Authority."

The specifications that govern the materials and equipment to be furnished and the work to be performed under this contract are listed in the following paragraphs. No attempt has been made in the specifications to segregate work that is to be performed by any trade or subcontract. Any segregation between trades or crafts will be solely a matter for agreement between the Contractor and his employees and his subcontractors.

All work performed under this contract shall be in full accordance with the laws and ordinances pertinent to such work. In case of any conflict wherein the methods or standards of installation or materials specified do not equal or exceed the requirements of the laws or ordinances, the laws or ordinances shall govern. All items required by the laws or ordinances but not specified or shown on the drawings shall be furnished without extra charge as shown or specified.

These Special Provisions are supplemental to the City of Midwest City Water Main and Sanitary Sewer Line Installation Specifications and Details, current edition, and Standard Specifications for Highway Construction, Oklahoma Department of Transportation (ODOT) 2019 edition, which govern all areas/types of construction and shall be considered as a part of these specifications and contract. Where the stipulations of the Special Provisions and the City / Authority specifications or plans are in conflict, the interpretation of the plans and specifications shall be made by the City / Authority.

The words "laws and ordinances" as used herein shall mean all local, state, or national codes, laws, ordinances, standards, rules or regulations of any nature which are in any way pertinent to, or regulatory over, the work covered by this contract.

4. PERMITS AND FEES

The Contractor shall secure all necessary permits or licenses to carry out this work and he shall pay all lawful fees, taxes, etc., in connection with the work.

5. EQUIVALENT MATERIALS AND EQUIPMENT

Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing the type, function and quality desired, unless specifically stated otherwise. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Engineer for the City / Authority (hereinafter "Engineer") to determine that the proposed products are equivalent to those named. Such items shall be submitted for approval by the procedure set forth in the SECTION B, General Conditions, 5. Shop Drawings. The words "or approved equal," although possibly not indicated after each proprietary specification, are implied as a result of the preceding statements in this paragraph.

6. WATER

The City / Authority will furnish all water that is required in connection with the work to be done under this contract in the vicinity of the site without charge, provided:

- a. The Contractor shall procure such water in the location and in the manner designated by the Engineer.
- b. The Contractor, at his own expense, shall make authorized connections and provide means for delivering the water to the work site.
- c. The Contractor shall provide adequately against waste and needless use of such water.
- d. The City / Authority shall provide a backflow preventer valve for the Contractor's use. The backflow preventer must be used at all times.

7. LINES AND GRADES

All work on lines, grades, and elevations shown on the plans shall be done. Basic horizontal and vertical control points will be established or designated by the Engineer. These points shall be used as datum for work under this contract. All additional survey, layout and measurement work shall be performed by the Contractor as a part of the work under this contract.

The Contractor shall provide an experienced instrument man, competent assistants, and such instruments, tools, stakes, and other materials as may be required to complete the survey, layout, and measurement work. In addition, the Contractor shall furnish (without charge) competent workers from his force and such tools, stakes and other materials as may be required by the Engineer in establishing or designating control points or in checking survey, layout, and measurement work performed by the Contractor.

All work done without being properly located may be ordered removed and replaced at the Contractor's expense.

8. CONNECTIONS TO EXISTING PIPELINES

Where connections are made between new work and existing pipe lines, such connections shall be made in a thorough and workmanlike manner and to the satisfaction of the Engineer. Each connection with an existing water line shall be made at a time and under conditions as authorized by the City / Authority. Suitable facilities shall be provided for proper dewatering, drainage, and disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.

9. UNDERGROUND INSTALLATIONS AND STRUCTURES

Pipelines and other existing underground installations and structures in the vicinity of the work to be done hereunder are indicated on the plans according to information available to the City / Authority. The City / Authority does not guarantee the accuracy of such information. The Contractor shall make every effort to locate all underground pipelines, conduits, and structures by contacting owners of underground utilities and by prospecting in advance of excavation or trenching. Should the Contractor encounter any utilities, whether shown or not on the plans, it will be his responsibility to protect the lines during construction. If there is any interference from alignment or elevation, it will be the responsibility of the Contractor to have these utilities relocated to permit construction to continue. Any delay or extra cost to the Contractor caused by pipelines or other underground structures or obstructions not shown on the plans or found in locations different from those indicated shall not constitute a claim by the Contractor for extra work, additional payment, or damages.

10. FIELD CHECK OF EXISTING STRUCTURES

It shall be the responsibility of the Contractor to check and verify all dimensions and elevations of existing structures, pipelines, equipment, or other existing items affected by or affecting the work under this contract. This shall be done prior to the start of construction or ordering of materials and equipment affected thereby.

The Contractor's attention is directed to the Advertisement for Bids which requires that each bidder visit the site of the work to familiarize himself with the arrangement and condition of existing construction. The drawings (in general) show only the details of existing construction that are to be connected to or that are to remain in place. The Contractor shall repair, to the Owner's satisfaction, any existing infrastructure, including private materials located in the City / Authority right of way, at no expense to the City / Authority and shall not constitute a claim by the Contractor for extra work, additional payment, or damages.

The Contractor shall be solely responsible for determining the extent and cost of all removal and salvage operations. Any delay or extra expense to the Contractor due to encountering construction, piping, or equipment not shown or in locations different from those indicated on the plans shall not constitute a claim by the Contractor for extra work, additional payment, or damages.

11. DAMAGE TO EXISTING PROPERTY

The Contractor will be held responsible for any damage to existing structures, work, materials, or equipment because of his operations; and shall repair or replace any damaged structures, work, materials, or equipment to the satisfaction of and at no additional cost to the City / Authority. The Contractor shall protect all existing structures and property (such as irrigation, landscaping, etc.) from such damage and shall provide bracing, shoring, or other work necessary for such protection.

12. PUMPING AND DEWATERING OPERATION

The Contractor shall furnish all equipment and materials for and shall construct and maintain as required temporary facilities for the care, handling, and removal of surface or seepage water or water from other sources which may be encountered during construction. The temporary facilities shall be removed after serving their purpose and the installation

area dressed up so as not to interfere in any way with surface water drainage. Payment shall be considered incidental and shall be included in other items of work.

13. SCHEDULE OF CONSTRUCTION OPERATIONS AND MAINTENANCE OF WATER SERVICE

The Contractor shall submit to the Engineer for approval, before starting work, a schedule of his proposed construction operations. He will be required to consult with the Engineer and a schedule shall be established whereby the proposed construction operations may be executed with a minimum of interruption to the normal water service. The City / Authority will fully cooperate with the Contractor in arrangements for continuity of service and operation of valves and other control facilities. The schedule of operations shall indicate the sequence of the work, the time of starting and completion of each part, and the time for making connections to existing pipes, structures, or any other facilities.

The Contractor's attention is directed to the fact that water service cannot be shut down except for short periods of time, and then only with the City / Authority's specific approval and until the new portions of the work are placed in service.

If conditions beyond the control of the Contractor justify, and the City / Authority approves an extension of contract time, the Contractor shall revise the construction schedule in accordance with the approved extension. If operations fall behind the approved schedule to an extent that the completion of the work within the specified time appears doubtful, the City / Authority may require the Contractor to add to his plant, equipment, or construction forces, and/or increase the working hours.

Approval of the proposed construction schedule by the Engineer is necessary before the actual performance of the work, but it shall not relieve the Contractor of his obligations to cooperate with the City / Authority to the fullest extent.

14. RIGHTS-OF-WAY

The necessary rights-of-way and temporary and permanent easements have been provided by the City / Authority. The Contractor shall confine his construction operations to the immediate vicinity of the location shown on the plans and shall use care in placing construction tools, equipment, excavated materials, and construction materials and supplies, so as to cause the least possible damage to property and interference with traffic. The placing of such tools, equipment, and materials shall be subject to the approval of the Engineer.

Work Within Highway Rights-of-Way. All work performed and all operation of the Contractor, his employees, or his subcontractors, within the limits of highway rights-of-way, shall be in conformity with the requirements and be under the control (through the City / Authority) of the highway authority owning, or having jurisdiction over and control of, the right-of-way in each case.

The Contractor shall be solely responsible for obtaining (and shall pay all costs in connection with) any additional work area, storage sites, access to the site, or temporary right-of-way which may be required for proper completion of the work.

It shall be clearly understood that the responsibility for the protection and safekeeping of equipment and materials on or near the site will be entirely that of the Contractor and that no claim shall be made against the City / Authority by reason of any act of any employee or trespasser. It shall be further understood that, should any occasion arise necessitating

access to the sites occupied by these stored materials or equipment, the Contractor owning or responsible for the stored materials or equipment shall immediately move same. No materials or equipment may be placed upon the property of the City / Authority until the City / Authority has approved the location contemplated by the Contractor to be used for storage.

The Contractor will be required to return the right-of-way affected by construction operations to a same or better condition than it was prior to any work conducted.

15. FENCES

All existing fences which interfere with the construction operations shall be maintained by the Contractor until the completion of the work affected thereby. Temporary fences, with gates where necessary to constrain livestock or pets, shall be installed by the Contractor, unless written permission is obtained from the owner of the fence to leave the fence dismantled for an agreed period of time. Where fences must be maintained across the right-of-way, adequate gates shall be installed. The price for temporary fences and gates shall be included in the price bid for other items of work. Gates shall be kept closed and locked at all times when not in use. On completion of the work across any tract of land, the Contractor shall restore all fences to their original condition or better.

16. PROTECTION AND MAINTENANCE OF PUBLIC AND PRIVATE PROPERTY

The Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains and other underground construction uncovered or otherwise affected by the construction work performed by him. All pavement, surfacing, driveway, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all shrubs in yards and parking, shall be restored to their original condition as determined and approved by the Engineer, within or outside the City / Authority's right-of-way. All replacements shall be made with new materials.

The Contractor shall not enter upon private property for any purpose without first obtaining permission and he shall be responsible for the preservation thereof and shall use every precaution necessary to prevent damage to all trees, fences, buildings, and other environments thereof and to all other public or private property along or adjacent to the work. The Contractor shall notify the proper representatives of any public service corporation, company or individual not less than twenty-four (24) hours in advance of any work which might damage or interfere with the operation of its or his property, along or adjacent to the work. The Contractor shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect, or misconduct in the manner or method of executing the work or due to his non-execution of the work or at any time due to defective work or materials, and said responsibility shall not be released until the work shall have been completed and accepted. When and where any direct or indirect damage or injury is done to public or private property on account of any act, omission, neglect, or misconduct in the execution of the work or in consequence of the non-execution thereof, on the part of the Contractor, he shall restore, at his expense, such property to a condition equal to or better than that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring as may be directed, or he shall make good for such damage or injury in an acceptable manner. The City / Authority's land shall be restored to a condition as good as or better than the original condition immediately after construction.

The Contractor shall either construct a temporary fence around all open excavations or backfill all open excavations on a daily basis to ensure that at no time are there any open excavations accessible.

No trees shall be removed outside of the permanent right-of-way except where authorized by the Engineer.

Additional information concerning areas where trees are specifically not to be removed are indicated on the plans.

The Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the work or any part or site thereof, whether by him or his subcontractors. The Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement, or payment of costs incurred in connection with the damage.

The Contractor will be required to return the right-of-way affected by construction operations to a same or better condition than it was prior to any work conducted.

17. MAINTENANCE OF TRAFFIC

The Contractor shall conduct his work so as to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, or walks (whether public or private) the Contractor shall, at his own expense, provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel. The Contractor shall give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when the Contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

18. BARRICADES AND LIGHTS

All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersection, public highway, or street on each side of the blocked section.

All open trenches and other excavations shall be provided with suitable barriers, signs, and lights to the extent that adequate protection is provided to the public. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.

All barricades and obstructions shall be illuminated by means of warning lights from sunset to sunrise. Materials stored upon or alongside public streets and highways shall be so placed, and the work at all times shall be so conducted, as to cause the minimum obstruction and inconvenience to the traveling public.

All barricades, signs, lights, and/or other protective devices shall be installed and maintained in conformity with applicable statutory requirements and where within railroad and highway rights-of-way as required by the authority having jurisdiction thereover.

19. SAFETY REQUIREMENTS

The Contractor shall familiarize himself and his employees with the requirements of the U.S. Labor Department's Occupational Safety and Health Administration Standards. He shall work in accordance with these OSHA Standards and Regulations.

20. ESTIMATED QUANTITIES

All estimated quantities stipulated in the bid or other contract documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the work and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. The Contractor agrees that he will make no claim for damages, anticipated profits, or other factors, which are due to any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts thereof.

21. SPECIAL NOTICE

The specifications are complete as written. No oral representations made by any agent or employee of the City / Authority or its affiliate agencies shall be of any force or effect unless reduced to writing and submitted to all prospective bidders at least 24 hours in advance of the Bid Opening.

Any protest of the award of this proposed contract to the lowest and best bidder by any bidder on the contract shall be in writing, shall specify the grounds for the protest in specific terms and shall be received by the City Clerk / Secretary within three (3) business days after the award of the contract by the governing body. The governing body reserves the right to review all bids and make the award to the lowest and best bidder. All other provisions of these specifications shall also apply.

22. APPLICABLE LAWS

Contractor and its subcontractors shall at all times comply with all applicable laws (including, but not limited to, the Federal Mine Safety and Health Act of 1977 or the Occupational Safety and Health Act of 1970, whichever is applicable), ordinances, rules, regulations, codes and orders of the United States, any state, county or any executive or administrative agency thereof and any other governmental body having any jurisdiction over the work and with the safety rules and regulations of the City / Authority in force at the facility, and all materials, equipment, and work shall comply therewith. All required personal safety items, including gloves, protective headgear, steel-toed footwear, and safety glasses shall be provided by the Contractor at no expense to the City / Authority.

23. CONTRACT TIME AND CITY / AUTHORITY HOURS OF OPERATION

The contract time allowed for completion of the project, as specified in the bid, expressed in consecutive calendar days, is that time estimated for completion and related testing of all items of work based on a five (5) day work week, eight (8) hours worked per day. Normal inclement weather days have been included in the contract time estimate.

The City / Authority engineering division observes working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding designated holidays. Work requiring inspection by the City / Authority must be performed during these observed times and days of operation. Inspection services can be provided outside the observed times and days of operation at the Contractor's request and with approval of the City / Authority. Requests must be submitted in writing to the City / Authority at least twenty-four (24) hours prior to the time requested, excluding weekends and holidays. The request must state day(s), time(s), and reason(s) in order for the City / Authority to evaluate the request and to schedule staff accordingly. Requests received less than 24 hours prior to the day(s) and time(s) of the requested inspections will not be honored.

24. BASIS OF PAYMENT

The prices bid shall be full compensation for all labor, materials, tools, equipment, and incidentals necessary to complete the work in accordance with the plans, these specifications, and the referenced City of Midwest City and Oklahoma Department of Transportation specifications.

SECTION B
GENERAL CONDITIONS

1 DEFINITIONS

Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

- a ADDENDA - Written or graphic instruments issued prior to the execution of the Contract which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS by additions, deletions, clarifications or corrections.
- b BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.
- c BIDDER - Any person, firm or corporation submitting a BID for the work.
- d BONDS - Bid, Performance, Statutory and Maintenance Bonds and other instruments of security furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.
- e CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.
- f CONTRACT DOCUMENTS - The CONTRACT, BONDS, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS and ADDENDA.
- g CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.
- h CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.
- i CONTRACTOR - The person, firm or corporation with whom the OWNER has executed the contract.
- j DRAWINGS - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.
- k ENGINEER - The City Engineer for the City / Authority.
- l FIELD ORDER - A written order effecting a change in the WORK, not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.
- m NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.
- n NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.
- o OWNER - City of Midwest City / Midwest City Municipal Authority, a municipal corporation for whom the WORK is to be performed.

- p PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.
- q RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.
- r SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, supplier or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.
- s SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment construction systems, standards and workmanship.
- t SUBCONTRACTOR - An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.
- u SUBSTANTIAL COMPLETION - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it was intended.
- v SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS.
- w WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.
- x WRITTEN NOTICE - Any notice to any party of the contract relative to any part of the contract in writing and considered delivered and the service thereof completed when posted by certified or registered mail to the party at his last given address or delivered in person to said party or his authorized representative on the PROJECT.

2 ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

- a The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.
- b The additional drawings and instructions thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

3 SCHEDULES, REPORTS AND RECORDS

- a The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the OWNER may request concerning WORK performed or to be performed.
- b Prior to the first partial payment estimate the CONTRACTOR shall submit schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:
 - (1) The dates at which special detail drawings will be required; and

- (2) Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.
- c The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

4 DRAWINGS AND SPECIFICATIONS

- a The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.
- b In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scale dimensions and detailed DRAWINGS shall govern over general DRAWINGS.
- c Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR's risk.

5 SHOP DRAWINGS

- a The CONTRACTOR shall provide SHOP DRAWINGS, in triplicate, as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER's approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.
- b When submitted for the ENGINEER's review, SHOP DRAWINGS shall bear the CONTRACTOR's certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.
- c Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING, or submission, has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6 MATERIALS, SERVICES AND FACILITIES

- a It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature and all other services and facilities of any nature whatsoever necessary to execute, complete and deliver the WORK within the specified time.

- b Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located as to facilitate prompt inspection.
- c Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.
- d Materials, supplies and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.
- e Materials, supplies or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7 INSPECTION AND TESTING

- a All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards.
- b The CONTRACTOR shall provide at his expense the necessary testing and inspection services required by the CONTRACT DOCUMENTS, unless otherwise provided.
- c The OWNER shall provide all other inspection and testing services not required by the CONTRACT DOCUMENTS.
- d If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.
- e Neither observations by the ENGINEER nor inspections, tests or approvals by persons other than the CONTRACTOR shall relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.
- f The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating federal or state agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection or testing thereof.
- g If any WORK is covered contrary to the written request of the ENGINEER, it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR's expense.
- h If any WORK has been covered that the ENGINEER has not specifically requested to observe prior to its being covered, or if the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR at the ENGINEER's request will uncover, expose or otherwise make available for observation, inspection or testing, as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expense of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation,

inspection, testing and reconstruction, and an appropriate CHANGE ORDER shall be issued as the term CHANGE ORDER is defined in Section B, General Conditions, (1)(e).

8 SUBSTITUTIONS

- a When a material, article or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalogue number and if, in the opinion of the ENGINEER, such material, article or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that, if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

9 PATENTS

- a The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design or the product of a particular manufacturer or manufacturers is specified but, if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

10 SURVEYS, PERMITS, REGULATIONS

- a The OWNER shall furnish and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as cut stakes, offset stakes and other working points, lines, elevations and cut sheets.
- b The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.
- c Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR. Permits, licenses, and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing and any necessary changes shall be adjusted as provided in Section 12, CHANGES IN THE WORK.

11 PROTECTION OF WORK, PROPERTY AND PERSONS

- a The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR's representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all time as required to perform adequate supervision and coordination of the WORK.
- b The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, declared or not, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them be liable, except damages or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.
- c In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or the OWNER, shall act to prevent threatened damage, injury or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

12 CHANGES IN THE WORK

- a The OWNER may at any time, as the need arises, order change within the scope of the WORK without invalidating the contract. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.
- b The ENGINEER also may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within fifteen (15) days after the receipt of the ordered change and the CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

13 CHANGES IN CONTRACT PRICE

- a The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

- (1) Unit prices previously approved.
- (2) An agreed lump sum.
- (3) The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the WORK. In addition there shall be added an amount to be agreed upon but not to exceed fifteen percent (15%) of the actual cost of the WORK to cover the cost of general overhead and profit.

14 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

- a The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.
- b All CONTRACTS are calendar day length contracts. There are no provisions for weather days. Weather days have been factored into the total days provided in the CONTRACT.
- c Arbitration for the extension of TIME FOR COMPLETION is prohibited.
- d The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.
- e If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.
- f The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER:
 - (1) To any preference, priority or allocation order duly issued by the OWNER.
 - (2) To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR including, but not restricted to, acts of God or of the public enemy, acts of the OWNER, acts of another contractor in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes; and
 - (3) To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 14.f.(1) and 14.f.(2) of this article.

15 CORRECTION OF WORK

- a The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other contractors destroyed or damaged by such removal or replacement.
- b All removal and replacement WORK shall be done at the CONTRACTOR's expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

16 SUBSURFACE CONDITIONS

- a The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:
 - (1) Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or
 - (2) Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in WORK of the character provided for in the CONTRACT DOCUMENTS.
- b The OWNER shall promptly investigate the conditions and, if it finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if it determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

17 SUSPENSION OF WORK, TERMINATION AND DELAY

- a The OWNER may, at any time and without cause, suspend the WORK or any portion thereof for a period of not more than ninety days, or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume the WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.
- b If the CONTRACTOR is adjudged bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method it may deem expedient. In such case, the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess shall be paid to the CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.
- c Where the CONTRACTOR's services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the

CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

- d After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the contract. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense plus reasonable profit.
- e If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by court order or legal proceeding within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days' notice to the OWNER and the ENGINEER stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME, or both, to compensate for the costs and delays attributable to the stoppage of the WORK.
- f If the performance of all or any portion of the WORK is suspended, delayed or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS or, if no time is specified, within a reasonable time, adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

18 PAYMENTS TO CONTRACTOR

- a At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER's title to the material and equipment and protect its interest therein, including applicable insurance. The ENGINEER will, within ten days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain five percent (5%) of the amount of each payment until fifty percent (50%) project completion and retain two and a half (2.5%) after to final completion and acceptance of all WORK covered by the CONTRACT DOCUMENTS. On completion and acceptance of a part of the WORK on which the price is

stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

- b The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.
- c All WORK covered by partial payment made shall thereupon become the sole property of the OWNER, but this provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK upon which payments have been made or the restoration of any damaged WORK, or as a waiver of the right of the OWNER to require the fulfillment of all terms of the CONTRACT DOCUMENTS.
- d Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance by the OWNER of the WORK.
- e The CONTRACTOR will indemnify and save the OWNER and the OWNER's agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, tools and all supplies incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER. Such payment(s) shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.
- f If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

19 ACCEPTANCE OF FINAL PAYMENT AS RELEASE

- a The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically expected by the CONTRACTOR for all things done or furnished in connection with the WORK and for every act and neglect of the OWNER and others relating to or arising out of the WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Bonds.

20 INSURANCE

- a The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR's execution of the WORK, whether such execution be by him or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
 - (1) Claims under worker's compensation, disability benefit and other similar employee benefit acts;
 - (2) Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;
 - (3) Claims for damages because of bodily injury, sickness or disease or death of any person other than his employees;
 - (4) Claims for damages insured by usual personal injury liability coverage which are sustained (a) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR or (b) by any other person;
 - (5) Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.
- b Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.
- c The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, liability insurance as hereinafter specified:
 - (1) CONTRACTOR's General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by him or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Insurance shall be written with a limit of liability of not less than \$200,000.00 for all damages arising out of bodily injury, including death, at any time resulting therefor, sustained by any one person in any one accident; a limit of liability of not less than \$1,000,000.00 for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$100,000.00 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$500,000.00 for any such damage sustained by two or more persons in any one accident.
 - (2) The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR and SUBCONTRACTORS as their interests may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR's surety from obligation under the CONTRACT DOCUMENTS to fully complete the PROJECT.
- d The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provision of the laws of Oklahoma, Worker's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the

PROJECT and, in case any work is sublet, the CONTRACTOR shall require all SUBCONTRACTORS similarly to provide Worker's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Worker's Compensation statute, the CONTRACTOR shall provide and shall cause each SUBCONTRACTOR to provide adequate and suitable insurance for the protection of his employees not otherwise protected.

- e The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for the WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as insured the CONTRACTOR, the ENGINEER and the OWNER.

21 CONTRACT SECURITY

- a The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance Bond and a Statutory Bond in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared a bankrupt or loses its right to do business in the state in which the WORK is to be performed, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

22 ASSIGNMENTS

- a Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the contract or any portion thereof, or of his right, title or interest therein, or his obligations thereunder, without written consent of the other party.

23 INDEMNIFICATION

- a The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorneys' fees arising out of or resulting from the performance of the WORK provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful

act or omission of the CONTRACTOR, and/or SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

- b In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by and for the CONTRACTOR or any SUBCONTRACTOR under worker's compensation acts, disability benefit acts or other employee benefit acts.
- c The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.
- d The OWNER is covered by the Oklahoma Tort Claims Act at 51 O.S. Sec. 151 *et seq.* Any claims for damages against the OWNER must be filed and comply with the requirement of the Oklahoma Tort Claims Act.

24 SEPARATE CONTRACTS

- a The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR's WORK depends upon the work of any other contractor, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such work that render it unsuitable for such proper execution and results.
- b The OWNER may perform additional work related to the PROJECT, or it may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other contractors who are parties to such contracts (or the OWNER, if it is performing the additional work itself) reasonable opportunity for the introduction and storage of materials and equipment and the execution of work, and shall properly connect and coordinate its WORK with theirs.
- c If the performance of additional work by other contractors or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the contract, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional work. If the CONTRACTOR believes that the performance of such additional work by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefor as provided in Sections 13 and 14.

25 SUBCONTRACTING

- a The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK that, under normal contracting practices, are performed by specialty SUBCONTRACTORS.
- b The CONTRACTOR shall not award WORK to SUBCONTRACTOR(S) in excess of fifty percent (50%) of the CONTRACT PRICE, without prior written approval of the OWNER.

- c The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- d The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.
- e Nothing contained in this contract shall create any contractual relation between any SUBCONTRACTOR and the OWNER.
- f The OWNER will not recognize any SUBCONTRACTOR on the WORK. The CONTRACTOR shall at all times when work is in progress be represented at the site either in person or by a qualified and approved superintendent who shall be in direct charge of all operations on the contract whether performed directly by the CONTRACTOR or the SUBCONTRACTOR.

26 ENGINEER'S AUTHORITY

- a The ENGINEER shall act as the OWNER's representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.
- b The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.
- c The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures or construction safety.
- d The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

27 LAND AND RIGHTS-OF-WAY

- a Prior to issuance of the NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.
- b The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.
- c The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities or for storage of materials.

28 GUARANTY

- a The CONTRACTOR shall guarantee all materials and equipment (including settlement or washing out of any backfill, leaks, etc.) furnished and WORK performed for a period of

two (2) years from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of two (2) years from the date of SUBSTANTIAL COMPLETION of the WORK that the completed WORK is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the WORK resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

29 GRADING AND CLEANING OF WORK SITE

- a Before final acceptance of the WORK by the OWNER, the work site shall be graded in an approved manner. All rubbish, materials of construction, CONTRACTOR's equipment, etc. shall be removed from the work site.
- b Any privately owned facility (sprinkler lines, etc.) damaged by the CONTRACTOR, even located in the right of way, shall be replaced or repaired at the CONTRACTOR'S expense.

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SECTION C - CONSTRUCTION SPECIFICATIONS

GENERAL DESCRIPTION OF WORK

The work to be performed under the provisions of these contract documents consists of furnishing all materials, equipment, tools and plant; and the performance of all necessary labor and services to construct as shown in the Plans.

LIQUIDATED DAMAGES

Liquidated damages shall be assessed at the rate of one hundred dollars (\$100.00) per consecutive calendar day effective midnight on the last day of the contract as stated on the Notice to Proceed. No maximum limit.

JOB SITE MAINTENANCE, SEDIMENT CONTROL, EROSION PREVENTION, AND OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY REQUIREMENTS

The Contractor shall provide and maintain sediment controls in accordance with state requirements as directed by the engineer and as indicated on the plans to prevent sediment from leaving the work area. Sediment controls shall be maintained at all times to the satisfaction of the engineer for the duration of the project. The costs for sediment controls shall not be paid separately but shall be included in the price bid for other items of work and shall include labor and materials necessary to accomplish installation and maintenance of the devices for the duration of the project.

For all projects that disturb 1 or more acres, either directly through actual construction and/or indirectly through construction related activities, such as construction of material storage areas and/or other temporary facilities incidental to construction, the Contractor shall file the required Oklahoma Department of Environmental Quality (ODEQ) notice of intent (NOI) prior to construction and the notice of termination (NOT) upon completion of restoration of the areas disturbed. Areas disturbed for right-of-way or easement clearing; excavations; material deliveries, stockpiling or storage; construction trailers with appurtenant parking areas and driveways; and other construction related activities shall be included in the estimate of disturbed area for the project. **Issuance of the notice to proceed for this project is contingent upon receipt of a copy of the N.O.I. filed with the state.**

ODEQ acceptance of the N.O.T. must be on file with the owner before the retainage is paid out.

The direct and indirect costs associated with the necessary permitting shall not be paid for as such, but shall be included in the price bid for other items of work. Any and all corrective orders issued and/or fines assessed by the ODEQ and/or United States Environmental Protection Agency (EPA) in response to violation of the NOI shall be solely at the Contractor's expense and at no expense to the owner.

BASIS OF PAYMENT

The "Unit Prices" described herein shall be full compensation for all labor, materials, tools, equipment and incidentals necessary to complete the work in accordance with the plans, these specifications and the referenced Oklahoma Department of Environmental Quality (ODEQ) OAC Title 252 Chapter 656 "Water Pollution Control Facility Construction Standards" and Chapter 626 "Public Water Supply Construction Standards", City / Authority's Sewer Main Installation Specifications and Water Main Installation Specifications, and 2019 Oklahoma Department of Transportation (ODOT) Standard Specifications For Highway Construction. This specification book and the referenced City / Authority specifications govern over the minimum ODEQ and ODOT specifications. The ODOT standard specifications apply only with respect to materials, construction methods and testing. All work not classified as a contract pay item shall be considered incidental construction and the cost for such shall be included in the price bid for other items of work.

MEASUREMENT AND PAYMENT

The method of measurement and basis of payment for each item listed in the bid shall be as stipulated Specification Section 01 29 00 Measurement and Payment.

Under each item, the Contractor shall furnish, construct, and install in place all items as shown on the plans or as directed by the Engineer or City / Authority Inspector.

End of Section

Advertisement for Bids

Notice is hereby given that The City of Midwest City and Midwest City Municipal Authority (hereinafter called the "Owner") will receive sealed bids in the Office of the City Clerk, Midwest City Municipal Complex, 100 N. Midwest Blvd., Midwest City, Oklahoma County, Oklahoma, until 2:00 p.m. on the 16th day of July, 2024 for the North Side Utilities Water Project.

Funding for this project is provided through American Rescue Plan Act (ARPA) grant program. As such, compliance with Labor Standards Contract Provisions is mandatory. Compliance with the Davis Bacon Act is mandatory **if the total project cost exceeds \$10,000,000 (ten million dollars)**.

All bids received at said time will be opened and evaluated for completeness and correctness. All work shall be performed, and all construction and materials used and furnished shall be in accordance with the Plans and Specifications prepared by Plummer Associates, Inc. and on file at the office of Plummer Associates, Inc.

The Bid Packet and Contract Documents for this project may be examined at the following locations:

1. Plummer Associates, Inc. 531 Couch Drive, Suite #200, Oklahoma City, OK 73102
2. City of Midwest City, 100 N. Midwest Boulevard, Midwest City, OK 73110
3. _____

Plummer Associates, Inc. is utilizing CivCast (www.civcastusa.com) for distribution of all Contract Documents on this project. Contract Documents, including addenda and plan holder's list, can be viewed and downloaded free of charge to all interested parties. Additionally, the documents for this project may be viewed on the City of Midwest City's website at www.midwestcityok.org/rfps Hardcopies are available at the offices of the City of Midwest City for a fee.

Each bidder shall accompany his original bid, filed with the Owner, with a certified or Cashier's Check on a solvent bank located in Oklahoma, or a Bidder's Bond, in the amount of five (5) percent of the amount bid, as a guarantee of his ability to perform the contract bid upon, and that he will enter into a written contract with the Owner to perform said work and/or furnish said materials in accordance with said Plans and Specifications, and furnish the required bonds according to the Public Competitive Bidding Act of 1974.

The Owner will retain the deposit for liquidated damages in case the successful bidder fails to enter in said contract and furnish the required bonds provided for in the specifications within the time required. Deposit of the unsuccessful bidders will be returned upon the execution of the Contract and required bonds.

Each bidder shall accompany his bid with a sworn statement in writing that the bidder has not directly or indirectly entered into an agreement, expressed or implied, with any other bidder concerning the price or amount of such bid or any bids, the limiting of the bids or bidders, the paying to anyone any money for promotion expenses, the parceling or farming out to any bidder or bidders or other persons of any part of the contract or any part of the subject matter of the bid or of the profits thereof.

Construction, Maintenance and Statutory Payment Bonds in the amount of 100% of the contract price are required for this project. These bonds must be obtained from a Corporate Surety licensed in Oklahoma and approved by the Owner and Consulting Engineer. The bidder shall state in the proposal the name and address of the Surety or Sureties who will sign this bond in case the contract is awarded. The Maintenance Bond required will guarantee the repair of all damage due to improper materials or workmanship for a period of one (1) year after the acceptance of the work by the Owner.

This project is to be financed by the ARPA grant program managed by the Oklahoma Water Resources Board (OWRB) and shall be referred to as Project No. ARP – 23 – 0258 – G. The following requirements and regulations must be complied with:

- A. "Equal Opportunity in Employment: All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, age or physical handicap. Bidders on this work will be required to comply with the President's Executive Order No. 11246, as amended."
- B. "Each bidder must fully comply with the requirements, terms and conditions of the Environmental Protection Agency's Disadvantaged Business Enterprise Requirements, which have been adopted for the OWRB ARPA program, and include employing the six (6) good faith efforts and soliciting disadvantaged business enterprises during the performance of this contract. Requirements are contained in OWRB's Guidance and Procedures, ARP-267. The bidder commits itself to following the good faith efforts to solicit disadvantaged business enterprises contained herein and all other requirements, terms, and conditions of these bid conditions by submitting a properly signed bid."
- C. **If the total project cost exceeds \$10,000,000 (ten million dollars)** "Davis Bacon Act wage rules shall apply. All laborers and mechanics employed by contractors and sub-contractors on projects funded directly by or assisted in whole or in part by and through the Federal Government shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of Chapter 31 of Title 40, United States Code and 29 CFR

parts 1,3, and 5. The Department of Labor provides all pertinent information related to compliance with labor standards, including prevailing wage rates and instructions for reporting. More information is available at <http://www.sam.gov/> and <https://www.dol.gov/agencies/whd/government-contracts/construction>

- D. System for Award Management (SAM) registration is required for all Applicants and Awardees (Entities, Prime Contractors, Subcontractors, Vendors) in order to receive funds from the ARPA program. SAM replaced the Central Contractor Registration/Federal Agency Registration, Online Representations and Certifications Application, and Excluded Parties List System. Applicants and awardees are required to complete a one-time free registration to provide basic information relevant to procurement and financial transactions. On April 4, 2022, the unique entity identifier used across the federal government changed from the DUNS Number to the Unique Entity ID (generated by SAM.gov). Registrants must retain an active status to be eligible for ARPA funding. Applicants and Awardees can go to SAM.gov to complete the registration process.

The bids filed with the Owner will be opened and considered by the Owner, at a meeting to be held in the City of Midwest City Council Chambers, at 2:00 p.m. on the 16th day of July, 2024. Bids received more than ninety-six (96) hours, excluding Saturdays, Sundays and holidays, before the time set for opening of bids, as well as bids received after the time set for opening of bids, shall not be considered and shall be returned unopened.

The contract is to be awarded to the lowest, responsive, responsible bidder. The Owner reserves the right to correct any non-material clerical errors in the bidding as allowed under Oklahoma Law. The Owner reserves the right to reject any and all bids in accordance with the Oklahoma Public Competitive Bidding Act of 1974. Conditional bids shall not be accepted.

A pre-bid conference will not be held for this project. Questions may be posted on CivCast and will be responded to by Addendum. Questions may also be emailed to Chris Ferguson, PE (cferguson@plummer.com) and they will be responded to by Addendum. **Questions submitted after July 10th may not be answered.**

Approved on this 19 day of June, 2024.

Sara Hancock

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Information for Bidders

Notice is hereby given that the City of Midwest City and the Midwest City Municipal Authority (hereinafter called the "Owner") will receive sealed bids in the office of the City Clerk, Midwest City Municipal Complex, 100 N. Midwest City Blvd., Midwest City, Oklahoma until the 16th day of July, 2024, for the North Side Utilities Water Project.

This project is to be financed by the ARPA grant program managed by the Oklahoma Water Resources Board (OWRB) and shall be referred to as Project No. ARP – 23 – 0258 – G. The following requirements and regulations must be complied with:

- A. "Equal Opportunity in Employment: All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, age or physical handicap Bidders on this work will be required to comply with the President's Executive Order No. 11246, as amended."
- B. " Each bidder must fully comply with the requirements, terms, and conditions of the Environmental Protection Agency's Disadvantaged Business Enterprise Requirements, which have been adopted for the OWRB ARPA program, and include employing the six (6) good faith efforts and soliciting disadvantaged business enterprises during the performance of this contract. Requirements are contained in OWRB's Guidance and Procedures, ARP-267. The bidder commits itself to following the good faith efforts to solicit disadvantaged business enterprises contained herein and all other requirements, terms, and conditions of these bid conditions by submitting a properly signed bid."
- C. **If the total project cost exceeds \$10,000,000 (ten million dollars)** "Davis Bacon Act wage rules shall apply. All laborers and mechanics employed by contractors and sub-contractors on projects funded directly by or assisted in whole or in part by and through the Federal Government shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of Chapter 31 of Title 40, United States Code and 29 CFR parts 1,3, and 5. The Department of Labor provides all pertinent information related to compliance with labor standards, including prevailing wage rates and instructions for reporting. More information is available at <https://www.dol.gov/agencies/whd/government-contracts/construction> and <http://www.sam.gov/>"

D. System for Award Management (SAM) registration is required for all Applicants and Awardees (Entities, Prime Contractors, Subcontractors, Vendors) in order to receive funds from the ARPA program. SAM replaced the Central Contractor Registration/Federal Agency Registration, Online Representations and Certifications Application, and Excluded Parties List System. Applicants and awardees are required to complete a one-time free registration to provide basic information relevant to procurement and financial transactions. On April 4, 2022, the unique entity identifier used across the federal government changed from the DUNS Number to the Unique Entity ID (generated by SAM.gov). Registrants must retain an active status to be eligible for ARPA funding. Applicants and Awardees can go to SAM.gov to complete the registration process.

Each sealed envelope containing a bid must be plainly marked on the outside as “Bid for the North Side Utilities Water Project.”, and the envelope should bear on the outside the bidder’s name, address, and license number (if applicable). If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to the Owner at the City of Midwest City, Attn.: City Clerk, North Side Utilities Water Project, 100 North Midwest Blvd., Midwest City, OK 73110.

All bids must be made on the required bid form, where all blank spaces for bid prices must be filled in, in ink or typewritten. The bid form must be fully completed and executed when submitted. Only one copy of the bid form is required. The Owner may waive any informalities or minor defects or reject any and all bids as allowed under Oklahoma Law. Any bid may be withdrawn prior to the above scheduled time for bid opening, or authorized postponement thereof. Bids received more than ninety-six (96) hours before the time specified, or those received after the time set for bid opening will not be considered and will be returned unopened. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the bidders.

Bidders must satisfy themselves of the accuracy of estimated quantities in the bid proposal by review of the Plans and Specifications, including any existing addenda, and by examination of the project site. Once a bid is submitted, the bidder shall not assert that there was a misunderstanding concerning the quantities or the nature of work to be performed. The failure or omission of any bidder to do any of the foregoing shall in no way relieve any bidder from any obligation in respect to its bid.

Prior to bidding, the Owner shall provide to the bidders all pertinent information that delineates and describes the land owned and rights-of-way acquired or to be acquired.

The Contract Documents contain the provisions required for the construction of the product. Information obtained from an officer, agent, or employee of the Owner or any other person shall not affect the risks or obligations assumed by the contractor or relieve the contractor from fulfilling any of the conditions of the contract.

Each bid exceeding \$100,000 must be accompanied by a Bid Bond for five percent of the total amount of the bid and payable to the Owner. A certified check may be used in lieu of the Bid Bond. As soon as the bid prices have been compared, the Owner will return the bonds of all except the three lowest responsive, responsible bidders. The bid securities of the successful bidder and the two remaining unsuccessful bidders will be returned upon Owner's approval of the successful bidder's executed certificate of insurance and construction bonds.

Construction bonds (Performance, Statutory, and Maintenance) in the amount of 100 percent with a corporate surety approved by the Owner will be required for the faithful performance of the contract. Attorneys-in-fact who sign bid and construction bonds must file with each bond a certified and effective dated copy of their Power-of-Attorney.

The Owner shall award a contract to the lowest, responsive, responsible bidder or bidders within thirty (30) calendar days after bid opening. The Owner may extend the award period not to exceed fifteen (15) calendar days by formal recorded action and for good cause. The time may be extended further by mutual agreement between the Owner and the bidder per O.S. Title 61 Section 111, Public Competitive Bidding Act of 1974 (PCBA).

The Notice of Award shall be accompanied by the necessary contract, bonds, and insurance. In the event of failure of the bidder to execute the contract, the Owner may consider the bidder in default, in which case the Bid Bond accompanying the proposal shall become the property of the Owner.

The party to whom the contract is awarded will be required to execute the contract and obtain the construction bonds (Performance, Statutory and Maintenance) and certificate of insurance within 30 calendar days (not to exceed 60 days) from the date when the Notice of Award is delivered to the bidder. The time may be extended further by mutual agreement between the Owner and the bidder per O.S. Title 61 Section 113 (PCBA).

With an acceptable contract, bonds and certificate of insurance signed by the party to whom the Contract was awarded, the Owner shall sign the contract and return to such party an executed duplicate. Should the Owner not execute the contract within the agreed upon period, the bidder may by written notice withdraw the signed contract. Such notice of withdrawal shall be effective upon its receipt by the Owner.

The Owner shall issue the Notice to Proceed after the execution of the contract, approval of bonds and certificate of insurance. If the Notice to Proceed has not been issued within the agreed upon period, the contractor may terminate the contract without further liability on the part of either party.

The Owner may make such investigations as deemed necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of such bidders fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.

A conditional or qualified bid will not be accepted. Tied bids are non-restrictive, and in order for a tied bid to be accepted it must be lower than the sum of low separate bids.

All applicable laws, ordinances, rules, and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout. The successful bidder will be required to meet all requirements of the Underground Facilities Damage Prevention Act when engaged in work within public rights-of-way.

When using alternate bids, they will be listed in numerical order, with the highest priority being number one, the second highest priority being number two, etc. The lowest bidder will be determined by comparing all bids that contain the selected alternates and computing the total value of the base bid plus the alternates.

All bidders and owners shall comply with the Oklahoma PCBA of 1974.

The awarded bidder shall supply the names and addresses of all subcontractors and material suppliers when required to do so by the Owner.

The Contractor will be required to begin work within 30 calendar days of the date shown on the Notice to Proceed. The time for completion is 270 calendar days. Liquidated damages will be \$100 per calendar day.

In the event of a conflict between the Plans and the Specifications, the Specifications will govern.

The following items, included in this Bid Packet, shall be submitted along with the bid: Bid Proposal, Bid Bond, Non-Collusion Affidavit, Business Relationship Affidavit, Contractor's

Statement about Equal Opportunity (ARP-211), Contractor's Certificate of Non-Segregated Facilities (ARP-212), Sub-Contractor's Certificate of Non-Segregated Facilities (ARP-212a) Bidder's/Supplier's List (ARP-249), Subcontractor Performance form (ARP-6100-3), Subcontractor Utilization form (ARP-6100-4) and DBE documentation (if applicable).

The consulting engineer is Plummer Associates, Inc. The consulting engineer's contact person for this project is Chris Ferguson, PE with phone number 405-652-1274.

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Bidder's Statement about: **sam.gov registration**

Mark **one**:

- I have registered in SAM.gov and my status is "active".
- I am not currently registered in SAM.gov, but I will be registered and holding an "active" status prior to the beginning of any construction.

- I certify that I will actively review the SAM.gov status of all of the subcontractors in this work to verify they are registered and their status is "active".

Bidder's Statement about: **Davis Bacon Act**

If the total project cost exceeds \$10,000,000 (ten million dollars):

- I hereby certify that all of my employees will be paid according to the Davis Bacon Act.

Name and Title of Prospective Prime Contractor's Representative

Signature of Prospective Prime Contractor's Representative

Name and address of Prospective Prime Contractor

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Disadvantaged Business Enterprise Program (DBE) Guidance (ARP-267)

Important note: All OWRB ARPA information can be found at: <https://www.owrb.ok.gov/financing/grant/arpa.php>

The OWRB is administering the State of Oklahoma's ARPA funding for various wastewater and water quality projects. The ARPA program is federally funded, and one of the conditions of federal grant awards is for recipients and sub-recipients (i.e., prime contractors and subcontractors) make a good-faith effort to award a fair share of work to DBEs who are small business enterprises (SBEs), minority business enterprises (MBEs) and women's business enterprises (WBEs).

To ensure compliance with federal DBE requirements, both **Grant Recipients (Project Owners)** and **Prime Contractors** **must** undertake the good faith efforts to provide opportunities for DBE firms to participate in contracts. Federal regulations require evidence of the demonstration of the six good faith efforts in trying to achieve the DBE participation goals. The Oklahoma Department of Transportation has a Directory of Certified DBE Firms. This directory can be accessed at <https://okdot.gob2g.com/Default.asp>

Good Faith Efforts: EPA's Good Faith Efforts for the Clean Water State Revolving Fund (CWSRF) will be used for the OWRB ARPA grant program. The following good faith efforts will apply to all procurement categories involving ARPA funds (See Appendices A& B).

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For state and local government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For state and local government recipients, this will include dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Use the services and assistance of the Small Business Administration (SBE) and the Minority Business Development Agency of the Department of Commerce.
6. If the prime contractor awards subcontracts, require the prime contractor to take the above steps.

Please submit all information to:
Financial Assistance Division, OWRB
3800 North Classen Blvd, Oklahoma City, OK 73118
Phone: 405.530.8800, FAX: 405.530.8900
<http://www.owrb.ok.gov>

Disadvantaged Business Enterprise Program (DBE) Guidance

Demonstration of the Six Good Faith Efforts. See Appendices A & B for **additional bidding instructions and contract administrative provisions**.

A: Project Owners are required to create and maintain a bidders list in accordance with Subpart E of Part 33 of EPA's Disadvantaged Business Enterprise Program rule, (§ 33.501(b)). This requirement will be adopted for projects funded through the OWRB ARPA program. The list must include all firms that bid or quote on prime contracts, or bid or quote subcontracts, on competitively bid ARPA funded projects. The bidders list must only be kept until the project period for the identified grant has ended. The following information must be obtained from all prime and subcontractors and can be provided on Bidders List (ARP-249):

1. Entity's name with point of contact
2. Entity's mailing address, telephone number, and e-mail address
3. The procurement on which the entity bid or quoted, and when; and
4. Entity's status as an MBE/WBE or non-MBE/WBE

B: Project Owners are required to undertake good faith efforts. Steps 1 through 5 can be utilized during the project planning, design and/or pre-bidding phase, to assure that qualified DBE firms have procurement opportunities in construction, equipment, services, and supplies.

To provide procurement opportunities to DBE Firms, the Project Owner should undertake the following:

- Conduct pre-bid meetings to inform potential bidders/contractors about DBE requirements and provide guidance in undertaking the required good faith efforts.
- Use listings of certified DBEs from the U.S. Small Business Administration (SBA), Oklahoma Department of Transportation (ODOT), etc., to solicit DBE firms as prime contractors whenever they are potential candidates. Project Owners should advertise in minority, local and regional newspapers.
- Invite DBE firms, where appropriate, to meetings, conferences etc., to inform them of procurement opportunities and develop, where possible, reasonable contract and delivery schedules that encourage and facilitate participation by DBE's. This includes, whenever possible, a minimum of 30 calendar days for bids or request for proposals.
- Determine if a project can be broken down into smaller components/contracts to allow opportunity for DBE firms to bid both as prime-contractors and as sub-contractors.
- For projects broken down into smaller components (e.g., painting, roofing, excavation, pipe laying, etc.) ensure that the delivery schedules are reasonable.
- Encourage DBE firms, where appropriate, to apply as a consortium of DBEs, when a contract is too large for one of these firms to handle individually.
- **Require prime contractor to complete ARP Form 6100-3 & ARP Form 6100-4** and submit with bid proposal to Project Owner.

C: Project Owners must require the prime contractor to undertake steps 1 through 5 of the Good Faith Efforts in providing DBE firms opportunity for sub-contracts.

Project Owner must provide the **DBE Guidance (ARP-267)** and associated forms to Prime Contractors for utilization of DBEs in the bidding documents.

APPENDIX A: Project Owner, Prime Contractor and Sub-Contractor Responsibilities

EPA's Disadvantaged Business Enterprise Program rule applies to contract procurement actions funded in part by EPA assistance agreements awarded after May 27, 2008. The rule is found at Federal regulation Title 40, Part 33. Specific responsibilities are highlighted below.

Project Owner Responsibilities:

- Include OWRB's DBE guidance (ARP-267) in each contract with a primary contractor.
- Employ the six Good Faith Efforts during prime contractor procurement (§33.301).
- Require prime contractor to comply with the following prime contractor requirements of Title 40 Part 33:
 - a) To employ the six Good Faith Efforts steps in paragraphs (a) through (e) of § 33.301 if the prime contractor awards subcontracts (§ 33.301(f)).
 - b) To provide **ARP form 6100-2 – DBE Subcontractor Participation Form to all DBE subcontractors** (Optional submittal by subcontractors) (§ 33.302(e)).
 - c) To submit **ARP form 6100-3 – DBE Program Subcontractor Performance Form and ARP form 6100-4 – DBE Program Subcontractor Utilization Form with bid package or proposal.** (§ 33.302 (f) and (g)).
 - d) To pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient (§ 33.302(a)).
 - e) To notify recipient in writing by its prime contractor prior to any termination of a DBE subcontractor for convenience by the prime contractor (§ 33.302(b)).
 - f) To employ the six good faith efforts described in § 33.301 if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason. (§ 33.302(c)).
 - g) To employ the six good faith efforts described in § 33.301 even if the prime contractor has achieved its fair share objectives under subpart D of Part 33. (§33.302(d)).
 - h) Provide Project Owner DBE participation achievements with bid proposal – this includes all information necessary for the Owner to complete the **Bidders List (ARP-249)**. The Owner may allow the prime contractor to complete the **Bidders List (ARP-249)**; however, the Owner is responsible for review and submittal.
- Maintain records documenting compliance with the requirements of Title 40 Part 33, including **Bidders List (ARP-249)** and documentation of the good faith efforts (§ 33.301(a)) by the project owner and prime contractor.

Prime Contractor Responsibilities:

- Employ the six Good Faith Efforts steps in paragraphs (a) through (e) of § 33.301 if the prime contractor awards subcontracts (§ 33.301(f)).

- Provide **ARP form 6100-2 – DBE Program Subcontractor Participation Form** and **ARP form 6100-3 – DBE Program Subcontractor Performance Form** to each DBE subcontractor as part of the bid conference and prior to opening of the contractor’s bid or proposal (§ 33.302(e) and (f)). Complete **ARP form 6100-4 – DBE Program Subcontractor Utilization Form** (§ 33.302(g))
- Submit to recipient with bid package or proposal the completed **ARP form 6100-4**, plus an **ARP form 6100-3** for each DBE subcontractor used in the contractor’s bid or proposal (§ 33.302(f) and (g)).
- Pay subcontractors for satisfactory performance no more than 30 days from the prime contractor’s receipt of payment from the Project Owner (§ 33.302(a)).
- Notify the recipient in writing prior to prime contractor termination of a DBE subcontractor for convenience (§ 33.302(b)).
- Employ the six good faith efforts described in (§ 33.301) if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason. (§ 33.302(c)).
- Employ the six good faith efforts described in (§ 33.301) even if the prime contractor has achieved its fair share objectives under subpart D of Part 33. (§33.302(d)).
- Provide Project Owner DBE participation achievements with bid proposal. This includes information necessary for Owner’s completion of the **Bidders List (ARP-249)**.
- Maintain records documenting its compliance with the requirements of Title 40 Part 33, including **Bidders List (ARP-249)** and documentation of the good faith efforts (§ 33.301(a)) by the project owner and prime contractor.

Subcontractor Responsibilities:

- May submit **ARP form 6100-2 – DBE Subcontractor Participation Form** to Debra Bradford, EPA Region 6 DBE Coordinator (§ 33.302(e)). Submitted if concerns with EPA funded project (e.g., termination, late payment, etc.)
- Must complete **ARP form 6100-3 – DBE Program Subcontractor Performance Form** and submit it to the prime contractor soliciting services from the subcontractor prior to the opening of bids for the prime contract.

Summary of ARP Forms

| <i>ARP Form</i> | <i>Requirement</i> | <i>Provided By</i> | <i>Completed By</i> | <i>Submitted To</i> |
|--|--|---|--|---|
| 6100-2: DBE Subcontractor Participation Form | Project Owners required to have prime contractors provide form to Subcontractors | Prime Contractors to DBE Subcontractors | DBE Subcontractors if concerns with EPA funded project (e.g., termination, late payment, etc.) | EPA Region 6 DBE Coordinator, Debora Bradford |
| 6100-3: DBE Subcontractor Performance Form | Project Owners required to have prime contractors provide form to Subcontractors | Prime Contractors to DBE Subcontractors | DBE Subcontractors with Prime Contractor’s Signature. Completed when bidding on a job. | Project Owners as part of a bid or proposal package |
| 6100-4: DBE Subcontractor Utilization Form | Project Owners required to have prime contractors complete the form | Project Owners to Prime Contractors | Prime Contractors to indicate the utilization of a DBE. | Project Owners as part of bid or proposal |

APPENDIX B: TITLE 40 PART 33 SUBPART C—GOOD FAITH EFFORTS

§ 33.102 When do the requirements of this part apply?

The requirements of this part apply to procurement under ARPA Grant program agreements performed entirely within the United States, whether by a Project Owner or its prime contractor, for construction, equipment, services, and supplies.

§ 33.106 What assurances must ARPA Grant program recipients obtain from their contractors?

The recipient must ensure that each procurement contract it awards contains the term and condition specified in Appendix A to this part concerning compliance with the requirements of this part.

§ 33.206 Is there a list of certified MBEs and WBEs?

The Oklahoma Department of Transportation has a Directory of Certified DBE Firms. This database can be found at this website: <https://okdot.gob2g.com/Default.asp>.

§ 33.301 What does this subpart require?

A recipient, including one exempted from applying the fair share objective requirements by § 33.411, is required to make the following good faith efforts whenever procuring construction, equipment, services, and supplies under an ARPA Grant program agreement, even if it has achieved its fair share objectives under subpart D of this part:

- a) Ensure DBEs are made aware of contracting opportunities fully practicable through outreach and recruitment activities. For State and Local and Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
- b) Make information on forthcoming opportunities available to DBE's, arrange periods for contracts, and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- c) Consider in the contracting process whether firms competing for large contracts could subcontract with DBE's. For state and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
- d) Encourage contracting with a consortium of DBE's when a contract is too large for one of these firms to handle individually.
- e) Use the services and assistance of the SBA and the Minority Business Development Agency of the Department of Commerce.
- f) If the prime contractor awards subcontracts, require the prime contractor to take the steps in paragraphs (a) through (e) of this section.

§ 33.302 Are there any additional contract administration requirements?

- a) Project Owners must require its prime contractor to pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient.
- b) Its prime contractor must notify Project Owner in writing prior to any termination of a DBE subcontractor for convenience by the prime contractor.
- c) If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six good faith efforts described in § 33.301 if soliciting a replacement subcontractor.
- d) A project owner must require its prime contractor to employ the six good faith efforts described in §33.301 even if the prime contractor has achieved its fair share objectives under §33.301 subpart D above.

- e) A recipient must require its prime contractor to provide **ARP Form 6100-2**—DBE Program Subcontractor Participation Form to all of its DBE subcontractors. **ARP Form 6100-2** gives a DBE subcontractor the opportunity to describe the work the DBE subcontractor received from the prime contractor, how much the DBE subcontractor was paid and any other concerns the DBE subcontractor might have, for example reasons why the DBE subcontractor believes it was terminated by the prime contractor. DBE subcontractors may send completed copies of **ARP Form 6100-2** directly to the appropriate EPA DBE Coordinator.
- f) A recipient must require its prime contractor to have its DBE subcontractors complete **ARP Form 6100-3**—DBE Program Subcontractor Performance Form. A recipient must then require its prime contractor to include all completed forms as part of the prime contractor’s bid or proposal package.
- g) A recipient must require its prime contractor to complete and submit **ARP Form 6100-4**—DBE Program Subcontractor Utilization Form as part of the prime contractor’s bid or proposal package.
- h) Copies of **ARP Form 6100-2**—DBE Program Subcontractor Participation Form, **ARP Form 6100-3**—DBE Program Subcontractor Performance Form and **ARP Form 6100-4**—DBE Program Subcontractor Utilization Form may be obtained from EPA OSDBU’s Home Page on the Internet or directly from EPA OSDBU.
- i) A recipient must ensure that each procurement contract it awards contains the term and condition specified in the Appendix A concerning compliance with the requirements of this part. A recipient must also ensure that this term and condition is included in each procurement contract awarded by an entity receiving a grant under federal financial assistance agreement.

§ 33.410 Can a recipient be penalized for failing to meet its fair share objectives?

A recipient cannot be penalized or treated by EPA as being in noncompliance with this subpart, solely because its MBE or WBE participation does not meet its applicable fair share objective. However, EPA may take remedial action under § 33.105 for a recipient’s failure to comply with other provisions of this part, including, but not limited to, the good faith efforts requirements described in subpart C of this part.

Source: Federal Requirements and Contract Provisions for Special Appropriation Act Projects, US Environmental Protection Agency, Region III, June 2008

**APPENDIX C: RESOURCE LISTING AND CONTACT INFORMATION
FOR UTILIZATION OF MINORITY AND WOMEN’S BUSINESS ENTERPRISES**

| Resource Listing | Contact Information | Website if applicable |
|---|--|--|
| <p>U.S. Small Business Administration (SBA) In addition to the national office, the SBA has local district and regional offices to assist small businesses in contracting with the public and private sector.</p> | <p>US Small Business Administration 409 3rd St, SW Washington DC 20416 Phone: 800-827-5722</p> | <p>https://www.sba.gov/</p> |
| <p>U. S. Small Business Administration (SBA) - OK. District Office</p> | <p>301 NW 6th St. Oklahoma City, OK 73102 Phone: 405.609.8000</p> | <p>https://www.sba.gov/offices/district/ok/oklahoma-city</p> |
| <p>Minority Business Development Administration (MBDA): The MBDA is an agency within the U.S. Dept. of Commerce, created to foster the development and growth of minority businesses in the U.S. and coordinates resources in the public and private sectors to help MBEs.</p> | <p>1401 Constitution Ave NW Washington, D.C. 20230 Email: support@mbda.gov Phone: (202) 482-2000</p> | <p>http://www.mbda.gov/</p> |
| <p>Standard Industrial Classification Codes (SIC) or North American Industry Classification System (NAICS) codes visit the websites.</p> | <p>U.S. Bureau of Labor Statistics Postal Square Building, 2 Massachusetts Ave. NE Washington, DC 20212-0001 Phone: 1-202-691-5200</p> | <p>http://www.bls.gov/iag/tgs/iag_index_naics.htm</p> |
| <p>Oklahoma Department of Transportation (ODOT) and the <u>Minority/Disadvantaged Business Enterprise (ODOT – MBE/DBE)</u>. Project Owners and bidders may locate qualified M/WBE’s through the MBE/WBE Directory</p> | <p>200 NE 21st Street Oklahoma City, OK 73105 Phone: 405.521.2082</p> | <p>https://okdot.gob2g.com/Default.asp.</p> |
| <p>US EPA Office of Small and Disadvantaged Business Utilization (OSDBU): advocates and advances the business, regulatory, and environmental compliance concerns of small and socio-economically disadvantaged businesses. The Small Business Vendor Profile System contains information of number of small and disadvantaged companies registered with OSDBU.</p> | <p>USEPA Office of Small Programs 1200 Pennsylvania Ave. NW Mail Code 1230T Washington, D.C. 20460 Phone: 202 566-2075</p> | <p>https://www.epa.gov/aboutepa/about-office-small-and-disadvantaged-business-utilization-osdbu</p> <p>Select “search the OSBP Registry”</p> <p>Click on the search criteria of interest (ethnicity, size, SIC, etc.)</p> |

| | | |
|---|---|---|
| National Black Chamber of Commerce | 4400 Jenifer St NW #331, Washington, DC 20015 Phone: 202 466-6888 Fax: 202 466-4918 Email: info@nationalbcc.org | http://www.nationalbcc.org |
| U.S. Hispanic Chamber of Commerce | 424 K St NW #401, Washington, DC 20005 Phone: (202) 842-1212 | http://www.usbcc.com |
| National Association of Minority Contractors (NAMC) | 910 17th Street, NW, Suite 413 Washington, DC 20006 Phone: 202.296.1600 info@namcnational.org | http://namcnational.org/ |
| National Association of Women's Business Owners (NAWBO) | 601 Pennsylvania Ave NW South Building, Ste 900 Washington, DC 20004 Phone: 800-556-2926 Fax: 202-403-3788 | www.nawbo.org |
| National Minority Supplier Development Council, Inc. (NMSDC) | 1359 Broadway, 10th Floor, Suite 1000 New York, NY 10018 Phone: (212) 944-2430 Fax: (212) 719-9611 | http://www.nmsdc.org/ |
| Native American Development Corporation (NADC) - provides technical assistance, financial lending opportunities, and champions small businesses | 17 N. 26th St. Billings, MT 59101 Phone: (406) 259-3804 Fax: (406) 259-4569 Email: nadcptac@nadc-nabn.org | http://www.nadc-nabn.org/ |
| City of Tulsa – Small Business Enterprise Program Maintains a list of Minority and Female business Enterprises that are certified through the “building Resources in Developing and Growing Enterprises | 175 E. 2nd St. Tulsa, OK. 74103 Phone: (918) 596-7818 | https://www.cityoftulsa.org/developmentbusiness/small-business-enterprise-program/ Click on the ‘member list’ |
| Southwest Minority Supplier Development Council: Maintains lists of certified Minority Business Enterprises in Oklahoma | 7301 Broadway Ext Ste 224, OKC, OK 73116 Phone: (405) 767-9900 | http://www.smsdc.org/ |

| | | |
|---|--|---|
| National Association of Women in Construction (NAWIC) | 327 S. Adams Street Fort Worth, TX 76104 Phone: 800-552-3506 817.877.5551 Fax: 817.877.0324 | http://www.nawic.org/ |
| Bureau of Indian Affairs - Maintains a list of Native American Contractors and Suppliers by Trade | P.O. Box 368 (1 Mile North on Hwy 281) Anadarko, OK 73005 Phone: (405) 247-6673 Fax: (405) 247-5611 | https://www.bia.gov/as-ia/ieed/division-economic-development/native-american-business-development |
| Oklahoma Department of Commerce Certification Programs and information | 900 N Stiles Ave. Oklahoma City, OK 73104 Phone: (405) 815-6552 Toll-Free: (800) 879-6552 | https://www.okcommerce.gov/doing-business/#business-services |
| Cherokee Nation Tribal Employment Rights Office - Maintains a directory of Indian-owned businesses | Cherokee Nation TERO Dept. P.O. Box 948 Tahlequah, OK 74465 Phone: (918) 453-5334 or Toll Free: 800-256-0671 ext. 5334 | http://cherokeetero.com/ |

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ARP-6100-2 DBE Subcontractor Participation Form

OWRB Financial Assistance Agreement Recipients must require prime contractors to provide this form to their DBE subcontractors. This form gives a DBE subcontractor the opportunity to describe work received and/or report any concerns regarding the project.

| | | |
|-----------------------|--|--|
| Subcontractor Name | Project Name | |
| Bid/Proposal No. | Point of Contact | |
| Address | | |
| Telephone No. | Email address | |
| Prime Contractor Name | Funding entity Oklahoma Water Resources Board | |

| Contract Item Number | Description of Work Received from the Prime Contractor Involving Construction, Services , Equipment or Supplies | Amount Received by Prime Contractor |
|-----------------------------|--|--|
| | | |

ARP-6100-3 DBE Subcontractor Performance Form

This form is intended to capture the DBE₁ subcontractor's₂ description of work to be performed and the price of the work submitted to the prime contractor. OWRB Financial Assistance Agreement Recipients must require prime contractors to provide this form to their DBE subcontractors.

| | | |
|-----------------------|---------------|--|
| Subcontractor Name | Project Name | |
| Bid/Proposal No. | | Point of Contact |
| Address | | |
| Telephone No. | Email Address | |
| Prime Contractor Name | | Funding Entity Oklahoma Water Resources Board |

| Contract Item Number | Description of Work Received from the Prime Contractor Involving Construction, Services , Equipment or Supplies | Price of Work Submitted to the Prime Contractor |
|--|---|--|
| | | |
| DBE Certified By: ____ DOT ____ SBA ____ Other: _____ | | Meets/ exceeds EPA certification standards? ____ YES ____ NO ____ Unknown |

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

| | |
|-----------------------------------|-------------------|
| Prime Contractor Signature | Print Name |
| | |
| Title | Date |
| | |

| | |
|--------------------------------|-------------------|
| Subcontractor Signature | Print Name |
| | |
| Title | Date |
| | |

ARP-6100-4 DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE₁ subcontractors₂ and the estimated dollar amount of each subcontract. OWRB Financial Assistance Agreement Recipients must require their prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

| | | | |
|--|--------------|------------------|--|
| Prime Contractor Name | Project Name | | |
| Bid/Proposal No. | | Point of Contact | |
| Address | | | |
| Telephone No. | | Email address | |
| Funding Entity Oklahoma Water Resources Board | | | |

| | | |
|--|---------|--------|
| I have identified potential DBE certified Subcontractors | ___ YES | ___ NO |
|--|---------|--------|

If yes, please complete the table below. If no, please explain:

| Subcontractor Name/ Company Name | Company Address/ Phone/ Email | Est. Dollar Amt. | Currently DBE Certified? |
|-------------------------------------|----------------------------------|---------------------|--------------------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

| | |
|-----------------------------------|-------------------|
| Prime Contractor Signature | Print Name |
| | |
| Title | Date |
| | |

Bidder's Statement about: **Equal Opportunity Clause (ARP-211)**

Mark **one**:

- I have participated in previous contract(s) or subcontract(s) subject to the equal opportunity clause under Executive Orders 11246 and 11375 or preceding Executive Orders 10925 and 11114. I have filed all reports due under the requirements contained in 40 CFR, Part C, 8.11.
- I have not participated in previous contract(s) subject to the equal opportunity clause under Executive Orders 11246 and 11375 or preceding Executive Orders 10925 and 11114.

- I will obtain a similar statement from any proposed subcontractor(s), when appropriate.

Bidder's Statement about: **Non-Segregated Facilities (ARP-212 and ARP-212a)**

- I hereby certify that I do not and will not maintain any facilities provided for my employees in a segregated manner or permit my employees to perform their services at any location under my control where segregated facilities are maintained; and that I will obtain a similar certification prior to the award of any subcontract exceeding \$10,000 which is not exempted from the equal opportunity clause.

Bidder's Statement about: **Bonds**

- I hereby certify that I will obtain and provide a Bid Bond along with my Bid.
- I hereby certify that, in the event of being awarded a Contract, I will provide a Performance Bond for 100% of the contract amount.
- I hereby certify that, in the event of being awarded a Contract, I will provide a Statutory/Payment Bond for 100% of the contract amount.
- I hereby certify that, in the event of being awarded a Contract, I will provide a Maintenance Bond for at least 1 year after construction completion, and 100% of the contract amount

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ARP-249 BIDDERS/SUPPLIERS LIST

To be completed by Project Owner with documentation from all bidding Prime Contractors & Subcontractors
(List of all firms that bid or quote on Prime Contracts and Subcontracts on the project including Services and Supplies)

Project Name: _____ OWRB Project Number: ARP-__-__-__

| | |
|---------------------------------|--|
| Company Name: | |
| Address: | |
| Contact Name: | |
| Phone: | |
| Email: | |
| Quote/Bid Amount (\$) | |
| Date: | |
| Utilized: Yes ___ No ___ | If utilized and >\$10,000 then ARP 212a form is required (from all subcontractors and suppliers). |
| DBE: Yes ___ No ___ | If yes , MBE or WBE? _____ Check one: Construction___ Equipment___ Services___ Supplies_____ ARP 6100-3 form is required for all DBEs that bid/quote, even if not utilized . Submit with Bidders List . If utilized submit the following with Bidders List: <ul style="list-style-type: none"> • A copy of the companies MBE or WBE certificate is required. • ARP 6100-4 form is also required. |

| | |
|---------------------------------|--|
| Company Name: | |
| Address: | |
| Contact Name: | |
| Phone: | |
| Email: | |
| Quote/Bid Amount (\$) | |
| Date: | |
| Utilized: Yes ___ No ___ | If utilized and >\$10,000 then ARP 212a form is required (from all subcontractors and suppliers). |
| DBE: Yes ___ No ___ | If yes , MBE or WBE? _____ Check one: Construction___ Equipment___ Services___ Supplies_____ ARP 6100-3 form is required for all DBEs that bid/quote, even if not utilized . Submit with Bidders List . If utilized submit the following with Bidders List: <ul style="list-style-type: none"> • A copy of the companies MBE or WBE certificate is required. • ARP 6100-4 form is also required. |

| | |
|---------------------------------|--|
| Company Name: | |
| Address: | |
| Contact Name: | |
| Phone: | |
| Email: | |
| Quote/Bid Amount (\$) | |
| Date: | |
| Utilized: Yes ___ No ___ | If utilized and >\$10,000 then ARP 212a form is required (from all subcontractors and suppliers). |
| DBE: Yes ___ No ___ | If yes , MBE or WBE? _____ Check one: Construction___ Equipment___ Services___ Supplies_____ ARP 6100-3 form is required for all DBEs that bid/quote, even if not utilized . Submit with Bidders List . If utilized submit the following with Bidders List: <ul style="list-style-type: none"> • A copy of the companies MBE or WBE certificate is required. • ARP 6100-4 form is also required. |

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AFFIDAVITS

State of _____ ss.
County of _____

_____, of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by the bidder to submit the attached bid.

Non-Collusion

Affiant further states that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any government official or employee as to quantity, quality, or price in the prospective contract, or any other terms of said prospective contract; or in any discussions between bidders and any government official concerning exchange of money or other value for special consideration in the letting of a contract; that the bidder/contractor had not paid, given or donated or agreed to pay, give or donate to any officer or employee of the _____ (or other entity) any money or other thing of value, either directly or indirectly in the procurement of a contract or pursuant to this bid.

Business Relationships

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 relationship herein above mentioned exists, affiant should so state.

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

Notary Public Signature

My Commission Expires: _____

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AGREEMENT

This Agreement made this ____ day of _____, 20__ between _____
(hereinafter called the Owner) and _____ (hereinafter called the Contractor).

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The Contractor will commence and complete the work for:

_____.

2. The Contractor will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the project described herein.

3. The Contractor will commence the work required by the Contract documents within _____ calendar days after the date of the Notice to Proceed and will complete the same within _____ calendar days unless the period for completion is extended otherwise.

4. The Contractor agrees to perform all the work described in the Contract documents and comply with the terms therein for the sum of \$ _____ or as shown in the Bid Schedule.

5. The term "Contract documents" means and includes the following:

- | | |
|---|---------------------------------|
| (A) Advertisement for Bids | (I) Standard Requirements |
| (B) Information for Bidders | (J) Statutory Bond |
| (C) Bid Proposal | (K) Performance Bond |
| (D) Bid Schedule | (L) Maintenance Bond |
| (E) Business Relationships Affidavit | (M) Certificate of Insurance |
| (F) Non-collusion Affidavit | (N) Notice of Award |
| (G) Bid Bond | (O) Notice to Proceed |
| (H) Agreement | (P) Change Order |
| (Q) Drawings prepared by _____ Numbers _____ through _____ and dated ____/____/____. | |
| (R) Specifications prepared by _____, dated ____/____/____. | |
| (S) ADDENDA: | |
| No. _____, dated ____/____/____ | No. _____, dated ____/____/____ |
| No. _____, dated ____/____/____ | No. _____, dated ____/____/____ |

6. The Owner will pay to the Contractor in the manner and at such times as set forth in the Standard Requirements such amounts as required by the Contract documents.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

8. It is understood that the following are also required of the Contractor in performance of this contract:

- a. Liquidated damages for failure to complete the work within the time specified shall be assessed at the rate of \$_____ per day for each additional calendar day until the work is completed.
- b. Contractor shall comply with the Underground Facilities Damage Prevention Act (63 O.S. 42.1 et seq.).

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in _____ copies each of which shall be deemed an original on the date first above written.

| | | | |
|--|-------|-----------|----------------|
| _____ | _____ | _____ | ____/____/____ |
| Owner's Authorized Representative | Title | Signature | Date |
| _____ | _____ | _____ | ____/____/____ |
| Attested by | Title | Signature | Date |
| _____ | _____ | _____ | ____/____/____ |
| Contractor's Authorized Representative | Title | Signature | Date |
| _____ | _____ | _____ | ____/____/____ |
| Attested by | Title | Signature | Date |

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NOTICE TO PROCEED

Date: ___/___/_____

Project: _____

Grant#: ARP-___-____-___

Notice is hereby given to _____ to commence work on the above
referenced project on or before ___/___/_____. In accordance with the Agreement dated
___/___/_____, you are to complete the work within ___ consecutive calendar days. The date of
completion of all work is ___/___/_____.

Owner's Authorized Representative signature

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by _____,
Contractor's Representative name

Authorized Representative of _____.
Contractor

Contractor's Authorized Representative signature

___/___/_____
Date

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CLAIM OR INVOICE AFFIDAVIT

State of _____ ss.
County of _____

The undersigned (engineer or supervisory official), of lawful age, being first duly sworn, on oath says that this (invoice, claim, or contract) is true and correct. Affiant further states that the (work, services, or materials) as shown by this invoice or claim have been (completed or supplied) in accordance with the plans, specifications, orders, or requests furnished to the affiant. Affiant further states that (s)he has made no payment, given, or donated or agreed to pay, give, or donate, either directly or indirectly, to any elected official, officer, or employee of the State of Oklahoma, of money or any other thing of value to obtain payment or the award of this contract.

Engineer/Supervisory Official signature

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

Notary Public signature

My Commission Expires: _____

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**CERTIFICATE OF APPROVAL OF CONTRACTS AND BONDS BY LOCAL
ATTORNEY**

I, the undersigned _____,
the duly authorized and acting legal representative of the _____,
after careful examination of the Contract between this Entity and
_____, and the surety bonds given by the contractor in
connection with the performance of said contract, do hereby certify that:

1. Each of the aforesaid agreements has been duly executed by the proper parties thereto, acting through their duly authorized representatives.
2. Said representatives have full power and authority to execute said agreements on behalf of the respective parties named therein.
3. The foregoing contract and surety bonds, as applicable, constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

Dated this ___ day of _____, 20__.

Attorney's signature

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STATUTORY BOND

KNOW ALL 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 Midwest City / Midwest City Municipal Authority in the penal sum of _____ Dollars (\$ _____) 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.

DATED this _____ day of _____, 2024.

The condition of this obligation is such that:

WHEREAS, Principal entered into a written contract with the City of Midwest City / Midwest City Municipal Authority dated _____, 2024, for:

NORTH SIDE UTILITIES WATER PROJECT

all in compliance with the plans and specifications therefor, made a part of said Contract and on file in the office of the City Clerk / Secretary, City of Midwest City / Midwest City Municipal Authority, 100 N. Midwest Boulevard, Midwest City, Oklahoma 73110.

NOW, THEREFORE, if Principal shall fail or neglect to pay all indebtedness incurred by Principal or subcontractors of Principal who perform work in the performance of said 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.

It is further expressly agreed and understood by the parties to said Contract 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 obligations of this Bond.

IN WITNESS WHEREOF, 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 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.

Principal:

By _____
Title

ATTEST:

Surety:

By _____
Attorney-in-Fact

PERFORMANCE BOND

KNOW ALL 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 Midwest City / Midwest City Municipal Authority in the penal sum of _____ Dollars (\$_____) 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.

DATED this _____ day of _____, 2024.

The condition of this obligation is such that:

WHEREAS, Principal entered into a written Contract with the City of Midwest City / Midwest City Municipal Authority dated _____, 2024, for:

NORTH SIDE UTILITIES WATER PROJECT

all in compliance with the plans and specifications therefor, made a part of said Contract and on file in the office of the City Clerk / Secretary, City of Midwest City / Midwest City Municipal Authority, 100 N. Midwest Boulevard, Midwest City, Oklahoma 73110.

NOW, THEREFORE, if Principal shall, in all particulars, well, truly, and faithfully perform and abide by said Contract and each and every covenant, condition, and part thereof and shall fulfill all obligations resting upon Principal by the terms of said Contract and said specifications; and if Principal shall promptly pay, or cause to be paid, all labor, materials and/or repairs and all bills for labor performed on said work, whether by subcontract or otherwise; and if Principal shall protect and save harmless the City of Midwest City / Midwest City Municipal Authority from all loss, damage, and expense to life or property suffered or sustained by any person, firm, or corporation caused by Principal or his or its agents, servants, or employees in the construction of said work, or by or in consequence of any negligence, carelessness or misconduct in guarding and protecting the same, or from any act or omission of Principal or his or its agents, servants, or employees in the construction of said work, or by or in consequence of any negligence, carelessness or misconduct in guarding and protecting the same, or from any act or omission of Principal shall protect and save the City of Midwest City / Midwest City Municipal Authority harmless from all suits and claims of infringement or alleged infringement or patent rights or processes, then this obligation shall be null and void, otherwise it shall 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 obligations of this Bond.

IN WITNESS WHEREOF, 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 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.

Principal:

By _____
Title

ATTEST:

Surety:

By _____
Attorney-in-Fact

MAINTENANCE BOND

KNOW ALL 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 Midwest City / Midwest City Municipal Authority in the penal sum of _____ Dollars (\$_____) in lawful money of the United States of America, said sum being equal to one hundred percent (100%) of the contract price, 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.

DATED this _____ day of _____, 2024.

The condition of this obligation is such that:

WHEREAS, Principal entered into a written Contract with the City of Midwest City / Midwest City Municipal Authority dated _____, 2024, for:

NORTH SIDE UTILITIES WATER PROJECT

all in compliance with the plans and specifications therefor, made a part of said Contract and on file in the office of the City Clerk / Secretary, City of Midwest City / Midwest City Municipal Authority, 100 N. Midwest Boulevard, Midwest City, Oklahoma 73110.

NOW, THEREFORE, if Principal shall pay or cause to be paid to the City of Midwest City / Midwest City Municipal Authority all damage, loss and expense which may result by reason of defective materials and/or workmanship in connection with said work occurring within FIVE (5) years from and after acceptance of said project by the City of Midwest City / Midwest City Municipal Authority; 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 Midwest City / Midwest City Municipal Authority harmless from all damages, loss and expense occasioned by or resulting from any failure whatsoever of 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 obligations of this Bond.

IN WITNESS WHEREOF, 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 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.

Principal:

By _____
Title

ATTEST:

Surety:

By _____
Attorney-in-Fact

Approved as to form this _____ day of _____, 2024.

City Attorney / Attorney

BID

Proposal of _____
_____, (hereinafter called BIDDER"),
organized and existing under the laws of the State of _____
doing business as * _____

To the **CITY OF MIDWEST CITY / MIDWEST CITY MUNICIPAL AUTHORITY** (hereinafter called "CITY" / "AUTHORITY").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all work for the construction of the following:

NORTH SIDE UTILITIES WATER PROJECT

in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of joint BID each party thereto certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence work under the contract documents on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within calendar days the bidder listed below. BIDDER further agrees to pay as liquidated damages the sum of One Hundred Dollars (\$100.00) per day for each consecutive calendar day thereafter as provided in Section 14 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

*** Insert "a corporation," "a partnership" or "an individual" as applicable.**

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the unit prices or lump sum as indicated on the detailed bid form. The CITY / AUTHORITY shall have the option to deduct any or all of the bid items at the unit cost or lump sum provided by the BIDDER.

BASE BID TOTAL (from DBF-1) \$ _____

(Total dollars written)

Respectfully submitted:

Signature

Address

Title

Date

License Number (if applicable)

(SEAL - If Bid is by a Corporation)

ATTEST: _____

DETAILED BID FORM

NORTH SIDE UTILITIES WATER PROJECT

Detailed bids shown below shall reflect all related project costs including, but not limited to, equipment, materials, labor, overhead and profit for installation and construction of each item per the drawings and specifications. Contractor is responsible for verifying quantities. See Appendix I to the Instructions to Bidders for directions and a sample Detailed Bid Form.

| <u>Pay Item</u> | <u>Estimated Quantity</u> | <u>Unit</u> | <u>Item</u> | <u>Unit Price</u> | <u>Item Total</u> |
|-----------------------------------|----------------------------------|--------------------|---|--------------------------|--------------------------|
| 1. | 7,130 | Linear Foot | 12-inch C-900 PVC (DR 18) Water Pipe (Open Cut) | | |
| | | | | Dollars | \$ _____ \$ _____ |
| <i>(Dollars per unit written)</i> | | | | | |
| 2. | 1,680 | Linear Foot | 12-inch Fusible C-900 PVC (DR 18) Water Pipe (Horizontal Directional Drill) | | |
| | | | | Dollars | \$ _____ \$ _____ |
| <i>(Dollars per unit written)</i> | | | | | |
| 3. | 60 | Linear Foot | 12-inch C-900 Fusible PVC (DR 18) Water Pipe with 18-inch Steel Encasement (Bore) | | |
| | | | | Dollars | \$ _____ \$ _____ |
| <i>(Dollars per unit written)</i> | | | | | |
| 4. | 80 | Linear Foot | 12-inch C-900 PVC (DR 18) Water Pipe with 18-inch Steel Encasement (Open Cut) | | |
| | | | | Dollars | \$ _____ \$ _____ |
| <i>(Dollars per unit written)</i> | | | | | |
| 5. | 2 | Each | 12-inch 11.25° Ductile Iron Bend (MJ) | | |
| | | | | Dollars | \$ _____ \$ _____ |
| <i>(Dollars per unit written)</i> | | | | | |
| 6. | 2 | Each | 12-inch 22.5° Ductile Iron Bend (MJ) | | |
| | | | | Dollars | \$ _____ \$ _____ |
| <i>(Dollars per unit written)</i> | | | | | |
| 7. | 21 | Each | 12-inch 45° Ductile Iron Bend (MJ) | | |
| | | | | Dollars | \$ _____ \$ _____ |
| <i>(Dollars per unit written)</i> | | | | | |

8. 4 Each 12-inch 90° Ductile Iron Bend (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
9. 1 Each 6-inch x 6-inch Ductile Iron Tee (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
10. 15 Each 12-inch x 6-inch Ductile Iron Tee (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
11. 1 Each 12-inch x 12-inch Ductile Iron Tee (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
12. 1 Each 12-inch x 4-inch Ductile Iron Reducer (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
13. 1 Each 12-inch x 6-inch Ductile Iron Reducer (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
14. 1 Each 8-inch x 4-inch Ductile Iron Reducer (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
15. 1 Each 12-inch x 8-inch Ductile Iron Reducer (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
16. 1 Each 8-inch x 8-inch Tapping Sleeve (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
17. 2 Each 12-inch Solid Sleeve (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)
18. 1 Each 8-inch Tapping Valve and Valve Box (MJ)
_____ Dollars \$ _____ \$ _____
(Dollars per unit written)

| | | | | | | |
|-----|----|------|--|-----------------------------------|----|----|
| 19. | 15 | Each | 6-inch Gate Valve and Valve Box (MJ) | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 20. | 6 | Each | 12-inch Tapping Valve and Valve Box (MJ) | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 21. | 3 | Each | 12-inch Gate Valve (MJ) in Manhole (4') | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 22. | 15 | Each | Fire Hydrant Assembly | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 23. | 15 | Each | 12-inch Fire Hydrant Riser | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 24. | 6 | Each | 2-inch Combination Air Release Valve and Vault | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 25. | 1 | Each | 4-inch Water Meter Vault | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 26. | 1 | Each | 6-inch Water Meter Vault | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 27. | 1 | Each | Connection to Existing 8-inch Water Line Secondary Feed at Sta 1+00 | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 28. | 1 | Each | Connection to Existing 12-inch Water Line on Primary Feed at 1+00 | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |
| 29. | 1 | Each | Connection to Existing 12-inch Water Line on Primary Feed at 36+87.40 | | | |
| | | | | Dollars | \$ | \$ |
| | | | | <hr/> | | |
| | | | | <i>(Dollars per unit written)</i> | | |

| | | | | | | |
|-----|-----------------------------------|------|--|---------------|----------|----------|
| 30. | 1 | Each | Connection to Existing 8-inch Water Line on Secondary Feed at Sta 32+75 | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 31. | 22 | Each | Utility Dome Marker | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 32. | 1 | LS | Sediment and Erosion Control | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 33. | 7,500 | LF | Trench Safety | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 34. | 7,270 | LF | Utility Location and Support | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 35. | 1 | LS | Seeding | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 36. | 220 | SY | Pavement Cut and Permanent Repair | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 37. | 1 | LS | Pressure Testing of Pipelines | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 38. | 1 | LS | Disinfection of Pipelines | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 39. | 1 | LS | Stormwater Pollution Prevention Plan Documentation and Management | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |
| 40. | 1 | LS | Mobilization and Demobilization | _____ Dollars | \$ _____ | \$ _____ |
| | <i>(Dollars per unit written)</i> | | | | | |

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CERTIFICATION OF PRE-BID SITE INSPECTION

I, _____,

representing

_____, certify that on the ____ day of _____, 2024, I inspected the project site located in Midwest City. I am thoroughly familiar and aware of all conditions at the site and problems that may be encountered during performance of the referenced project:

NORTH SIDE UTILITIES WATER PROJECT

BY: _____
Name

TITLE: _____

All bidders must inspect the project work site prior to submitting a bid. Therefore, a mandatory pre-bid conference is scheduled as specified in the Notice to Bidders.

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BID BOND

KNOW ALL PEOPLE BY THESE PRESENTS, that we, the undersigned, _____, as Principal, and _____, as Surety, are hereby held and firmly bound unto the City of Midwest City / Midwest City Municipal Authority in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our successors and assigns.

Signed this _____ day of _____, 2024.

The condition of the above obligation is such that whereas the Principal has submitted to the City of Midwest City / Midwest City Municipal Authority a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing, for the:

NORTH SIDE UTILITIES WATER PROJECT

NOW, THEREFORE,

(a) If said Bid shall be rejected or, in the alternate,
(b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the form of contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise the same shall remain in force and effect. It is expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the City / Authority may accept such bid; and said Surety does hereby waive notice of any extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunder set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal

Surety

By: _____

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Contractor Certification

Contractor certifies and warrants that it will comply with the Immigration Laws of the United States, including but not limited to 8 USC 1324(a), which makes it unlawful for an employer to hire or continue to employ an illegal or undocumented alien *knowing* the alien is or has become unauthorized with respect to such employment, or to fail to comply with the I-9 requirements. Contractor further agrees to comply with the Oklahoma Taxpayer and Citizen Protection Act of 2007. Contractor will not knowingly employ or knowingly allow any of its Subcontractors to employ any illegal or undocumented aliens to perform any work in connection with services performed for the City of Midwest City / Midwest City Municipal Authority. After July 1, 2008, Contractor and its Subcontractors will verify information on all new employees on the Status Verification System operated by the U.S. Government.

Contractor will retain and make available for inspection by the City / Authority, upon reasonable notice, a completed I-9 Employment Eligibility Verification Form for each person that contractor directly employs to perform services for the City / Authority. If Contractor, or any of its Subcontractors, receives *actual knowledge* of the unauthorized status of one of its employees engaged in providing services to the City / Authority, then Contractor or Subcontractor will remove that employee from the project, and shall require each Sub-contractor to act in a similar fashion with respect to such Sub-contractor's employees. Contractor agrees to have a provision in its subcontracts stating that each Sub-contractor will have the same duties and responsibilities with regard to its employees that the Contractor has certified in this paragraph.

Signed under penalty of perjury on _____, 2024.

_____,
Contractor

By: _____
Owner or Authorized Officer

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STATEMENT OF BIDDER'S QUALIFICATIONS
(Site Preparation Contractor)

All questions must be answered. All responses must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate sheets. The Bidder may submit any additional information.

1. Name of Bidder:

2. Permanent main office address:

3. When organized:

4. If a corporation, where incorporated:

5. How many years have you been engaged in the contracting business under your present firm or trade name:

6. Contracts on hand (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion):

7. General character of work performed by your company:

8. Have you ever failed to complete any work awarded to you?

9. Have you ever defaulted on a contract?

10. List the more important projects recently completed by your company, stating the approximate cost for each and the month and year completed.

11. List your major equipment available for this contract

12. Experience in construction work similar in scope to this project:

13. Background and experience of the principal members of your organization, including officers:

**INSTRUCTIONS TO BIDDERS
APPENDIX 1
INSTRUCTIONS FOR COMPLETION OF THE DETAILED BID FORM**

Detailed Bid Forms are included in the Bidding Documents when projects are bid all or partially on a unit cost basis. Where a Detailed Bid Form is provided, Bidder is to enter the cost per unit in words and in numerals and then enter the total cost of the item (unit cost x estimated quantity) in the right hand column under "Item Total".

The Total of the Item Total Column should be entered at the bottom of the Detailed Bid Form and on the "Amount Bid" line on the Bid Form. Bidders should check to insure that the total of the Detailed Bid Form is entered correctly on the Bid Form. In cases of conflict between words and numerals, the words will govern. In cases of conflict between the amount on the Bid Form and the amount on the Detailed Bid Form, the amount on the Detailed Bid Form will govern.

There may be a Detailed Bid Form for one or more of any Alternates. If a Detailed Bid Form is provided for an Alternate, it should be completed in the same manner as the Form for the Base Bid.

An example of a correctly completed Detailed Bid Form is provided below.

DETAILED BID FORM ITEMS

PROJECT NO. _____

| <u>Pay Item</u> | <u>Estimated Quantity</u> | <u>Unit</u> | <u>Item</u> | <u>Unit Price</u> | <u>Item Total</u> |
|-----------------|--|-------------|-----------------------------------|--|---|
| 1. | 45 | S.Y. | 6" P.C. Concrete | | |
| | <u>Fifteen and no/100</u> <i>(Dollars per unit written)</i> | | | Dollars \$ <u>15.00</u> | \$ <u>675.00</u> |
| 2. | 70 | L.F. | 6" Integral Curb | | |
| | <u>One and 50/100</u> <i>(Dollars per unit written)</i> | | | Dollars \$ <u>1.50</u> | \$ <u>105.00</u> |
| 3. | 56 | L.F. | 6" Curb Removal | | |
| | <u>Two and 13/100</u> <u>Three and no/100 MC</u> <i>(Dollars per unit written)</i> | | | Dollars \$ <u>2.13</u> <u>3.00 MC</u> | \$ <u>119.28</u> <u>168.00 MC</u> |
| 4. | 1 | L.S. | Plug Existing 42" R.C.P. (3 pts.) | | |
| | <u>Three Hundred and no/100</u> <i>(Dollars per unit written)</i> | | | Dollars \$ <u>300.00</u> | \$ <u>300.00</u> |
| 5. | 45 | L.F. | 24" R.C.P. | | |
| | <u>Thirty and no/100</u> <i>(Dollars per unit written)</i> | | | Dollars \$ <u>30.00</u> | \$ <u>1,350.00</u> |
| | | | | APX-1 | |
| | | | | TOTAL | \$ <u>2,598.00 MC</u> <u>2,549.28</u> |

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SECTION 01 10 39
INTERNET-BASED CONSTRUCTION MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. The Engineer will subscribe to an Internet-Based Construction Management system specific for this project. The System will be managed by the Engineer.
- B. The project website will provide server space and secured access to staff members representing the Owner, Engineer, and Contractor. Each user will have a separate log-in name and password to access the website.
- C. Contract management related documents will be submitted, tracked, responded to, and made available to the Owner, Engineer, and Contractor over the Internet.

1.2 ALLOWANCE (NOT USED)

1.3 REQUIREMENTS

- A. The Contractor will be required to make all submittals in electronic format. The required format will be discussed at the pre-construction meeting. The software product to be chosen will support multiple file formats and provide viewing and markup capability.
- B. The website includes a secured document management system for storing and making available to the Project team the following:
 - 1. Ability to store files and correspondence.
 - 2. Latest drawings and specifications.
 - 3. Project progress photos.
- C. The website will include the following database driven applications. The system is designed to inform team members regarding new or updated documents and automatic task assignment and overdue notifications. The following items shall be entered, submitted, tracked, and responded to on-line.
 - 1. Meeting Minutes
 - 2. Supplemental Instructions
 - 3. Field Reports
 - 4. RFIs (Requests For Information)
 - 5. Shop Drawings/Submittals
 - 6. PCMs (Proposed Contract Modifications)
 - 7. Change Orders
 - 8. Field Orders
 - 9. Contractor's Daily Reports
 - 10. Contractor's Storm Water Pollution Prevention Inspections
 - 11. Applications for Payment with Schedule of Values, Payment Forecast Schedules
 - 12. Construction Schedule
 - 13. CTRs (Certified Test Reports)

14. Warranty Documents

1.4 ARCHIVES

- A. The chosen web-based project management application is capable of archiving all files on the website periodically.
- B. All data from the website, such as RFIs, Submittals, etc. will be available in the archive.

PART 2 - PRODUCTS

2.1 SOFTWARE

- A. The specific site used by the Owner will be sent to the Contractor via e-mail with instructions on accessing the site.

PART 3 - EXECUTION

3.1 TRAINING

- A. One training session by the vendor to the team members at the beginning of the project will be provided. Additional training expenses will be borne by the Contractor.

3.2 SUPPORT

- A. Software support will be available by the software vendor to all users of the project.

3.3 OPERATION

- A. Contractor shall maintain a PC system on the jobsite including high-speed access to the Internet and ability to scan documents.

3.4 DURATION

- A. The website will be active during construction and a minimum of 3 months past Final Completion. The Owner and Engineer will have the option to continue use of the website after completion of the project.

3.5 ARCHIVES

- A. All files on the website will be archived every quarter and at the end of the Project. These archives will be made available to the Contractor for download over the Internet.

END OF SECTION

**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Project Identification and Contact Information.
 - 2. Description of Work.
 - 3. Description of Connections
 - 4. Water for Construction
 - 5. Type of the Contract.
 - 6. Work phases.
 - 7. Work under other contracts.
 - 8. Limits of subcontractor participation.
 - 9. Products ordered in advance.
 - 10. Owner-furnished products.
 - 11. Use of premises.
 - 12. Owner's occupancy requirements.
 - 13. Work restrictions.
 - 14. Special Formats and Conventions.
 - 15. Permits.
 - 16. Other professional services.
- B. Related Sections include the following:
 - 1. Division 1 Section 01 12 16 "Construction of Sequence Items" for requirements for the construction sequence of various work elements.

1.2 PROJECT IDENTIFICATION AND CONTACT INFORMATION

- A. Project Identification:
 - 1. North Side Utilities Water Project
- B. Project Number:
 - 1. Plummer Project No. 3435-003-01
- C. Project Location:
 - 1. Midwest City Water Resources Recovery Facility (7420 NE 36th St, Oklahoma City, OK 73141) and adjacent parcels
- D. Owner: City of Midwest City / Midwest City Municipal Authority, Oklahoma
 - 1. Representative: Brandon Bundy, P.E.
 - 2. Address: 100 N Midwest Blvd, Midwest City, OK 73110.
 - 3. Telephone: 405-739-1213

- E. Engineer: Plummer Associates, Inc.
 - 1. Contact: Chris Ferguson, P.E.
 - 2. Address: 531 Couch Drive, Suite 200, Oklahoma City, Oklahoma 73102
 - 3. Telephone: 405-652-1274

1.3 DESCRIPTION OF WORK

The Work, under this Contract, consist of construction of approximately 8,950 linear feet of 12-inch potable water pipe via open cut, bore, and horizontal directional drill.

- A. The Project consists of the Work in the Plans and Specifications.
- B. The construction Work to be executed in the field will be based on Conformed Drawings and Specifications, which will be prepared by the Engineer based on the Work included in the Final Plans and Specifications.
- C. Unless otherwise specified, Contractor shall provide the following:
 - 1. Temporary facilities and controls as specified in SECTION 01 32 39 CONTRACTOR REQUIREMENTS.
 - 2. Provide quality control, material testing, field testing, and related services in accordance with requirements of each Specification Section.
 - 3. Provide quality assurance and control services in accordance with requirements in each Specification Section. Owner provided quality assurance and quality control services would be an overview of the Work during construction.
 - 4. Provide training of Owner's operation and maintenance personnel in accordance with SECTION 01 78 23 OPERATION AND MAINTENANCE DATA.
 - 5. Field surveying required for support of construction operations. Applicable permits, licenses and jurisdictional inspections, certificate of occupancy, and related work as necessary for Owner to assume operation of facility.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contact.

1.5 USE OF PREMISES

- A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to areas where work is permitted.
 - 2. Owner Occupancy: Allow for Owner occupancy of Project site.
 - 3. Driveways and Entrances: Keep driveways and entrances serving facilities 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.
- C. Use of Existing Facilities: Maintain existing building, structures and/or site elements in a working condition throughout construction period. Repair damage caused by construction operations. Protect any facility and their occupants during construction period.

1.6 OWNER'S OCCUPANCY REQUIREMENTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits, unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than 72-hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of Project, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Engineer will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of facilities.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.7 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed at the site during normal business working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.
 - 1. Weekend Hours: 7:00 a.m. to 6:00 p.m., with written notification to OWNER 48 hours in advance.
 - 2. Early Morning Hours: Contractor shall minimize early morning hours or late evening hours of work and shall comply with local requirements of authorities having jurisdiction for restrictions on noisy work. A variance shall be obtained before proceeding with the work.
 - 3. Hours for Utility Shutdowns: Tuesday through Thursday, no utility shutdown on Monday or Friday.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by OWNER or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify ENGINEER not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without ENGINEER'S written permission.

1.8 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI "Master Format" numbering system.
 1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.
- 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.
 3. 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.
 4. Additional meaning of language used may be found in the General Conditions Article "Defined Terms and Terminology."

1.9 PERMITS

- A. Attention is directed to the requirements of the General Conditions regarding obtaining permits. The Contractor shall obtain and pay for all applicable permits in connection with the Work including a stormwater discharge permit. The Bid Prices shall include the costs for obtaining all required permits, as well as performing the work in accordance with the permit requirements.

1.10 OTHER PROFESSIONAL SERVICES

- A. Other Professional Services: Engineer(s) or engineering firms which may be retained by the Contractor his subcontractors or vendors to fulfill engineering requirements of the Project during the construction phase.
- B. When professional engineering services are required during the course of the Project, the Contractor shall comply with the requirements of Chapter 475 of the Oklahoma Statutes and shall select and award on the basis of demonstrated competence and qualifications to perform the services for a fair and reasonable price and shall not select services or award contracts on the basis of competitive bidding.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 12 16
CONSTRUCTION OF SEQUENCE ITEMS

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 CONSTRUCTION SEQUENCE FOR SPECIFIC ITEMS

- A. Any operational shutdowns must be coordinated at least five days in advance.
- B. Dewatering, demolition, and repairs must be completed within the approved shutdown window.
- C. The Owner shall define the available shutdown window at the time of the repair.
- D. All Materials shall be on-site, verified, and ready for installation two days prior to the scheduled shutdown. Failure to have all materials at the site will result in cancelling of the planned shutdown at no cost to the Owner.

1.3 COORDINATION WITH OTHER CONTRACTORS AND PROJECTS

- A. Work by other contractors at Water Resources Recovery Facility and adjacent parcels may be in progress during this Project.
- B. Schedule construction operations in sequence required obtaining the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
- C. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
- D. Make adequate provisions to accommodate items scheduled for later installation.
- E. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

1.4 GENERAL

- A. The conveyance and operations necessary to meet critical drinking water requirements are of higher priority than other construction activities. Schedules of connections, renovations and modifications required during operation shall be submitted to the Owner for approval, and all such items shall be coordinated with the Owner. These schedules shall permit full and normal treatment and conveyance of potable water.
- B. The Contractor shall prepare and submit a project schedule within 30 days of beginning work, outlining the schedule and time requirements for each item involving major valves and appurtenances, conveyance system and tunnels. No payment shall be made until these items are received.
- C. The Contractor shall notify the Owner at least 14 days in advance and again 3 days prior to beginning work on a particular area and prior to any shutdowns, and coordinate with the

Owner the specific items to be isolated and duration for each. The Contractor shall submit a workplan with each Shutdown request. The workplan shall include a list of materials, personnel, equipment, items needed from the Owner, and isolation needs. Obtain written approval from the Owner prior to each shutdown. High flow conditions or equipment outages may require the rescheduling of an approved shutdown. Any cost associated with rescheduling will be subsidiary to Project.

- D. After startup, the Contractor shall not operate any valves or equipment in the plant unless directed to do so in writing by the Owner.
- E. Prior to beginning work, the Contractor shall have on-site all materials, equipment, and personnel necessary to complete the work in the time scheduled. The Contractor shall also perform all possible tasks to the most complete state possible prior to shutdowns. All exposed bolts and nuts on valves or fittings which are to be disassembled shall be removed and replaced one at a time prior to shutdown to assure as timely progress as possible.
- F. Failure of the Contractor to properly plan and perform the work in the prescribed manner may result in partially treated water. In this case, the Contractor may be liable for payment of fines, fees or other charges imposed upon the Owner by state or federal regulatory agencies, and all other costs associated with the partially treated water.
- G. Access to all plant facilities must be maintained at all times.
- H. Existing plugged pipelines, in which water has been standing, shall have to be cleaned of debris and disinfected prior to connecting to a new pipeline.
- I. The Contractor shall coordinate and schedule each task necessary to complete all work within the time allowed for the project. Specific connection coordination, shutdown, and out of service (downtime) limitations are further described in Paragraph 1.5 and 1.6.
- J. The sequencing may require the Contractor to perform work such as installing temporary or permanent plugs and/or diversion facilities in structures that are online. The specifics related to flow diversion and temporary plugging means and methods are the responsibility of the Contractor, however, the Contractor's proposed work operations and schedules shall be submitted to the Owner for review.
- K. Plant Piping Interconnections Requirements. All testing of pipes to be connected shall be completed and test reports furnished to the Engineer prior to making connections.
 - 1. Drain system connections should generally not require prior notification to proceed unless the existing pipe must be temporarily plugged or blocked for the connection.
 - 2. Plant water and potable water connections require advance notification and concurrence from the Owner prior to isolating or shutting down the system for connection. Potable pipes should be flushed and pressure tested prior to connection and disinfected prior to the connection. Contractor shall coordinate these items.
 - 3. Reduce the number of shutdowns required for piping systems by combining as many connections at the same time as feasible.
 - 4. Plant process piping connections are critical and shall be fully coordinated and shall be expedited and done in a continuous manner upon initiation. These pipes generally do not have isolation valves or parallel pipes and require shutting down the treatment process for connection. Time shall be allowed for shutting down the process and dewatering the existing pipe in addition to the actual connection time. Contractor

shall provide all equipment, tools and labor to dewater the pipes for connections. This process water shall be contained in the facilities and not allowed to discharge over the ground or to the surface drainage systems. Generally, the time period allowed for these connections will not exceed four hours total unless approved in writing by the Owner.

5. All filtered water, finished water, and in plant potable water piping shall be cleaned, disinfected, and tested prior to placing into service. Contractor shall provide taps, flushing, and blow-off connections to flush and disinfect each pipe section and treatment unit.

1.5 OPERATIONS AND MAINTENANCE ACCESS

- A. Provide safe, continuous access to process control equipment for pipeline operations personnel.
- B. Provide access on 1-hour advance notice to process control equipment for pipeline maintenance personnel and associated maintenance equipment.

1.6 UTILITIES

- A. Provide advance notice to and utilize services of One Call for location and marking of underground utilities operated by utility agencies other than the Owner.
- B. Maintain electrical, telephone, water, gas, sanitary facilities, and other utilities within existing facilities in service. Provide temporary utilities when necessary.
- C. New yard utilities were designed using existing facility drawings.
 1. Field verification of utilities locations was not performed during design.
 2. Services crossed or located nearby by new yard utilities may require relocation and possible shutdowns.
 3. Pipe alignments as indicated on the Drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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**SECTION 01 29 00
MEASUREMENT AND PAYMENT**

PART 1 - GENERAL

The "Bid Price" for each item, as set forth in the Proposal, shall include the furnishing of all labor, tools, materials, machinery, appliances, plant and equipment appurtenant to and necessary for the construction and completion in a first class, workmanlike manner of all work as herein specified in strict accordance with these Specifications and accompanying Plans. The "Bid Price" shall include any amount or class of excavation, backfilling, dewatering, bypass pumping, drainage, sheeting, shoring and bracing, disposal of any and all surplus materials, protection of all overhead, surface or underground structures; removal and replacement of any poles, conduits, pipelines, appurtenances and connections, clean up, overhead expense, bond, public liability and compensation and property damage insurance, patent fees, and royalties, risk due to the elements, and profits, unless otherwise specified.

The Bid price shall also include all other incidentals not specifically mentioned above that may be required to fully construct each and every item complete in place in accordance with the true intent and meaning of the Specifications and accompanying Plans.

The Contractor shall take all measures necessary to protect existing structures, lawns, trees, shrubbery, etc., on the areas adjacent to the work which is not necessary to cut as a part of the construction, and if damaged, shall replace them in as good condition or better than previously existed at his own cost and expense without additional compensation from the Owner.

The Contractor shall protect and attempt to save all trees noted in the Plans and as instructed by the Owner without additional compensation by the Owner.

Listed below are descriptions of items as listed in the Proposal and the manner in which payment shall be awarded for each. If there is not a specific measurement and/or payment section, paragraph or item associated with each Technical Specification contained in this Contract Document, then the following descriptions shall be used to describe measurement and payment. If there is not a bid item provided for work identified on plans or in specifications, it shall be understood to be subsidiary to construction, measurement, and payment of one of the following Bid Items provided below.

PART 2 - BASE BID ITEMS

BID ITEM 1 – 12-INCH C-900 PVC (DR 18) WATER PIPE (OPEN CUT)

This per linear foot bid item shall include furnishing all labor, equipment, and materials necessary to install, BY OPEN CUT, the 12-inch C-900 DR 18 PVC pipe as shown in the plans, standard details, and specifications. The cost of all pipe, trench excavation, pipe embedment, warning tape, backfill, compaction, hydrostatic testing, site clearing, top soil stripping and stock piling, topsoil redistribution, relocating or supporting all existing conflicting utilities, ground water control planning and dewatering activities, closure pieces, geotextile fabric, temporary construction access to the site, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 2 – 12-INCH C-900 FUSIBLE PVC (DR 18) WATER PIPE (HORIZONTAL DIRECTIONAL DRILL)

This per linear foot bid item shall include furnishing all labor, equipment, and materials necessary to install, BY HORIZONTAL DIRECTIONAL DRILL, the 12-inch fusible PVC pipe as shown in the plans, standard details, and specifications. The cost of pipe, pipe fusion, excavation, bore pits, shoring, dewatering, horizontal directional drilling, carrier pipe installation, joint restraints, embedment, backfill, compaction, tracer wire, warning tape and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 3 – 12-INCH C-900 PVC (DR 18) WATER PIPE WITH 18-INCH STEEL ENCASEMENT (BORE)

This per linear foot bid item shall include furnishing all labor, equipment, and materials necessary to install, BY HORIZONTAL AUGER BORE, the 12-inch PVC pipe with 18-inch welded steel encasement as shown in the plans, standard details, and specifications. The cost of all pipe, excavation, bore pits, shoring, dewatering, boring, steel casing, casing spacers, joint restraints, vents, end seals, grouting, embedment, backfill, compaction, tracer wire, warning tape and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 4 – 12-INCH C-900 PVC (DR 18) WATER PIPE WITH 18-INCH STEEL ENCASEMENT (OPEN CUT)

This per linear foot bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch PVC pipe inside an 18-inch welded steel encasement pipe by OPEN CUT. The cost of all pipe, excavation, shoring, dewatering, steel casing, casing spacers, joint restraints, vents, end seals, grouting, embedment, backfill, compaction, tracer wire, warning tape and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 5 – 12-INCH 11.25° DUCTILE IRON BEND (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the restrained mechanical joint (MJ) 12-inch 11.25° ductile iron bend as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, epoxy coatings and cement mortar lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 6 – 12-INCH 22.5° DUCTILE IRON BEND (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the restrained mechanical joint (MJ) 12-inch 22.5° ductile iron bend as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 7 – 12-INCH 45° DUCTILE IRON BEND (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the restrained mechanical joint (MJ) 12-inch 45° ductile iron bend as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete

and workable installation are included in this pay item.

BID ITEM 8 – 12-INCH 90° DUCTILE IRON BEND (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the restrained mechanical joint (MJ) 12-inch 90° ductile iron bend as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 9 – 6-INCH x 6-INCH DUCTILE IRON TEE (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 6-inch x 6-inch restrained mechanical joint (MJ) ductile iron tee as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 10 – 12-INCH x 6-INCH DUCTILE IRON TEE (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch x 6-inch restrained mechanical joint (MJ) ductile iron tee as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 11 – 12-INCH x 12-INCH DUCTILE IRON TEE (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch x 12-inch restrained mechanical joint (MJ) ductile iron tee as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 12 – 12-INCH x 4-INCH DUCTILE IRON REDUCER (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch x 4-inch restrained mechanical joint (MJ) ductile iron reducer as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 13 – 12-INCH x 6-INCH DUCTILE IRON REDUCER (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch x 6-inch restrained mechanical joint (MJ) ductile iron reducer as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a

complete and workable installation are included in this pay item.

BID ITEM 14 – 8-INCH x 4-INCH DUCTILE IRON REDUCER (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 8-inch x 4-inch restrained mechanical joint (MJ) ductile iron reducer as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 15 – 12-INCH x 8-INCH DUCTILE IRON REDUCER (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch x 8-inch restrained mechanical joint (MJ) ductile iron reducer as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 16 – 8-INCH x 8-INCH TAPPING SLEEVE

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 8-inch x 8-inch ductile iron tapping sleeve as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 17 – 12-INCH DUCTILE IRON SOLID SLEEVE (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch restrained mechanical joint (MJ) ductile iron solid sleeve as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 18 – 8-INCH TAPPING VALVE AND VALVE BOX (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 8-inch restrained mechanical joint (MJ) ductile iron tapping valve and valve box as shown in the plans, standard details, and specifications. The cost of valve, valve box, cover, excavation, backfill, compaction, grading, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, stem extension, stabilizer ring, concrete collar, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 19 – 6-INCH GATE VALVE AND VALVE BOX (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 6-inch mechanical joint (MJ) ductile iron gate valve and valve box as shown in the plans, standard details, and specifications. The cost of valve, valve box, cover, excavation, backfill, compaction, grading, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, stem extension, stabilizer ring, concrete collar, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 20 – 12-INCH GATE VALVE AND VALVE BOX (MJ)

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch mechanical joint (MJ) ductile iron gate valve and valve box as shown in the plans, standard details, and specifications. The cost of valve, valve box, cover, excavation, backfill, compaction, grading, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, stem extension, stabilizer ring, concrete collar, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 21 – 12-INCH GATE VALVE (MJ) INSIDE 4-FOOT MANHOLE

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch mechanical joint (MJ) gate valve and 4-foot manhole as shown in the plans, standard details, and specifications. The cost of valve, valve box, stem extension, stabilizer ring, concrete manhole base, concrete manhole risers, concrete lid section, grading rings, watertight frame and cover, excavation, backfill, compaction, grading, thrust restraints, bolts, nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 22 – FIRE HYDRANT ASSEMBLY

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the fire hydrant assembly as shown in the plans, standard details, and specifications. The cost of fire hydrant, 6-inch restrained MJ gate valve and valve box, thrust restraint, excavation, backfill, disinfection, testing, crushed rock, fittings, as shown on the detail in the plans, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 23 – 12-INCH FIRE HYDRANT RISER

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 12-inch fire hydrant riser as shown in the plans, standard details, and specifications. The cost of fitting, installation, thrust restraints, stainless steel bolts, stainless steel nuts, accessories, required coatings and lining, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 24 – 2-INCH COMBINATION AIR RELEASE VALVE AND VAULT

This per each bid item shall include furnishing all labor, equipment, and materials necessary to install the 2-inch air release valve and vault as shown in the plans, standard details, and specifications. The cost of excavation, foundation preparation, formwork, rebar, concrete, precast vault, vault cover, fittings, spool pieces, bolts, nuts, gaskets, 2-inch air release valve, bollards, corporation stop, curb stop, copper tubing, backfill, compaction and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 25 –4-INCH WATER METER VAULT

This per each bid item shall include furnishing all labor, equipment, and materials necessary to connect the proposed 12-inch primary water feed to the proposed 4-inch water meter vault (4-inch SENSUS OMNI T2 Water Meter by others) as shown in the plans, standard details, and specifications. The cost of precast meter vault, steel door, 4-inch ductile iron piping, 4-inch tees, 4-inch 90 degree bends, 4-inch gate valves, couplings, stainless steel hardware, protection of existing utilities and service connections, excavation, sheeting, shoring and bracing, dewatering, backfill, compaction, grading, restoration and clean-up, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 26 –6-INCH WATER METER VAULT

This per each bid item shall include furnishing all labor, equipment, and materials necessary to connect the proposed 12-inch primary and secondary water feed to the proposed 6-inch water meter vault (6-inch SENSUS OMNI T2 Water Meter by others) as shown in the plans, standard details, and specifications. The cost of precast meter vault, steel door, 6-inch ductile iron piping, 6-inch tees, 6-inch 90 degree bends, 6-inch gate valves, couplings, stainless steel hardware, protection of existing utilities and service connections, excavation, sheeting, shoring and bracing, dewatering, backfill, compaction, grading, restoration and clean-up, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 27 – CONNECTION TO EXISTING 8-INCH WATER LINE ON SECONDARY FEED AT STA 1+00

This per each bid item shall include furnishing all labor, equipment, and materials necessary to connect the proposed 12-inch secondary water feed to the existing 8-inch water line at STA 1+00 as shown in the plans, standard details, and specifications. The cost of fittings, 8-inch restrained solid sleeves, 12-inch x 8-inch restrained mechanical joint (MJ) reducer, stainless steel hardware, protection of existing utilities and service connections, cutting pipe, excavation, dewatering, backfill, compaction, grading, restoration and clean-up, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 28 – CONNECTION TO 12-INCH WATER LINE ON PRIMARY FEED AT STA 1+00

This per each bid item shall include furnishing all labor, equipment, and materials necessary to connect the proposed 12-inch primary water feed to the 12-inch water line at STA 1+00 as shown in the plans, standard details, and specifications. The cost of fittings, 12-inch restrained solid sleeves, stainless steel hardware, protection of existing utilities and service connections, cutting pipe, excavation, dewatering, backfill, compaction, grading, restoration and clean-up, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 29 – CONNECTION TO EXISTING 12-INCH WATER LINE ON PRIMARY FEED AT STA 36+87.40

This per each bid item shall include furnishing all labor, equipment, and materials necessary to connect the proposed 12-inch secondary water feed to the existing 12-inch water line at STA 36+87.40 as shown in the plans, standard details, and specifications. The cost of fittings, 12-inch restrained solid sleeves, stainless steel hardware, protection of existing utilities and service connections, cutting pipe, excavation, dewatering, backfill, compaction, grading, restoration and clean-up, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 30 – CONNECTION TO EXISTING 8-INCH WATER LINE ON SECONDARY FEED AT STA 32+75.00

This per each bid item shall include furnishing all labor, equipment, and materials necessary to connect the proposed 12-inch secondary water feed to the existing 8-inch water line at STA 32+75 as shown in the plans, standard details, and specifications. The cost of fittings, 8-inch restrained tapping sleeves, 8-inch tapping valve and valve box, 4-inch water meter and vault, 4-inch double check valve and vault, 12-inch x 4-inch restrained mechanical joint (MJ) reducer, 8-inch x 4-inch restrained MJ reducer, stainless steel hardware, protection of existing utilities and service connections, cutting pipe, excavation, dewatering, backfill, compaction, grading, restoration and clean-up, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 31 – UTILITY DOME MARKER

This per each bid item shall include furnishing all labor, equipment, and materials necessary for the utility dome markers as shown in the plans, standard details, and specifications. The cost of dome markers, excavation, backfill, compaction, and all other incidental items necessary for a complete and workable installation are included in this item.

BID ITEM 32 – SEDIMENT AND EROSION CONTROL

This lump sum bid item shall include furnishing all labor, equipment, and materials necessary for the sediment and erosion control as shown in the plans, standard details, and specifications. The cost of sediment erosion control and all other incidental items necessary for a complete and workable installation are included in this item.

BID ITEM 33 – TRENCH SAFETY

The unit price bid per linear foot shall include furnishing all labor, equipment, and materials necessary to design, furnish, install, and maintain a trench safety system. The cost shall include the design (must be sealed by a Professional Engineer licensed in the State of Oklahoma), all necessary geotechnical work, labor, all shoring (including any special shoring), sheeting, bracing and any other equipment or incidental items necessary for a complete and workable installation are included in this pay item. This Bid Item shall be paid per linear foot and will be measured along the centerline of the pipe and the outside edge of any vaults or structures.

BID ITEM 34 – UTILITY LOCATION AND SUPPORT

The unit price bid per linear foot shall include furnishing all labor, equipment, and materials necessary to locate and support all existing private, public and franchise utilities that will be crossed or encountered on this project as shown in the plans, standard details, and as described in the specifications. The cost of excavation, recording the horizontal and vertical utility location with GPS survey equipment, establishment of size and material, temporary support of the utility, flowable fill, embedment, compaction, backfill and all other incidental items necessary for a complete and workable installation are included in this pay item. This Bid Item shall be paid per linear foot and will be measured along the centerline of the pipe.

BID ITEM 35 – SEEDING

This lump sum bid item shall include furnishing all labor, equipment, and materials necessary for seeding as shown in the plans, standard details, and specifications. The cost of final grading, seed mixture, fertilizer, water, pulp, maintenance watering, and all other incidental items necessary for a complete and workable installation are included in this item.

BID ITEM 36 – PAVEMENT CUT AND PERMANENT REPAIR

This per square yard bid item shall be measured based on the amount of concrete pavement removed and replaced and shall be paid at the unit price in the Detailed Bid Form. This item shall include furnishing all materials, labor, and equipment to properly remove and replace existing concrete pavement in accordance with the plans, standard details, and specifications. The cost of saw cutting, concrete removal and disposal, aggregate base, subgrade preparation, compaction, formwork, rebar, dowels, concrete, and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 37 – PRESSURE TESTING OF PIPELINES

This per lump sum bid item shall be measured based on the percentage of the pipeline that has been installed and shall include all labor, equipment, and materials necessary for the pressure testing of the 12" diameter primary water feed and 12" diameter secondary water feed as shown in the plans, standard details, and specifications. The cost of pressure testing and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 38 – DISINFECTION OF PIPELINES

This per lump sum bid item shall be measured based on the percentage of the pipeline that has been installed and shall include all labor, equipment, and materials necessary for the disinfection of the 12” diameter primary water feed and 12” diameter secondary water feed as shown in the plans, standard details, and specifications. The cost of disinfection, sampling laboratory verification and all other incidental items necessary for a complete and workable installation are included in this pay item.

BID ITEM 39 – STORMWATER POLLUTION PREVENTION PLAN DOCUMENTATION AND MANAGEMENT

This per lump sum bid item shall be measured based on the percentage of the pipeline that has been installed. This item shall include all material, labor and equipment to design, install, and maintain an approved Stormwater Pollution Prevention Plan (SWPPP), in accordance with project standard details and specifications. The SWPPP must be approved by Engineer and erosion control measures must be installed prior to any construction. This item shall include filing the Notice of Intent (NOI) and the Notice of Termination (NOT) with the Oklahoma Department of Environmental Quality (DEQ). The cost of permitting, SWPPP preparation, installation, maintenance and removal of erosion control devices, sediment handling and all other incidental items necessary to restore the ground surface are included in this item.

BID ITEM 40 – MOBILIZATION AND DEMOBILIZATION

This per lump sum bid item shall include furnishing materials and equipment, permits and labor necessary to move all machinery and personnel required onto, and off, the job site to perform construction in accordance with the plans, standard details, and specifications. The cost of the insurance, bonds, mobilization, demobilization, and all other incidental items are included in this lump sum pay item. This item shall not exceed 5% of the total bid. No more than 90% of this item shall be paid until Substantial Completion.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 31 00
PROJECT ADMINISTRATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Applications for Payment.
 - 2. Allowances.
 - 3. Unit Prices.
 - 4. Alternates.
 - 5. Contract Modifications.
 - 6. Execution of the Work including, but not limited to, the following:
 - a. OSHA Standards
 - b. Construction layout.
 - c. Field engineering and surveying.
 - d. General installation of products.
 - e. Progress cleaning.
 - f. Starting and adjusting.
 - g. Protection of installed construction.
 - h. Correction of the Work.
 - i. Basin dewatering and cleaning.
 - j. Workmanship.
 - k. Firearms.
 - l. Handling materials not approved.
 - m. Salvaged material.
 - n. Archeological discoveries.
 - o. Endangered species.
 - p. Blasting and burning.
 - q. Pipe closure and buoyancy of structures.
 - 7. Project Closeout

1.3 RELATED SECTIONS

- A. SECTION 01 11 00 – SUMMARY OF WORK
- B. SECTION 01 32 33 – PROJECT DOCUMENTATION

1.4 APPLICATIONS FOR PAYMENT

A. Schedule of Values

1. Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule
 - a. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets, Submittals Schedule, and Contractor's Construction Schedule.
 - b. Submit the Schedule of Values to Engineer at earliest possible date but no later than ten (10) days before the date scheduled for submittal of initial Applications for Payment.
2. Use the Bid Form and Specification Table of Contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - a. Include the following Project identification on the Application for Payment:
 - 1) Project name and location.
 - 2) Owner's Project Number.
 - 3) Name of Engineer.
 - 4) Engineer's project number.
 - 5) Contractor's name and address.
 - 6) Date of submittal.
 - 7) Application for Payment number.
 - b. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 - c. Mobilization payment shall not exceed 3 percent of the total Contract amount. Payment will be made as follows:
 - 1) Payment will be authorized when Contractor commences site preparation and earthwork with equipment and materials sufficiently deployed to maintain progress of work in accordance with the construction schedule.
 - d. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
 - e. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - f. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - g. Include accepted Schedule of Values for each schedule or portion of lump sum Work, and the unit price breakdown for Work to be paid on a unit price basis.
 - h. Include separate line item for each Change Order and Work Order Directive executed prior to date of submission. Provide further breakdown of such as requested by Engineer.
 - i. Provide separate line items in the Schedule of Values for initial cost of materials,

for each subsequent stage of completion, and for total installed value of that part of the Work.

- j. Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
- k. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - 1) Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- l. Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

B. Applications for payment

- 1. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
 - a. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- 2. The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- 3. Use one of the following forms for Applications for Payment.
 - a. AIA Document G702 and AIA Document G703 Continuation Sheets
 - b. AIA Document G702/CMA and AIA Document G703 Continuation Sheets
 - c. Contractor's form, when approved by Engineer and Owner.
- 4. Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.
 - a. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - b. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- 5. Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - a. List of subcontractors.
 - b. Schedule of Values.
 - c. Contractor's Construction Schedule (preliminary if not final).
 - d. Schedule of unit prices.
 - e. Submittals Schedule (preliminary if not final).
 - f. List of Contractor's staff assignments.

- g. List of Contractor's principal consultants.
 - h. Copies of building permits.
 - i. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - j. Initial progress report.
 - k. Report of preconstruction conference.
 - l. Certificates of insurance and insurance policies.
6. Contractor shall submit to the Engineer for review and approval a Schedule of Values for portions of work that are lump sum bid items.
7. Payment Application Procedures:
- a. Once a month, the Contractor shall submit to the Owner's Representative one (1) draft copy of the partial pay estimate for review. Owner's Representative shall review and revise, as necessary, and then return the draft to the Contractor. Allow Owner's Representative seven (7) days minimum to check pay estimate.
 - b. Contractor shall then prepare six (6) original signed copies for the Owner's Representative signature. Provide one (1) extra original for Owner's Representative to check one more time. (Original signatures are required on all six (6) summary pages and six (6) signature pages. Photocopied signatures will not be accepted.)
 - c. One copy shall include waivers of lien and similar attachments if required. Partial pay requests shall be on forms approved by the Owner.
 - d. Contractor shall use approved Schedule of Values and Bid Schedule for pay items. Provide signature space for Contractor, Owner's Project Manager, or as designated.
 - e. Pay Estimate pages should be submitted in this order:
 - 1) Summary of Payment Estimate Values with notarized statement.
 - 2) Attachment A – Total Value of Contract Performed
 - 3) Attachment B – Extra Work on Approved Change Orders
 - 4) Attachment C – Materials on Hand
 - 5) Copies of new "materials on hand" invoices received during the current payment period placed in the order listed on Attachment C. Copies of invoices for prior periods do not need to be submitted again.
 - 6) Attachment D – Project Summary
 - 7) Signature page
 - f. After signature is obtained from the Owner's Representative, the Contractor shall submit the six (6) signed copies to the Engineer for review and forwarding to the Owner for payment.
 - g. The Engineer will review and if he approves shall mail the six (6) copies to the Owner.
 - h. Contractor should always check pay estimate remittance copies for any corrections prior to preparation of the next pay estimate. Just because the payment amount is the same as that submitted does not mean there were no

- errors.
- i. Type written working copies are required.
 - j. Materials incorporated into the project are tax-exempt. Contractor is responsible for all taxes related to construction of this project.
 - k. Some of this pay estimate process may be able to be performed electronically.
8. Beginning with the second Application for Payment, each Application shall include a Contractor's Affidavit regarding discharge of payment obligations in accordance with the General Conditions.
9. After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
- a. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - b. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
10. Submit Final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
- a. Requirements of General and Supplementary Conditions for final payment.
 - b. Evidence of completion of Project closeout requirements.
 - c. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - d. Updated final statement, accounting for final changes to the Contract Sum.
 - e. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - f. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 - g. AIA Document G707, "Consent of Surety to Final Payment."
 - h. Evidence that claims have been settled, or provide a list of claims Contractor believes are unsettled.
 - i. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 - j. Final, liquidated damages settlement statement.

C. Payment

- 1. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
- 2. Payment will not be made for the following:
 - a. Loading, hauling, and disposing of rejected material.
 - b. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
 - c. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.

- d. Material not unloaded from transporting vehicle.
 - e. Material remaining on hand after completion of work.
- D. Partial Payment for Stored Materials and Equipment
- 1. No partial payment will be made for materials and equipment delivered or stored unless Shop Drawings or preliminary operation and maintenance manuals are acceptable to Engineer.
 - 2. Final Payment will be made only for products incorporated in Work; remaining products, for which partial payment have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.5 ALLOWANCES

- A. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
- 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
 - 4. Contingency allowances.
 - 5. Testing and inspecting allowances.
- C. Allowance shall include cost to Contractor of specific products and materials ordered by Owner and/or selected by Engineer under allowance and shall include taxes, freight, and delivery to Project site.
- D. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner and/or selected by Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.
- E. Selection and Purchase
- 1. At the earliest practical date after award of the Contract, advise Engineer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
 - 2. At Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
 - 3. Purchase products and systems selected by Engineer from the designated supplier.
 - 4. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.
- F. Contingency Allowances
- 1. Use the contingency allowance only as directed by Engineer for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
 - 2. Contractor's overhead, profit, and related costs for products and equipment ordered

by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

3. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
4. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.6 UNIT PRICES

- A. Unit price is an amount proposed by bidders 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.
- B. Procedures
 1. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
 2. Refer to SECTION 01 29 00 - MEASUREMENT AND PAYMENT for work that requires establishment of unit process.
 3. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

1.7 CONTRACT MODIFICATIONS

- A. Engineer will issue Field Orders authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.
- B. Proposal Requests
 1. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - a. Proposal Requests issued by Engineer are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - b. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - 1) Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 2) Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 3) Include costs of labor and supervision directly attributable to the change.
 - 4) Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity

duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

2. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Engineer.
 - a. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - b. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - d. Include costs of labor and supervision directly attributable to the change.
 - e. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - f. Comply with requirements in SECTION 01 32 33 - PROJECT DOCUMENTATION if the proposed change requires substitution of one product or system for product or system specified.
 3. Proposal Request Form: Use forms provided by the Internet-Based Construction Management program.
- C. Allowance for Contract Modification
1. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - a. Include installation costs in purchase amount only where indicated as part of the allowance.
 - b. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - c. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - d. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
 2. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21-days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21-days after such authorization.

D. Change Order Procedures

1. On Owner's approval of a Proposal Request, Engineer will issue a Change Order for signatures of Owner and Contractor.

1.8 EXECUTION OF THE WORK

A. Submittals

1. Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
2. Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
3. Submit two copies of certified surveys signed by land surveyor.
4. Submit two copies of final property survey showing the Work performed and record survey data.

B. Quality Assurance

1. Land Surveyor shall be a professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

1.9 PROJECT CLOSEOUT

A. This subpart includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Final cleaning.

B. Substantial Completion

1. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - a. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - b. Advise Owner of pending insurance changeover requirements.
 - c. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - d. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - e. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - f. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - g. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

- h. Complete startup testing of systems.
 - i. Submit test/adjust/balance records.
 - j. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - k. Advise Owner of changeover in heat and other utilities.
 - l. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - m. Complete final cleaning requirements, including touchup painting.
 - n. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
2. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, which must be completed or corrected before certificate will be issued.
- a. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - b. Results of completed inspection will form the basis of requirements for Final Completion.
- C. Final Completion
1. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
- a. Submit a final Application for Payment.
 - b. Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - c. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - d. Submit pest-control final inspection report and warranty, as applicable.
 - e. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.
2. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
- a. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- D. List of Incomplete Items (Punch List)
1. Preparation: Submit three copies of list. Include name and identification of each

space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use Punch List similar to the form attached.

- a. Organize list in sequential order as directed by Owner's Representative.
- b. Organize items applying to each space by major element.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 ALLOWANCES

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.
- B. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.2 UNIT PRICES

- A. Not Used

3.3 ALTERNATES

- A. Schedule of Alternates – Not Used

3.4 CONTRACT MODIFICATIONS SUPPLEMENTS

- A. Forms for the following work will be provided by the Internet-Based Construction Management Program. Forms can be provided in electronic format.
 1. Field Change
 2. Proposed Contract Modification by Owner
 3. Contractor's Modification Request
 4. Change Order

3.5 EXECUTION OF THE WORK

- A. Examination
 1. Existing Conditions and Utilities: When appropriate, the existence and location of site improvements, underground and other utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - a. Before construction, verify the location and points of connection of utility services.
 - b. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - c. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

2. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - a. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - b. Examine rough-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - c. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - d. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.
- B. Preparation
1. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
 2. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 3. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
 4. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Engineer. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.
- C. OSHA Standards
1. All work performed under this Contract shall meet the applicable requirements of the Occupational Safety and Health Administration (OSHA). It is the responsibility of the Contractor to become familiar with the provisions of regulations published by OSHA in the Federal Register and to perform all of the responsibilities thereunder. It is the Contractor's responsibility to see that the Project is constructed in accordance with OSHA regulations and to indemnify and save harmless the Owner from any penalties resulting from the Contractor's failure to so perform.
- D. Construction Layout
1. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.
 2. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - a. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.

- b. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - c. Inform installers of lines and levels to which they must comply.
 - d. Check the location, level and plumb, of every major element as the Work progresses.
 - e. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
 - f. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
 3. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
 4. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
 5. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.
- E. Field Engineering
 1. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 2. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - a. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- F. Installation
 1. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - a. Make vertical work plumb and make horizontal work level.
 - b. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - c. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 2. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
 3. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
 4. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

5. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
 6. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
 7. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - a. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - b. Allow for building movement, including thermal expansion and contraction.
 - c. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
 8. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
 9. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.
- G. Progress Cleaning
1. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - a. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - b. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degree F.
 - c. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 2. Site: Maintain Project site free of waste materials and debris.
 3. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - a. Remove liquid spills promptly.
 - b. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 4. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
 5. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

6. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 7. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
 8. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 9. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- H. Starting and Adjusting
1. Start equipment and operating components to confirm proper operation in accordance with SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA and the following:
 - a. Remove malfunctioning components, replace with new components, and retest.
 - b. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
 - c. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Manufacturer's Services: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in each Specification Section.
- I. Protection of Installed Construction
1. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
 2. Comply with manufacturers written instructions for temperature and relative humidity.
- J. Cutting and Patching
1. Perform cutting, fitting, and patching required to complete the Work or to:
 - a. Uncover Work to provide for installation of new Work or the correction of defective work.
 - b. Provide routine penetrations of non-structural surfaces for installation of mechanical, electrical, and plumbing Work.
 - c. Uncover Work that has been covered prior to observation by the Engineer.
 2. Submit written notification to the Engineer in advance of performing any cutting which affects:
 - a. Work of any other contractors or the Owner.
 - b. Structural integrity of any structure or system of the Project.
 - c. Integrity of effectiveness of weather exposed or moisture resistant structure or systems.

- d. Efficiency, operational life, maintenance, or safety of any structure or systems.
 - e. Appearance of any structure or surfaces exposed occasionally or constantly to view.
3. The notification shall include:
- a. Identification of the Project.
 - b. Location and description of affected Work.
 - c. Reason for cutting, alteration, or excavation.
 - d. Effect on the Work of any separate contractor or Owner.
 - e. Effect on the structural or weatherproof integrity of the Project.
 - f. Description of proposed Work, including:
 - 1) Scope of cutting, patching, or alteration.
 - 2) Trades that will perform the Work.
 - 3) Products proposed for use.
 - 4) Extent of refinishing to be performed.
 - 5) Cost proposal, when applicable
 - g. Alternates for cutting and patching.
 - h. Written authorization from any separate contractor whose Work would be affected.
 - i. Date and time Work will be uncovered or altered.
4. Determine the existing conditions, including structures subject to damage or to movement during cutting and patching.
- a. Inspect conditions affecting installation or products or performance of the Work after uncovering the Work.
 - b. Provide a written report of unacceptable or questionable conditions to the Engineer. The Contractor shall not proceed with Work until Engineer has provided further instructions. Beginning Work will constitute acceptance of existing conditions by the Contractor.
5. Protect the structure and other parts of the Work and provide adequate support to maintain the structural integrity of the affected portions of the Work. Provide devices and methods to protect adjacent Work and other portions of the Project that may be exposed by cutting and patching Work.
6. Execute cutting and demolition by methods which will prevent damage to other Work and will provide proper surfaces to receive installation of repairs.
7. Execute fitting and adjustments of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
8. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to, the removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the modified Work.
9. Restore permanent facilities used during construction to their specified condition.
10. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

11. Fit Work air-tight to pipes, sleeves, ducts, conduit, and other penetrations through the surfaces. Where fire rated separations are penetrated, fill the space around the pipe of insert with materials with physical characteristics equivalent to fire resistance requirements of penetrated surface.
 12. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
 13. Patch finished surfaces and building components using new products specified for the original installation.
 14. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - a. For continuous surfaces, refinish to the nearest intersection.
 - b. For an assembly, refinish the entire unit.
- K. Hazardous Environment/Confined Space Entry Plans
1. Contractor shall develop and implement Hazardous Environment/Confined Space Entry Plans for this Project. Plans shall be submitted to the Engineer for record purposes prior to the pre-construction conference. Plans shall include all local, state and federal requirements for entrance to and working in hazardous environments and confined spaces and shall include a written safety plan for the Project.
 2. Contractor shall have a safety officer present at the jobsite whenever the Contractor's activities require entering or working in a hazardous environment or confined space.
- L. Plan of Action
1. Contractor shall prepare a detailed, written plan of action (covering all shutdowns, material deliveries, confined space/hazardous environment entries, plant protection system, construction sequence for major facilities and modifications to existing facilities, trench/excavation protection, for review and coordination with the Owner and Engineer at the pre-construction conference. The pre-construction conference will be held prior to beginning construction activities.
- M. Basin Dewatering and Cleaning
1. The Contractor shall clean basins, pipelines and equipment as specified and, when necessary to complete the work. No additional payment will be made for such work. Washdown water shall be contained and disposed of properly.
- N. Workmanship
1. Specifications contain detailed instructions and descriptions of the major items of construction and workmanship necessary for building and completing the various elements of the Project. The Specifications are intended to be written so that only first class workmanship and finish of the best grade and quality will result. The fact that these Specifications may fail to be so complete as to cover all details will not relieve the Contractor of full responsibility for providing a completed project of high quality, first class finish and appearance and satisfactory for operation, all within the apparent intent of the Plans and Specifications.
- O. Firearms
1. Neither the Contractor nor any of his employees shall be allowed to carry firearms on the Project, either on their persons or within their automobiles. Any violation of this

requirement will result in the permanent removal from the Project of the employee committing the violation.

P. Handling Materials Not Approved

1. The Contractor shall remove from the site any materials found to be damaged, and any materials not meeting the specifications. These materials shall be removed promptly, unless the Engineer will accept the materials after repairing. Materials found to be damaged, or not acceptable to the Engineer, shall be removed. Examination before installation shall not relieve the Contractor from any responsibility to furnish good quality materials.

Q. Surplus and Salvaged Material

1. Surplus equipment or material, which is removed by the Contractor as specified in the Drawings and Specifications, shall become the property of the Contractor. The Contractor shall be responsible for the disposal of salvage material offsite.
2. Equipment and material designated to be salvage shall be transported by the Contractor to a location as directed by the Resident Project Representative.

R. Archeological Discoveries

1. No activity, which may affect a State Archeological Landmark, is authorized until the Owner has complied with provisions of the Antiquities Code of Oklahoma. The Owner has previously coordinated with the appropriate agencies and impacts to known cultural or archeological deposits have been avoided or mitigated. However, the Contractor may encounter unanticipated cultural or archeological deposits during construction.

S. Endangered species

1. No activity is authorized that is likely to jeopardize the continued existence, or a threatened, or endangered species as listed, or proposed for listing, under the Federal Endangered Species Act (ESA), and/or the State of Oklahoma Parks and Wildlife Code on Endangered Species, or to destroy or adversely modify the habitat of such species.
2. If a threatened or endangered species is encountered during construction, the Contractor shall immediately cease work in the area of the encounter and notify the Resident Project Representative, who will immediately implement actions in accordance with the ESA and applicable State statutes. These actions shall include reporting the encounter to the U.S. Fish and Wildlife Service and the Oklahoma Parks and Wildlife Department, obtaining any necessary approvals or permits to enable the continuation of work, or implement other mitigate actions.
3. The Contractor shall not resume construction in the area of the encounter until authorized to do so by the Resident Project Representative.

T. Blasting and Burning

1. Explosives: Do not use explosives.
2. Burying: Waste Disposal: Burying waste materials on-site will not be permitted.
3. Burning: Waste Disposal: No Burning will be allowed.

U. Pipe Closure and Buoyancy of Structures

1. At the end of each working day, the Contractor shall plug the ends of all exposed pipeline to prevent any material or objects from entering the pipeline.

2. The Contractor shall anchor all pipelines and structures to prevent their flotation should rain occur prior to the completion of backfilling to proposed final grade.

V. Final cleaning

1. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
2. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each Project site, equipment, structures, buildings and related facilities. Comply with manufacturer's written instructions.
 - a. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - 1) Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - 2) Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - 3) Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - 4) Remove tools, construction equipment, machinery, and surplus material from Project site.
 - 5) Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - 6) Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - 7) Sweep concrete floors broom clean in unoccupied spaces.
 - 8) Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - 9) Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - 10) Remove labels that are not permanent.
 - 11) Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - a) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - 12) Wipe surfaces of mechanical and electrical equipment and similar

equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

- 13) Replace parts subject to unusual operating conditions.
 - 14) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - 15) Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - 16) Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - 17) Leave Project clean and ready for occupancy.
3. Pest Control: Not Used
 4. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

**SECTION 01 32 23
SURVEY AND LAYOUT DATA**

PART 1 - GENERAL

1.1 CONSTRUCTION STAKING

- A. Unless otherwise specified, all construction stakes shall be provided by the Contractor using the benchmarks as shown on the Plans.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GRADES, LINES AND LEVELS

- A. The Contractor shall construct all work under this Contract to the alignments and to within +0.20/-0.00 feet of the grades shown on the Plans. The Contractor shall be responsible for layout, staking and control of all grades, lines, and levels. Permanent benchmarks at the site are provided as shown on the Plans by identified parcel numbers. Contractor shall be responsible for returning the existing grade to the appropriate elevation. The Contractor shall be responsible to verify all elevations have been brought back to existing grade prior to construction.

END OF SECTION

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**SECTION 01 32 33
PROJECT DOCUMENTATION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the following:
 - 1. Construction Progress Documentation including the following:
 - a. Submittals Schedule.
 - b. Preliminary Network Diagram for Internet-Based Construction Management
 - c. Contractor's Construction Schedule.
 - d. Critical Path Method Reports.
 - e. Daily construction reports.
 - f. Field condition reports.
 - 2. Photographic documentation.
 - 3. Submitting Shop Drawings, Product Data, Samples, and other submittals.
 - 4. Selection of products for use in Project; product delivery, storage, and handling; product substitutions; and comparable products.
 - 5. Project Record Documents, including the following:
 - a. As-Built Record Drawings.
 - b. As-Built Record Specifications.
 - 6. Preparing operation and maintenance manuals, including the following:
 - a. Operation and maintenance documentation directory.
 - b. Emergency manuals.
 - c. Operation manuals for systems, subsystems, and equipment.
 - d. Maintenance manuals for the care and maintenance of systems and equipment.
- B. Related Sections include the following:
 - 1. SECTION 01 31 00 PROJECT ADMINISTRATION for submitting the Schedule of Values and Project Closeout Procedures.
 - 2. SECTION 01 32 39 CONTRACTOR REQUIREMENTS for submitting and distributing meeting and conference minutes.
 - 3. SECTION 01 78 36 WARRANTIES for submitting warranties.
 - 4. Divisions 2 through 50 Sections for specific requirements for Project Documentation of the Work in those Sections.

1.3 CONSTRUCTION PROGRESS DOCUMENTATION

- A. Submittals
 - 1. Submittals Schedule: Submit schedule per SECTION 01 10 39 INTERNET-BASED

CONSTRUCTION MANAGEMENT. Arrange the following information in a tabular format:

- a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category (action or informational).
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.
2. Contractor's Construction Schedule: Submit initial schedule, large enough to show entire schedule for entire construction period, per SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT.
 - a. Submit an electronic copy of schedule. Include type of schedule (Initial or Updated) and date on filename.
 3. Critical Path Method (CPM) Reports: Concurrent with CPM schedule, submit each of the following computer-generated reports per SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - a. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - b. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - c. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Daily Construction Reports: Submit, per SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT AT weekly intervals.
 5. Field Condition Reports: Submit, per SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT at time of discovery of differing conditions.
- B. Coordination
1. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
 2. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - a. Secure time commitments for performing critical elements of the Work from parties involved.
 - b. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.4 PHOTOGRAPHIC DOCUMENTATION

A. Submittals

1. Submit a key plan of Project site with notation of vantage points marked for location

and direction of each photograph. Indicate elevation or stage of construction of structure or area. Include same label information as corresponding set of photographs.

2. Submit digital copies of all image files of each photographic view on CD-ROMs or USB thumb drives within seven 14 days of taking photographs.
 - a. Format: JPEG or TIFF file format.
 - b. Identification: For each image, provide the following information in in a text or Microsoft Word file:
 - 1) Name of Project.
 - 2) Name of Contractor.
 - 3) Date photograph was taken if not date stamped by camera.
 - 4) Description of vantage point, indicating location, direction (by compass point), and elevation or stage of construction.
 - 5) Unique sequential identifier.
 - c. Submit a complete set of digital image electronic files with each submittal of prints as a Project Record Document on CD-ROM or USB thumb drive. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.
- B. Photographer may be member of the Contractor's staff, experienced in construction photography.
- C. Photographer shall be granted access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.
- D. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

1.5 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

- A. Definitions
 1. Action Submittals: Written and graphic information that requires Engineer's responsive action.
 2. Informational Submittals: Written information that does not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.
- B. Submittal Procedures
 1. Coordinate preparation and processing of submittals with performance of construction activities.
 - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that requires sequential activity.
 - b. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - 1) Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

2. Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - a. Allow 21 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - b. If intermediate submittal is necessary, process it in same manner as initial submittal.
 - c. Allow 21 days for review of each resubmittal.
3. Place a permanent label or title block on each submittal for identification.
 - a. Indicate name of firm or entity that prepared each submittal on label or title block.
 - b. Provide a space approximately on label or beside title block to record Contractor's review markings (green in color).
 - c. Include the following information on label for processing and recording action taken:
 - 1) Project name.
 - 2) Date.
 - 3) Name and address of Engineer.
 - 4) Name and address of Contractor.
 - 5) Name and address of subcontractor.
 - 6) Name and address of supplier.
 - 7) Name of manufacturer.
 - 8) Submittal number shall be by means of a specification number, a chronological order, and a letter suffices to indicate number of times submitted.
 - a) Submittal number shall use Specification Section number followed by a hyponym and then a sequential number (e.g., 06100-01). Resubmittals shall include an alphabetic suffix after another hyponym (e.g., 06100-01-A).
 - b) Operational and Maintenance Manuals submitted shall be identified with the same number as it's corresponding equipment submittal (e.g., 11300-DRAFT).
 - 9) Number and title of appropriate Specification Section.
 - 10) Drawing number and detail references, as appropriate.
 - 11) Location(s) where product is to be installed, as appropriate.
 - 12) Other necessary identification.
4. Deviations from Contract Documents: Contractor shall highlight, encircle, or otherwise specifically identify deviations (green in color) from the Contract Documents on submittals. Requests for deviation shall be by Contractor's Modification Request in accordance with the requirements of SECTION 01 31 00 PROJECT ADMINISTRATION.

5. Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
6. Package each submittal individually and appropriately for transmittal and handling. Transmit submittals per SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT. Engineer will return submittals, without review, received from sources other than Contractor.
7. Make resubmittals in same form and number of copies as initial submittal.
 - a. Note date and content of previous submittal.
 - b. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - c. Resubmit submittals until they are marked "REVIEWED."
 - d. For resubmittals, Contractor shall provide the entire and complete submittal for project documentation. If the Contractor provides only the portions required by the previous shop drawing review, then the Engineer may elect to return the submittal without review.
8. Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
9. Use only final submittals with mark indicating "REVIEWED" or "Furnished As Corrected" for Construction.

1.6 PRODUCT REQUIREMENTS

A. Definitions

1. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
 - b. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - c. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
2. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
3. Basis-of-Design Product Specification: Where a specific manufacturer's product is

named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

B. Submittals

1. **Material and Equipment List.** Within 60 days after Notice to Proceed, submit a complete list of major products proposed for the Project, with the name of the manufacturer and the installing entity.
2. **Substitution Requests:** Submit each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - a. **Substitution Request Form:** Use facsimile of form provided at end of Section.
 - b. **Documentation:** Show compliance with requirements for substitutions and the following, as applicable:
 - 1) Statement indicating why specified material or product cannot be provided.
 - 2) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will be necessary to accommodate proposed substitution.
 - 3) Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 4) Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - 5) Samples, where applicable or requested.
 - 6) List of similar installations for completed projects with project names and addresses and names and addresses of architects, engineers, and owners.
 - 7) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - 8) Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - 9) Cost information, including a proposal of change, if any, in the Contract Sum.
 - 10) Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - 11) Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 - c. **Engineer's Action:** If necessary, Engineer will request additional information or

documentation for evaluation within 7 days of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- 1) Form of Acceptance: Change Order or Field Order.
- 2) Use product specified if Engineer cannot make a decision on use of a proposed substitution within time allocated.

3. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

a. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Engineer will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- 1) Form of Approval: As specified in in this specification Section.
- 2) Use product specified if Engineer cannot make a decision on use of a comparable product request within time allocated.

4. Basis-of-Design Product Specification Submittal: Comply with requirements in this specification Section. Show compliance with requirements.

C. Quality Assurance

1. If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
2. Where Contractor design is specified; design of installation, systems, equipment, and components, including supports and anchorage, shall be in with provisions of International Building Code by International Code Council. Refer to the drawings for required design load criteria.
3. Provide products suitable for installation and operation under rated conditions at 3,256 feet above sea level. Products installed outdoors or in unheated enclosures shall be capable of continuous operation within an ambient temperature range of 0 degrees F to 120 degrees F.

D. Product Delivery, Storage, And Handling

1. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
2. Delivery and Handling:
 - a. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - b. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - c. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and

- instructions for handling, storing, unpacking, protecting, and installing.
 - d. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 3. Storage:
 - a. Store products to allow for inspection and measurement of quantity or counting of units.
 - b. Store materials in a manner that will not endanger Project structure.
 - c. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - d. Store cementitious products and materials on elevated platforms.
 - e. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - f. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - g. Protect stored products from damage and liquids from freezing.
 - h. Off-site storage of materials and equipment shall be the sole responsibility of the Contractor.
 - 4. Extra Materials, Special Tools, Test Equipment, and Expendables:
 - a. Divisions 2 through 50 Sections for specific requirements.
 - b. Schedule:
 - 1) Ensure shipment and delivery occurs concurrent with shipment of product.
 - 2) Transfer to Owner upon acceptance by Contractor of shipment.
 - c. Packaging and Shipment:
 - 1) Package and ship items to avoid damage during long term storage in original cartons or in appropriately sized, hinged-cover, wood, plastic or metal boxes.
 - 2) Prominently display on each package: Part number, consistent with Operation and Maintenance Manual identification system; equipment description, quantity of parts; and equipment manufacturer.
 - d. Deliver to designation location as directed by Engineer.

1.7 PROJECT RECORD DOCUMENTATION

- A. Submit one set of marked-up As-Built Record Drawings.
- B. Submit one copy of marked-up Project Specifications, including addenda and contract modifications.
- C. Submit one copy of each marked-up Product Data submittal.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Definitions
 - 1. Preliminary Data: Initial and subsequent submissions for Engineer's review.

2. Final Data: Engineer accepted data, submitted as specified herein.
 3. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.
 4. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
 5. Subsystem: A portion of a system with characteristics similar to a system.
 6. Instructional Manual: Equipment and Operating Data submitted prior to the testing and startup of the equipment, subsystem, or system.
 7. Operation and Maintenance Data: The operation and maintenance data submitted to be included in the Operation and Maintenance Manual for the Project.
- B. Sequencing and Scheduling
1. Equipment and System Data (Instructional manual):
 - a. Preliminary Data:
 - 1) Do not submit until Engineer has approved Shop Drawings.
 - 2) Submit prior to shipment date.
 - b. Final Data: Submit Instructional Manual Formatted data not less than 30 days prior to equipment or system field functional testing. Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of Project.
- C. Submittals
1. Initial Submittal: Submit draft copy of each Operation and Maintenance Data (Manual) at least 60 days before check-out, start-up or testing of equipment in accordance with SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT. Include a complete operation and maintenance directory. Engineer will review and mark whether general scope and content of Manual is acceptable.
 2. Final Submittal: Submit one (1) copy of each Manual in final form at least 30 days before requesting inspection for Substantial Completion. Engineer will return copy with comments within 15 days of receipt or notify Contractor it is accepted.
 - a. Correct or modify each manual to comply with Engineer's comments. Submit (4) copies of each corrected manual within 15 days of receipt of Engineer's comments. Provide three (3) electronic copies of the final manual in PDF format.
- D. Coordination
1. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 CONSTRUCTION PROGRESS DOCUMENTATION

A. Submittals Schedule

1. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - a. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - b. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
- B. Contractor's Construction Schedule, General
1. Extend schedule from date established for the Notice to Proceed to date of Final Completion.
 - a. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
 2. Treat each facility or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - a. Activity Duration: Define activities so no activity is longer than approximately 20 days.
 - b. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - c. Submittal Review Time: Include review and resubmittal times.
 - d. Startup and Testing Time: Include time for equipment testing and facility startup.
 - e. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
 3. Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.
 - a. Indicate important stages of construction for each major portion of the Work.
 4. Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
 5. For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- C. Contractor's Construction Schedule
1. Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
 2. Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - a. For construction activities that require 3 months or longer completing, indicate an estimated completion percentage in 10 percent increments within time bar.

D. Contract Time

1. Contract time cannot be changed by the submission of progress changes. Contract time can only be modified by approved Change Order.

E. Reports

1. Prepare a daily construction report recording the following information concerning events at Project site:
 - a. List of subcontractors at Project site.
 - b. Equipment at Project site.
 - c. Material deliveries.
 - d. High and low temperatures and general weather conditions.
 - e. Accidents.
 - f. Stoppages, delays, shortages, and losses.
 - g. Meter readings and similar recordings.
 - h. Orders and requests of authorities having jurisdiction.
 - i. Services connected and disconnected.
 - j. Equipment or system tests and startups.

- F. Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.2 PHOTOGRAPHIC DOCUMENTATION

A. Photographic Media

1. Digital Images: Provide images in JPEG or TIFF format, produced by a digital camera with minimum sensor size of 20 megapixels, and at an image resolution of up to 5152 by 3864 pixels.

2.3 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Action Submittals

1. Prepare and submit Action Submittals required by individual Specification Sections.
2. Collect information into a single submittal for each element of construction and type of product or equipment.
 - a. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - b. Mark each copy of each submittal to show which products and options are applicable.
 - c. When pre-printed catalog information is submitted, clearly identified item to be submitted with arrow or other mark. Catalog information not marked clearly shall be returned.
 - d. Include the following information, as applicable:
 - 1) Manufacturer's written recommendations.

- 2) Manufacturer's product specifications.
 - 3) Manufacturer's installation instructions.
 - 4) Manufacturer's catalog cuts.
 - 5) Wiring diagrams showing factory-installed wiring.
 - 6) Printed performance curves.
 - 7) Operational range diagrams.
 - 8) Compliance with specified referenced standards.
 - 9) Testing by recognized testing agency.
- e. Submit Product Data electronically in accordance with SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT.
3. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Engineer's CAD Drawings is otherwise permitted.
- a. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - 1) Dimensions.
 - 2) Identification of products.
 - 3) Fabrication and installation drawings.
 - 4) Roughing-in and setting diagrams.
 - 5) Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - 6) Shop work manufacturing instructions.
 - 7) Templates and patterns.
 - 8) Schedules.
 - 9) Notation of coordination requirements.
 - 10) Notation of dimensions established by field measurement.
 - 11) Relationship to adjoining construction clearly indicated.
 - 12) Seal and signature of professional engineer if specified.
 - 13) Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 - 14) Electrical requirements.
 - 15) Limits of or range of operation.
 - 16) Performance curves.
 - b. Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 - c. Submit Shop Drawings electronically in accordance with SECTION
 - d. 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT.
4. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

- a. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - b. Identification: Attach label on unexposed side of Samples that includes the following:
 - 1) Generic description of Sample.
 - 2) Product name and name of manufacturer.
 - 3) Sample source.
 - 4) Number and title of appropriate Specification Section.
 - c. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - d. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - 1) Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
 - e. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - 1) Submit two sets of Samples. Engineer will retain one Sample set; remainder will be returned.
5. As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
- a. Submit three copies of product schedule or list, unless otherwise indicated. Engineer will return two copies.
6. Schedule of Values: Comply with requirements specified in SECTION 01 31 00 PROJECT ADMINISTRATION.
7. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
- B. INFORMATIONAL SUBMITTALS**
- 1. Prepare and submit Informational Submittals required by other Specification Sections.
 - a. Submit per SECTION INTERNET-BASED CONSTRUCTION MANAGEMENT unless otherwise indicated.
 - b. Provide a notarized statement that includes signature of entity responsible for preparing certification. An officer shall sign certificates and certifications or

- other individual authorized to sign documents on behalf of that entity.
- c. Test and Inspection Reports: Comply with requirements specified in each Specification Section.
2. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
 3. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
 4. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 5. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 6. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
 7. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 8. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 9. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
 10. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
 11. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
 12. Operational and Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
 13. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for

installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

14. **Manufacturer's Field Reports:** Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - a. Statement on condition of substrates and their acceptability for installation of product.
 - b. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - c. Results of operational and other tests and a statement of whether observed performance complies with requirements.
15. **Insurance Certificates and Bonds:** Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
16. **Material Safety Data Sheets (MSDS):** Submit information directly to Owner; do not submit to Engineer.
 - a. Engineer will not review submittals that include MSDS and will return them for resubmittal.

C. DELEGATED DESIGN

1. Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - a. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
2. In addition to Shop Drawings, Product Data, and other required submittals, submit per SECTION 01 10 39 INTERNET-BASED CONSTRUCTION MANAGEMENT signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

2.4 PRODUCT REQUIREMENTS

A. PRODUCT SELECTION PROCEDURES

1. Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 - a. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - b. **Standard Products:** If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - c. Like items of products furnished and installed shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and

- replacement, manufacturer's services, and implement same or similar process instrumentation and control functions.
- d. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
 - e. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - f. Where products are accompanied by the term "as selected," Engineer will make selection.
 - g. Where products are accompanied by the term "match sample," sample to be matched is Engineer's.
 - h. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 - i. Regulatory Requirements: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
 - j. Safety Guards:
 - 1) Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal.
 - 2) Use 16-gauge or heavier; galvanized steel, aluminum, coated steel and ½-inch mesh expanded steel.
 - 3) For outdoor installations prevent entrance of rain or dripping water.
 - k. Provide Work in accordance with NFPA 70, National Electrical code, and be labeled by a nationally recognized testing laboratory or other agency acceptable to the authority having jurisdiction.
 - l. Equipment Finish:
 - 1) Provide manufacturer's standard finish and color, except where specific color is indicated.
 - 2) If manufacturer does not have a standard color, provide color as approved by Engineer.
 - m. Provide to Owner all special tools and accessories required placing equipment in operation. These include, but not limited to, adequate oil and grease (as required for first servicing of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts required for maintenance.
 - n. Provide initial lubricant recommended by manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, start-up, and operation until final acceptance by Owner.
2. Fabrication and Manufacture:
- a. General Requirements:
 - 1) Manufacture parts to U.S.A. standard sizes and gauges.
 - 2) Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.

- 3) Design structural members for anticipated shock and vibratory loads.
 - 4) Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
 - 5) Modify standard products as necessary to meet performance specifications.
- b. Lubrication System Requirements:
- 1) Require no more than weekly attention during continuous operation.
 - 2) Convenient and accessible. Oil drains, with bronze or stainless steel valves, and fill-plugs easily accessible from normal operating area or platform. Locate drains to allow convenient collection of oil during changes without removing equipment from its installed position.
 - 3) Provide constant-level oilers or oil level indicators for oil lubrication systems.
 - 4) For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.
3. Product Selection Procedures:
- a. Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 - b. Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 - c. Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that comply with requirements.
 - d. Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 - e. Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 - f. Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 - g. Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
 - h. Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.

- i. Where Specifications require matching an established Sample, select a product that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a proposed product matches.
 - 1) If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
- j. Where Specifications include the phrase "as selected from manufacturer's colors, patterns, and textures" or a similar phrase, select a product that complies with other specified requirements.
 - 1) Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Engineer will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - 2) Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Engineer will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.5 PRODUCT SUBSTITUTIONS

- A. Engineer will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Engineer.
- B. Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
 - 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - 2. Requested substitution does not require extensive revisions to the Contract Documents.
 - 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - 4. Substitution request is fully documented and properly submitted.
 - 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 - 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - 7. Requested substitution is compatible with other portions of the Work.
 - 8. Requested substitution has been coordinated with other portions of the Work.
 - 9. Requested substitution provides specified warranty.

2.6 COMPARABLE PRODUCTS

- A. Engineer will consider Contractor's request for comparable product when the following

conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, which it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

2.7 REUSE OF EXISTING MATERIAL

- A. Except as specifically indicated or specified, materials and equipment removed from existing facilities shall not be used in the completed Work.
- B. For materials and equipment designated for reuse in the Work:
 1. Use special care in removal, handling, storage, and installation to ensure proper function in the completed Work.
 2. Arrange for transportation, storage and handling of the products when offsite storage, restoration, or renovation. All costs associated with this work are the Contractor's responsibility.

2.8 PROJECT RECORD DOCUMENTATION

- A. As-Built Drawings
 1. Contractor shall maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.
 - a. Mark As-Built Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained As-Built data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up As-Built Prints.
 - 1) Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - 2) Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - b. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 - c. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - d. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2. Format: Identify and date each As-Built Drawing; include the designation "Project As-Built Drawing" in a prominent location.
 - a. Include identification on cover sheets.
 - b. Identification: As follows:
 - 1) Date.
 - 2) Designation "Project As-Built Drawings."
 - 3) Name of Engineer.
 - 4) Name of Contractor.
- B. Miscellaneous record submittals
1. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and found or filed, ready for use and reference. Miscellaneous records include, but are not limited to, the following:
 - a. Field records on excavations and foundations.
 - b. Field records on underground construction and similar work.
 - c. Surveys showing locations and elevations of underground lines.
 - d. Invert elevations of drainage pipes.
 - e. Surveys establishing building lines and levels.
 - f. Records of equipment testing, start-up, and operation.
 - g. Certifications received in lieu of labels on bulk products.
 - h. Batch mixing and bulk delivery tickets.
 - i. Documented qualifications of installation firms.
 - j. Inspections and certification of governing agencies.
 - k. Load and performance testing.
 - l. Results of pressure testing of lines.
 - m. Final inspection and correction procedures.

2.9 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance documentation directory
1. Include a section in the directory for each of the following:
 - a. List of documents.
 - b. List of systems.
 - c. List of equipment.
 - d. Table of contents.
 2. List systems alphabetically or by treatment area as directed by Engineer. Include references to operation and maintenance manuals that contain information about each system.
 3. List equipment for each system, organized alphabetically by system or by treatment area as directed by Engineer. For pieces of equipment not part of system, list alphabetically in separate list.

4. Include a table of contents for each emergency, operation, and maintenance manual.
 5. In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents.
- B. Manuals, General
1. Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - a. Title page.
 - b. Table of contents.
 - c. Manual contents.
 2. Enclose title page in transparent plastic sleeve. Include the following information:
 - a. Subject matter included in manual.
 - b. Name and address of Project.
 - c. Name and address of Owner.
 - d. Name, address, and telephone number of Contractor.
 - e. Name and address of Engineer.
 - f. Subcontractor, Supplier, Manufacturer, Installer, or Maintenance Contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts, replacement, and service.
 - g. Cross-reference to related systems in other operation and maintenance manuals.
 3. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - a. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
 4. Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - a. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - 1) If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - 2) Identify each binder on front and spine, with printed title "OPERATION

AND MAINTENANCE MANUAL, VOLUME NO. ___ OF ___", Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

- 3) Text: Manufacturer's printed data, or neatly typed.
 - 4) Three-hole punch data for binding and composition; arrange printing so punched holes do not obliterate data.
- b. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Manual.
 - c. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 - d. Supplementary Text: Prepared on 8-1/2-by-11-inch 20-, white bond paper.
 - e. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - 1) If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - 2) If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
 - f. Electronic Media Format:
 - 1) Portable Document format (PDF)
 - a) After all preliminary data has been found to be acceptable, submit operational and maintenance data in PDF format on CD-ROM.
 - b) Files to be exact duplicates of accepted preliminary data. Arrange by specification Section number. Bookmark sections.
 - c) Files to be fully functional and viewable in most recent version of Adobe Acrobat.
 - 2) Manufacturer's Standard Electronic Format:
- C. Operation Manuals
1. In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria.
 - c. Operating standards.
 - d. Operating procedures.
 - e. Operating logs.
 - f. Wiring diagrams.
 - g. Control diagrams.
 - h. Piped system diagrams.
 - i. Precautions against improper use.

- j. License requirements including inspection and renewal dates.
 - 2. Include the following:
 - a. Product name and model number.
 - b. Manufacturer's name.
 - c. Equipment identification with serial number of each component.
 - d. Equipment function.
 - e. Operating characteristics.
 - f. Limiting conditions.
 - g. Performance curves.
 - h. Engineering data and tests.
 - i. Complete nomenclature and number of replacement parts.
 - 3. Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Instructions on stopping.
 - f. Normal shutdown instructions.
 - g. Seasonal and weekend operating instructions.
 - h. Required sequences for electric or electronic systems.
 - i. Special operating instructions and procedures.
 - 4. Describe the sequence of operation, and diagram controls as installed.
 - 5. Diagram piping as installed and identifies color-coding where required for identification.
- D. Product Maintenance Manual
- 1. Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
 - 2. List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
 - 3. Include the following, as applicable:
 - a. Product name and model number.
 - b. Manufacturer's name.
 - c. Color, pattern, and texture.
 - d. Material and chemical composition.
 - e. Reordering information for specially manufactured products.
 - 4. Include manufacturer's written recommendations and the following:
 - a. Inspection procedures.

- b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Schedule for routine cleaning and maintenance.
 - e. Repair instructions.
5. Include lists of materials and local sources of materials and related services.
 6. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - a. Include procedures to follow and required notifications for warranty claims.
- E. Systems and Equipment Maintenance Manual
1. For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
 2. List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
 3. Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - a. Standard printed maintenance instructions and bulletins.
 - b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - c. Identification and nomenclature of parts and components.
 - d. List of items recommended to be stocked as spare parts.
 4. Include the following information and items that detail essential maintenance procedures:
 - a. Test and inspection instructions.
 - b. Troubleshooting guide.
 - c. Precautions against improper maintenance.
 - d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - e. Aligning, adjusting, and checking instructions.
 - f. Demonstration and training videotape, if available.
 5. Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - a. Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - b. Include manufacturers' forms for recording maintenance.
 6. Include lists of replacement and repair parts, with parts identified and cross-

referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

7. If applicable, include copies of maintenance agreements with name and telephone number of service agent.
8. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - a. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 CONSTRUCTION PROGRESS DOCUMENTATION

A. Contractor's construction schedule

1. At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - a. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - b. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - c. As the Work progresses, indicate Actual Completion percentage for each activity.
2. Distribute copies of approved schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - a. Post copies in Project meeting rooms and temporary field offices.
 - b. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.2 PHOTOGRAPHIC DOCUMENTATION

A. Construction photographs

1. Engage a qualified photographer to take the preconstruction, initial, monthly progress, final aerials, and final construction photographs. The photographer may be a member of the Contractor's staff, experienced in construction photography.
2. Photographer shall be granted access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.
3. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.
4. Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Images with blurry or out-of-focus areas will not be accepted.

- a. Maintain key plan with each set of construction photographs that identifies each photographic location.
5. Images:
 - a. Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
 - b. Retain progress photographs in the field office at Project site, available at all times for reference. Identify photographs same as for those submitted to Engineer.
 6. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - a. Include date and time in filename for each image.
 - b. Maintain one set of images on CD-ROM or USB thumb drive in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Engineer.
 7. Before starting construction, take color photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Engineer.
 - a. Flag construction limits before taking construction photographs.
 - b. Provide one aerial photograph of Project site prior to start of construction.
 - c. Take a minimum of ten (10) photographs to show existing conditions adjacent to property before starting the Work.
 - d. Take photographs of existing facilities either on or adjoining property to accurately record physical conditions at start of construction.
 8. Take a minimum of two (2) color photographs of each structure or area under construction monthly, coinciding with the cutoff date associated with each Application for Payment. As approved by Engineer, select vantage points to show status of construction and progress since last photographs were taken.
 9. Provide a minimum of twenty (20) color photographs and two (2) aerial photographs of Project site following construction.
 10. Engineer may issue requests for additional photographs, in addition to periodic photographs specified.
 - a. Three days' notice will be given, where feasible.
 - b. In emergency situations, take additional photographs within 24 hours of request.
 - c. Circumstances that could require additional photographs include, but are not limited to, the following:
 - 1) Special events planned at Project site.
 - 2) Immediate follow-up when on-site events result in construction damage or losses.
 - 3) Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - 4) Substantial Completion of a major phase or component of the Work.

- 5) Extra record photographs at time of final acceptance.
- 6) Owner's request for special publicity photographs.

3.3 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Contractor's Review

1. Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall insure the values, material, equipment, or method of work shall be as described.
2. Contractor shall insure there is no conflict with other submittals and shall notify Engineer of each case where a conflict may occur.
3. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp (green in color) before submitting to Engineer.
4. Approval Stamp: Stamp each submittal with a uniform, approval stamp (green in color). Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

B. Engineer's Action

1. Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
2. Engineer will review each action submittal, make marks to indicate corrections or modifications required, and return it. Engineer will either stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, or use the Shop Drawing Review Comments Form listed in Part 3 to indicate the action taken for each submittal as follows:
 - a. REVIEWED
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal.
 - b. FURNISHED AS CORRECTED
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - c. REVISE AND RESUBMIT
 - 1) Make corrections or obtain missing portions and resubmit.
 - d. REJECTED
 - 1) Contractor may not incorporate product(s) or implement Work covered by submittal.
3. Engineer will review each information submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
4. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

5. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
- C. Supplements
1. Sample forms included after “End of Section” are considered part of this Section and can be provided electronically.
 - a. Shop Drawing Transmittal.
 - b. Shop Drawing Review Comments.
- D.

3.4 PRODUCT REQUIREMENTS

- A. Work in accordance with manufacturer’s instructions
1. When the specification Section requires the Work to be accomplished in accordance with “manufacturer’s instructions”, obtain and distribute copies of such instructions to parties involved in the installation. Submit instructions as required per this Section and maintain one set at the Project site.
 2. Handle, install, connect, clean, condition and adjust products in strict accordance with the manufacturer’s instructions and in conformity with the Contract Documents. Do not omit any preparatory step or installation procedures. In case of conflict between job conditions or Contract Documents with manufacturer’s instructions notify Engineer.
 3. Upon completion of installation, obtain Certificate of Installation from manufacturer’s representative.
- B. Inspection
1. Inspect products for signs of pitting, rust decay, or other deleterious effects of storage. Do not install products showing such effects. Remove damaged product from Project site and expedite delivery of identical new product. Delays to Work resulting from product damage, which necessitates procurement of new product, will be considered delays within Contractor’s control.
- C. Installation
1. Drawings show general locations for product installation, unless specially dimensioned.
 2. No shimming between machined surfaces is allowed.
 3. Install Work in accordance with NECA Standard of Installation, unless otherwise specified.
 4. Recoat finish surfaces that are damaged prior to final acceptance of Work.
 5. Do not cut or notch any structural member or building surface without specific approval of Engineer.
 6. Handle, install, connect, clean, condition, and adjust product in accordance with Contract Documents and manufacturer’s instructions.
 7. Apply field coating in accordance with Contract Documents.
 8. Perform required adjustments, tests, operation checks, and other start-up activities.
 9. Fill lubricant reservoirs and replace consumption during testing, start-up, and

operation prior to final acceptance of Work by Owner.

D. Supplements

1. Sample forms included after "End of Section" are considered part of this Section:
 - a. Substitution Request.

3.5 OPERATION AND MAINTENANCE DOCUMENTATION

A. Recording and maintenance

1. Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
2. Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.

B. Manual Preparation

1. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
2. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
3. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
4. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
5. Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data includes more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
6. Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control

sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

- a. Do not use original Project Record Documents as part of operation and maintenance manuals.
 - b. Comply with requirements of newly prepared Record Drawings in this specification Section.
7. Comply with this specification Section for schedule for submitting operation and maintenance documentation.
8. Maintenance Summary:
- a. Compile individual Maintenance Summary Form for each applicable equipment item, respective unit, or system and for components or sub-units.
 - b. Format:
 - 1) Use Maintenance Summary Form included with this Section as a guide.
 - 2) Use only 8-1/2 by 11-inch size paper.
 - c. Include detailed lubrication instructions and diagrams showing points to be greased or oiled, as well as recommended type, grade, and temperature range of lubricants and frequency of lubrication.
 - d. Recommended Spare Parts:
 - 1) Data to be consistent with manufacturer's Bill of Materials/Parts List furnished with the Operation and Maintenance Data.
 - 2) "Unit" is the unit of measure for ordering part.
 - 3) "Quantity" is the number of units recommended.
 - 4) "Unit Cost" is the current purchase price.
- C. Data for Materials and Finishes
1. Content for Architectural Products, Applied Materials, and Finishes:
 - a. Manufacturer's data, giving full information on products:
 - 1) Catalog number, size, and composition.
 - 2) Color and texture designations.
 - 3) Information required for reordering special-manufactured products.
 - b. Instructions for Care and Maintenance:
 - 1) Manufacturer's recommendation for types of cleaning agents and methods.
 - 2) Cautions against cleaning agents and methods that are detrimental to product.
 - 3) Recommended schedule for cleaning and maintenance.
 2. Content 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.

D. Supplements

1. Sample forms included after “End of Section” are considered part of this Section.
 - a. Maintenance Summary Form.

END OF SECTION



SUBSTITUTION REQUEST

(After the Bidding Phase)

Project: _____ Substitution Request Number: _____
From: _____
To: _____ Date: _____
A/E Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____
Installer: _____ Address: _____ Phone: _____
History: [] New product [] 2-5 years old [] 5-10 yrs old [] More than 10 years old

Differences between proposed substitution and specified product: _____
[] Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation:
Project: _____ Architect: _____
Address: _____ Owner: _____
Date Installed: _____

Proposed substitution affects other parts of Work: [] No [] Yes; explain _____

Savings to Owner for accepting substitution: (\$ _____).
Proposed substitution changes Contract Time: [] No [] Yes [Add] [Deduct] _____ days.

Supporting Data Attached: [] Drawings [] Product Data [] Samples [] Tests [] Reports [] _____

SUBSTITUTION REQUEST

(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with SECTION 01 32 33 PROJECT DOCUMENTATION
- Substitution approved as noted - Make submittals in accordance with SECTION 01 32 33 PROJECT DOCUMENTATION
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

Additional Comments: Contractor Subcontractor Supplier Manufacturer A/E _____

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO: _____

EQUIPMENT ITEM: _____

MANUFACTURER: _____

EQUIPMENT TAG NOS.: _____

WEIGHT OF INDIVIDUAL COMPONENTS (Over 100 Pounds): _____

NAME PLATE DATA (HP, Voltage, Speed, etc.): _____

Manufacturer's Local Representative: _____

Name: _____ Telephone No. _____

Address: _____

| Maintenance Operation Requirements | Frequency | Lubricant |
|--|---|--|
| List briefly each maintenance operation required and refer to specific information in manufacturer's maintenance manual, if applicable. Also note tools needed for each maintenance operation and safety considerations. | List frequency of each maintenance operation. | Refer by symbol to lubricant required. |
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MAINTENANCE SUMMARY FORM (Continued)

LUBRICANT LIST

| Reference Symbol | Mfgr _____ | Mfgr _____ | Mfgr _____ |
|---|--|------------|------------|
| List symbols used in maintenance requirements | List equivalent lubricants of several manufacturers' | | |
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RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY

| Part No. | Description | Unit | Quantity | Unit Price |
|----------|-------------|------|----------|------------|
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**SECTION 01 32 39
CONTRACTOR REQUIREMENTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes:
 - 1. Management and Coordination
 - 2. Coordination
 - 3. Project Meetings
 - 4. Request for Information
 - 5. Quality Assurance and Quality Control
 - a. Owner Quality Control
 - b. Contractor Quality Control
 - 6. Project Identification Sign
 - 7. Temporary Utilities and Facilities
 - 8. Environmental Controls
 - 9. Security and Protection Facilities
 - 10. Traffic Control
 - 11. Archeological Discoveries
 - 12. Endangered Species
- B. Related Sections include the following:
 - 1. SECTION 01 31 00 PROJECT ADMINISTRATION for changes to the Contract Documents.
 - 2. SECTION 01 32 33 PROJECT DOCUMENTATION for preparing and submitting Contractor's Construction Schedule, Testing and Inspection Schedule, and Project Closeout Documents.
 - 3. Divisions 2 through 40 Sections for specific test and inspection requirements.

1.3 MANAGEMENT AND COORDINATION

- A. Definitions
 - 1. RFI: Request for Information from Contractor seeking interpretation or clarification of the Contract Documents.
- B. Coordination
 - 1. Coordinate construction operations to ensure efficient and orderly installation of each part of the Work.
 - a. Schedule construction operations in sequence required obtaining the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - b. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - c. Make adequate provisions to accommodate items scheduled for later installation.

- d. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
2. Coordinate scheduling of construction activities to avoid conflicts and to ensure orderly progress of the Work. Activities include, but are not limited to, the following:
- a. Preparation of Contractor's Construction Schedule.
 - b. Preparation of the Schedule of Values.
 - c. Installation and removal of temporary facilities and controls.
 - d. Delivery and processing of submittals.
 - e. Progress meetings.
 - f. Pre-installation conferences.
 - g. Project closeout activities.
 - h. Startup and adjustment of systems.
- C. Project Meetings
1. Engineer shall schedule a preconstruction meeting before starting construction, at a time convenient to Owner, Engineer, and Contractor. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
- a. Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants shall be familiar with Project and authorized to conclude matters relating to the Work.
 - b. Discuss items of significance including the following:
 - 1) Construction Schedule.
 - 2) Construction Phasing.
 - 3) Critical work sequencing and long-lead items.
 - 4) Designation of key personnel and their duties.
 - 5) Procedures for processing field decisions and Change Orders.
 - 6) Procedures for RFIs.
 - 7) Procedures for testing and inspecting.
 - 8) Procedures for processing Applications for Payment.
 - 9) Distribution of the Contract Documents.
 - 10) Submittal procedures.
 - 11) Environmental requirements.
 - 12) Preparation of Record Documents.
 - 13) Owner Facilities and Utilities
 - 14) Use of the premises.
 - 15) Work restrictions.
 - 16) Responsibility for temporary facilities and controls.
 - 17) Construction waste management and recycling.
 - 18) Parking availability.
 - 19) Office, work, and storage areas.
 - 20) Equipment deliveries and priorities.
 - 21) First aid.
 - 22) Security.
 - 23) Progress cleaning.
 - 24) Work hours.

- c. Contractor Quality Control Plan (CQCP), quality assurance and control system will be discussed prior to the submittal of the CQCP. A mutual understanding of the system details, including the forms for recording CQC operations, control activities, testing, administration of the system for both onsite and offsite Work, and the interrelationship of the Contractor's management and control with the Owner's Quality Assurance.
 - d. Engineer will record and distribute meeting minutes.
2. Engineer shall schedule and conduct progress meetings at monthly intervals. Coordinate dates of meetings with preparation of payment requests.
- a. In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - b. Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - 1) Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 2) Review schedule for next period.
 - c. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
 - d. Engineer will record and distribute to Contractor the meeting minutes.

- e. Contractor shall distribute minutes of the meeting to each subcontractor present and to parties who should have been present.
 - f. Contractor shall revise Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
3. Contractor will conduct pre-installation meetings at Project site before each activity that requires coordination with other construction or Owner operation.
- a. Contractor and manufacturer's representative involved in or affected by the installation and its coordination or integration into the Work shall attend the meeting. Notify Engineer and Owner of scheduled meeting dates.
 - b. Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following items as applicable:
 - 1) The Contract Documents.
 - 2) Related RFIs.
 - 3) Related Change Orders.
 - 4) Purchases.
 - 5) Deliveries.
 - 6) Submittals.
 - 7) Review of mockups.
 - 8) Possible conflicts.
 - 9) Compatibility problems.
 - 10) Time schedules.
 - 11) Weather limitations.
 - 12) Manufacturer's written recommendations.
 - 13) Warranty requirements.
 - 14) Temporary facilities and controls.
 - 15) Space and access limitations.
 - 16) Regulations of authorities having jurisdiction.
 - 17) Testing and inspecting requirements.
 - 18) Installation procedures.
 - 19) Coordination with other work.
 - 20) Required performance results.
 - 21) Protection of adjacent work.
 - 22) Protection of construction and personnel.
 - c. Record significant discussions, agreements, and disagreements, including required corrective measures and actions Contractor shall distribute meeting minutes to each party present, the Owner and Engineer.
 - d. Contractor will conduct Unit Process Testing and Startup Meeting(s) and Facility Startup Meeting(s) to discuss testing and startup schedules, test methods, required materials and utilities for Contractor installed Products, Unit Processes, and Facilities. Discussions will include Operation Interface, Owner and Engineer involvement.
 - e. Contractor's testing and startup schedule shall be approved by the Owner and Engineer prior to commencing with any testing procedures.
 - f. Schedule a minimum of one facility testing and startup meeting. This meeting will be held prior to submitting Facility Startup and Performance Demonstration Plan.

- g. Agenda items will include as a minimum; the objectives of the testing and startup, what actions and work will be included, the coordination between the various parties, and potential problems associated with startup.
- h. Attendees will include Contractor and Contractor QC Manager, subcontractors and manufacturer's representatives, Engineer and Owner representatives.
- i. Individual Product and Unit Process Meetings will be required to discuss Product and Process startups not discussed at other meetings or as requested by the Owner and Engineer.
- j. Manufacturer's representative involved in the installation and its coordination or integration into the Work shall attend the meeting.
- k. All Testing and Startup Meetings shall include discussion of the following items as applicable:
 - 1) Operation and Maintenance Manuals.
 - 2) Possible conflicts.
 - 3) Compatibility problems.
 - 4) Time schedules.
 - 5) Weather limitations.
 - 6) Manufacturer's written recommendations.
 - 7) Warranty Start Dates.
 - 8) Temporary facilities, utilities and controls.
 - 9) Space and access limitations.
 - 10) Inspection and Checkout prior to testing.
 - 11) Installation procedures.
 - 12) Lubrication and Alignment requirements.
 - 13) Coordination with other work.
 - 14) Required performance and test results.
 - 15) Protection of adjacent work.
 - 16) Protection of construction and operation personnel.
- l. Record significant meeting discussions, agreements, and disagreements, including required corrective measures and actions. Contractor shall distribute meeting minutes to each party present, the Owner and Engineer.

D. Requests For Information (RFI)

- 1. Immediately on discovery of the need for interpretation or information of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI per SECTION 01 10 39 INTERNET BASED CONSTRUCTION MANAGEMENT.
 - a. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - b. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 - c. Include a detailed, legible description of item needing interpretation and the following:
 - 1) Project name.
 - 2) Date.
 - 3) Name of Contractor.
 - 4) Name of Engineer.
 - 5) RFI number, numbered sequentially.

- 6) Specification Section number and title and related paragraphs, as appropriate.
 - 7) Drawing number and detail references, as appropriate.
 - 8) Field dimensions and conditions, as appropriate.
 - 9) Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 10) Contractor's signature.
 - 11) Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
- d. Engineer will review each RFI, determine action required, and return it. Allow seven working days for Engineer's response for each RFI. RFIs received after 1:00 p.m. local time will be considered as received the following working day.
- 1) The following RFIs will be returned without action:
 - a) Requests for approval of submittals.
 - b) Requests for approval of substitutions.
 - c) Requests for coordination information already indicated in the Contract Documents.
 - d) Requests for adjustments in the Contract Time or the Contract Sum.
 - e) Requests for interpretation of Engineer's actions on submittals.
 - f) Incomplete RFIs or RFIs with numerous errors.
 - 2) Engineer's action may include a request for additional information, in which case Engineer's time for response will start again.
 - 3) Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
 - 4) On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.
 - 5) RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.
 - 6) Project name.
 - 7) Name and address of Contractor.
 - 8) Name and address of Engineer.
 - 9) RFI number including RFIs that were dropped and not submitted.
 - 10) RFI description.
 - 11) Date the RFI was submitted.
 - 12) Date Engineer's response was received.
 - 13) Identification of related Field Order and Proposal Request, as appropriate.
- e. Utilize Internet-Based Construction Management program for Request for Information Form.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Owner Quality Control

1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
2. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
3. Costs for retesting and re-inspecting materials of construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor,
4. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - a. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 1) Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - b. Contractor shall pay for all charges of testing laboratory services in connection with tests made in the field or laboratory for the following, but not limited to, services:
 - 1) Concrete mix designs, design of asphalt mixtures, lime stabilization of subgrade, flowable mix design, and related design parameter determinations.
 - 2) Soil test for classifications of on-site and off-site borrow materials, soil densities and moisture determination of subgrade and embankment materials, cement or lime stabilization of subgrade, and other related testing required during construction.
 - 3) Weld inspection, coating inspections, torque requirements for steel erection, and other non-destructive testing.
 - 4) Vacuum and pressure testing of pipe lines, manholes, and related work, including disinfection testing of potable water lines and CCTV of lines.
 - 5) All other inspection and testing work not specifically stated to be the Owner's responsibility.
 - c. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - d. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, distribution as indicated, of each quality-control service.
 - 1) Engineer: two (2) copies
 - 2) Contractor: two (2) copies
 - 3) Owner: three (3) copies
 - e. Testing and inspecting desired by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - f. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
5. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections. The Testing Agency shall:

- a. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - c. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - d. Submit a certified written report, distribution as indicated, of each test, inspection, and similar quality-control service.
 - 1) Engineer: two (2) copies
 - 2) Contractor: two (2) copies
 - 3) Owner: three (3) copies
 - e. Not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - f. Not perform any duties of Contractor.
6. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
- a. Access to the Work.
 - b. Incidental labor and facilities necessary to facilitate tests and inspections.
 - c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - d. Facilities for storage and field curing of test samples.
 - e. Delivery of samples to testing agencies as applicable.
 - f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - g. Security and protection for samples and for testing and inspecting equipment at Project site.
7. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
- a. Schedule times for tests, inspections, obtaining samples, and similar activities.
8. All Work by Contractor will be subject to Owner's inspection and testing at all locations and at reasonable times before acceptance of the Work. Owner's inspection and testing will be for the sole benefit of the Owner and does not:
- a. Relieve Contractor of responsibility for providing adequate quality control measures.
 - b. Relieve Contractor of responsibility for damaged to or loss of material, products, equipment, or related Work prior to final acceptance.
 - c. Constitute or imply acceptance.
 - d. Affect the continuing rights of Owner after acceptance of the completed Work.
9. The presence or absence of the Owner's quality assurance personnel does not relieve Contractor from performing Work in accordance with Contract requirements
- B. Contractor Quality Control
- 1. The Contract requires the Contractor to provide the required quality assurance and quality control services to ensure compliance with the Contract Documents
 - 2. Maintain an adequate quality assurance and control system, performing inspections and testing necessary to ensure Work conforms to Contract Documents.

3. Maintain complete inspection record, logs, test reports, pre-installation reports, and other related records and make them available to Owner and Engineer.
4. The CQC system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the contract Documents. The CQC system shall cover all construction and demolition operations, both onsite and offsite, including Work by subcontractors, suppliers, fabricators, manufacturers, testing agencies, and other entities.
5. Definitions
 - a. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
 - b. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.
 - c. Contractor Quality Program (CQC): The means by which the Contractor ensures that the construction, to include that performed by subcontractors, suppliers, and manufacturers, complies with the requirements of the Contract.
 - d. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
 - e. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
 - f. Material Testing: Tests and inspections that are performed by an Nationally Recognized Testing Laboratory, an National Voluntary Laboratory Accreditation Program, or a testing agency qualified to conduct material testing and acceptable to authorities having jurisdiction, to establish material performance and compliance with industry standards.
 - g. Source Quality Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
 - h. Field Quality Control Testing: Tests and inspections that are performed onsite for installation of the Work and for completed Work.
 - i. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
 - j. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - k. Using a term such as "carpentry" does not imply that accredited or unionized individuals of a corresponding generic name, such as "carpenter", must perform certain construction activities. It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

- for compliance with the Contract Documents. Make any required corrections, noting any deviations. Provide the required justification for deviations.
- b. CQC manager and staff shall maintain a submittal log showing status of submittals.
11. Final Inspection and Punch List
 - a. CQC manager and staff shall conduct an inspection of the Work at the completion of all work or any milestone. This inspection will precede any final inspection by the Owner and Engineer.
 - b. Prior to requesting final inspection by the Owner and Engineer, the Contractor shall accomplish the following:
 - 1) CQC manager and staff shall develop a punch list of non-conforming items. The punch list shall be included in the CQC Report, along with the estimated date by which the items will be corrected.
 - 2) Following corrective action by Contractor, a second inspection shall be made to ascertain that all deficiencies have been corrected. Then notify the Engineer and Owner.
 - c. The Owner and Engineer, along with the Contractor, shall perform a Final Inspection of the Project. These inspections, along with correction of any deficiencies, shall be accomplished within the time stated for completion of the Work or particular increment thereof.
 12. Close Out Documents
 - a. The CQC manager and staff will assemble and prepare the Closeout Documents and As-Built Documents required to complete the Project closeout in accordance with SECTION 01 32 33 PROJECT DOCUMENTATION.
 13. Quality Assurance
 - a. Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
 - b. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
 - c. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - d. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - e. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
 - f. Testing Agency Qualifications:

- 1) Laboratory facilities, including personnel, and equipment, utilize shall meet the criteria detailed in ASTM E329 "Specification for Agencies Engaged in Construction Inspection and/or Testing", ASTM D3666 "Practice for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials," and ASTM D3740 "Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction."
 - 2) Testing Agency shall be accredited by the American Association of Laboratory Accreditation (AALA), National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHT)), or other nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 3) Comply with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- g. Factory Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- h. Mockups: If applicable, before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
- 1) Build mockups in location and of size indicated or, if not indicated, as directed by Engineer.
 - 2) Notify Engineer seven days in advance of dates and times when mockups will be constructed.
 - 3) Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4) Obtain Engineer's approval of mockups before starting work, fabrication, or construction. Allow seven days for initial review and each re-review of each mockup.
 - 5) Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6) Demolish and remove mockups when directed, unless otherwise indicated.

1.5 PROJECT IDENTIFICATION SIGN

- A. Provide Project Identification Sign and other temporary signs. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted. Project Identification Sign shall be 8 foot wide by 4 foot high, constructed of 3/4-inch exterior high-density overlaid plywood. Sign shall bear the Name of Project, Owner, Engineer, Contractor, and other participating agencies. Lettering shall be blue applied on a white background by an experience sign painter. Paint shall be exterior grade enamel. Information to be included shall be provided by Engineer.

1.6 TEMPORARY UTILITIES AND FACILITIES

- A. Temporary Utilities

1. Install temporary service.
2. Provide temporary sewer and drainage utilities for lawful removal from site.
3. Install water service and distribution piping in sizes and pressures adequate for construction and acceptable to Owner.
4. Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
5. Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
6. Provide temporary ventilation and humidity control required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
7. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
8. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
9. Provide temporary telephone service in common use facilities for use by all construction personnel. Provide a directory at each telephone, listing the name and business telephone number of:
 - a. Contractor and all subcontractors employed at work site.
 - b. Owner's representatives.
 - c. Engineer's representative.
 - d. Medical Services; Physicians, Hospitals, and Ambulance service companies.
 - e. Emergency numbers of all utilities.
 - f. Police.
 - g. Fire Departments.
10. Provide temporary electronic communication service, including internet and electronic mail in field offices.
11. Cost or use charges for temporary utilities shall be included in the Contract Sum. Allow for the use of utilities by other entities without cost, including, but not limited to Owner's representative, Engineer when onsite, testing agencies, and authorities having jurisdiction.
 - a. Water from Owner's existing water system is available for purchase and use. Provide connections and extensions of services as required for construction operations.
 - b. Electric power shall be obtained by Contractor, with Contractor responsible for obtaining meter and paying for all use charges. Provide connections and extensions of services as required for construction operations. Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
 - c. Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

- d. Installer of each permanent or temporary service shall assume responsibility for operation, maintenance, and protection of each service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Temporary Facilities

1. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
2. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
3. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
4. At the Contractor's option, furnish, equip, and maintain a Contractor Field Office at the site for Contractor's use. The Contractor Field Office shall have weather-tight construction, doors with locks and convenience outlets, air conditioning, ventilation and heating, electric lighting, and telephones. Contractor Field Office shall have a room large enough and furnishings to be able to hold Project Meetings.
5. Provide storage sheds for products in conformance with the General Conditions. The storage sheds shall have weather-tight construction, heating, ventilating and air conditioning as required to comply with the General Conditions, sufficient space to provide for inspection, and electric lighting.
6. Properly store and protect equipment delivered to the job site until installation in accordance with manufacturer's recommendations. Motor space heaters shall be connected, shafts rotated, etc. All equipment shall be stored on skids or blocking, off the ground.
7. Construct and maintain temporary roads and paved areas adequate for construction operations and access to field offices. When possible, locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - a. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - b. Prepare subgrade and install subbase and base for temporary roads and paved areas according to SECTION 31 05 00 EARTHWORK MATERIALS.
 - c. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 - d. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
8. Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with SECTION 01 31 00 PROJECT ADMINISTRATION for progress cleaning requirements.
9. Provide a first aid station in Contractor's field office. Provide full complement of first aid supplies in weatherproof container at first aid station.
10. Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may

have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

- a. Materials and facilities that constitute temporary facilities are property of Contractor, except as noted elsewhere. Owner reserves right to take possession of Project identification signs.
- b. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements.

1.7 TRAFFIC CONTROLS

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
 3. Construction traffic shall be controlled to minimize impact of normal plant traffic.
 4. Contractor shall repair damage to plant and public roadways.
 5. Provide signs warning of a construction site entrance.
 6. Provide flagman when excessive construction traffic is expected.
- B. Provide temporary parking areas for construction personnel.
- C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
- D. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
- E. Remove snow and ice as required to minimize accumulations.
- F. Provide temporary, directional signs for construction personnel and visitors.
- G. Maintain and touchup signs so they are legible at all times.

1.8 ENVIRONMENTAL CONTROLS

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at

Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

- F. The Contractor shall be responsible for eliminating and/or alleviating dust resulting from his construction operations. This is particularly applicable to dust which results from vehicular traffic traveling along or through areas where construction has resulted in dirt or dust being left on roadways. The Contractor shall sprinkle water or use other dust control methods which will reduce dust to a minimum. The Owner may request additional dust control sprinkling at any time as deemed necessary. Dust control will be considered subsidiary to construction and no separate measurement and payment will be made.

1.9 SECURITY AND PROTECTION FACILITIES

- A. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Resident Project Representative with one set of keys.
- B. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- D. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
- E. Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- F. Maintain facilities in good operating condition until removal.
- G. Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- H. Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor, except as noted elsewhere. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements.
- I. Neither the Contractor nor any of his employees shall be allowed to carry firearms on the Project, either on their persons or within their automobiles. Any violation of this

requirement will result in the permanent removal from the Project of the employee committing the violation.

- J. The Contractor shall remove from the site any materials found to be damaged, and any materials not meeting the specifications. These materials shall be removed promptly, unless the Engineer will accept the materials after repairing. Materials found to be damaged, or not acceptable to the Engineer, shall be removed. Examination before installation shall not relieve the Contractor from any responsibility to furnish good quality materials.
- K. Fire Protection:
 - 1. Furnish and maintain onsite adequate firefighting equipment capable of extinguishing incipient fires. UL rated; with class and extinguishing agent as required by locations and classes of fire exposures. Comply with applicable parts of National fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241).
 - 2. Provide portable fire extinguishers, rated 2A minimum, at Contractor's and Engineer's field office, and at storage sheds.
 - 3. Ensure that internal combustion engine powered equipment is located a safe distance from combustible materials.
 - 4. Prohibit smoking in locations and operations of potential fire hazard and clearly post "No Smoking" or "Open Flame" signs.
 - 5. Store flammable/combustible liquids in conformance with requirements of federal and local codes and regulations and prohibit storage of flammable/combustible liquids near exits, stairways or common passageways. Provide approved metal safety containers for storage of flammable/combustible liquids in excess of 1 gallon.
- L. Surplus equipment or material, which is removed by the Contractor as specified in the plans and specifications, shall become the property of the Contractor. The Contractor shall be responsible for the disposal of salvage material offsite. Equipment and material designed to be salvage shall be transported by the Contractor to a location as directed by the Owner's Representative.

1.10 ARCHEOLOGICAL DISCOVERIES

- A. No activity, which may affect a State Archeological Landmark, is authorized until the Owner has complied with provisions of the Antiquities Code of Oklahoma. The Owner has previously coordinated with the appropriate agencies and impacts to known cultural or archeological deposits have been avoided or mitigated. However, the Contractor may encounter unanticipated cultural or archeological deposits during construction.

1.11 ENDANGERED SPECIES

- A. No activity is authorized that is likely to jeopardize the continued existence, or a threatened, or endangered species as listed, or proposed for listing, under the Federal Endangered Species Act (ESA), and/or the State of Oklahoma Parks and Wildlife Code on Endangered Species, or to destroy or adversely modify the habitat of such species.

END OF SECTION

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**SECTION 01 33 10
SUPPLIER'S SUBMITTALS**

PART 1 - GENERAL

1.1 SUMMARY

- A. The EQUIPMENT SUPPLIER shall submit descriptive information to:
 - 1. Advise the OWNER whether the materials and equipment proposed for the project are in general conformance with the design concepts and in conformance with the Contract Documents and Specifications.
 - 2. Provide a record for the OWNER of the materials and equipment which have been incorporated into the project.
 - 3. Provide a guide for operations and maintenance of equipment.
 - 4. Provide information required for the administration of the Contract for construction of the project. This section of the specifications provides a more detailed description of the requirements for submittals as outlined in the Special Conditions.
 - 5. The CONTRACTOR will make available to the OWNER and ENGINEER all submittals over an Internet-Based Construction Management System for documentation and tracking.
- B. Additional submittals associated with the bidding process shall be provided as specified in Division 0 Documents.

1.2 REFERENCES

- A. Drawings and general provisions of the Contract, including Special Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections
 - 1. All other Contract Documents for specific requirements for demonstration and training for products in those Sections.

1.3 SUPPLIER'S RESPONSIBILITIES

- A. The EQUIPMENT SUPPLIER shall be responsible for the accuracy and completeness of the information contained in each submittal and shall insure that the values, material, equipment, or method of work shall be as described in the submittal. The following responsibilities will be assigned to the CONTRACTOR: All submittals must be stamped by the CONTRACTOR, indicating that they have been checked by the CONTRACTOR for compliance with the Contract Documents and approved by the CONTRACTOR, or contain certifications as required by the Contract Documents. Submittals that do not have the stamp applied or include the required certifications will be returned without processing to the CONTRACTOR.
- B. The EQUIPMENT SUPPLIER shall insure that there is no conflict with other submittals and notify the ENGINEER of each case where the proposed change may affect the work of another EQUIPMENT SUPPLIER or OWNER. The EQUIPMENT SUPPLIER in coordination with the CONTRACTOR shall insure coordination of submittals among the related crafts and subcontractors. Submittals will not be accepted from sub-contractors.

PART 2 - PRODUCTS

2.1 MARKING OF SUBMITTALS

- A. A number shall be assigned to each submittal provided to the ENGINEER to allow each submittal to be tracked while processing through the review procedures. The CONTRACTOR will assign the numbers on the Internet-Based Construction Management System.
- B. Assignment of numbers shall be by means of a letter prefix, a sequence number, and letter suffix to indicate resubmittals.
- C. The sequence number shall be issued in chronological order for each type of submittal. Resubmittals shall be followed by a letter of the alphabet to indicate the number of times a submittal has been sent to the ENGINEER for processing. As an example, a submittal with the number 25 indicates that the submittal is the 25th submitted. Submittal number 25.1 indicates the submittal is being submitted for the second time.
- D. Correct assignment of numbers is essential as different submittal types are processed in different ways. Some submittals received do not require that any response be given for the material. A log of submissions to allow the processing of SUPPLIER's submittals will be maintained by the CONTRACTOR and ENGINEER on the Internet-Based Construction Management System and will be monitored. Logs will be reviewed periodically to determine that all submittals are received and processed.
- E. Submittals shall be marked to show clearly the applicable sections of the specification and sheet number of drawings.
- F. Submittals shall be accompanied by a Submittal Transmittal Form to be provided by the ENGINEER or through the Internet-based Construction Management System. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate discrete sections, etc. for which a submittal is required. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that they should be checked as a unit.

2.2 DEVIATIONS FROM CONTRACT DOCUMENTS

- A. Any change in the contract documents that is requested will be initiated by the EQUIPMENT SUPPLIER issuing a Contract Modification Request or by ENGINEER issuing a Proposed Contract Modification on the form provided by the ENGINEER. The EQUIPMENT SUPPLIER's Modification Request shall fully identify and describe the deviations and state the reason the change is requested. Any savings in cost related to the substitution is to be stated in the request for consideration. Modification requests will be considered and if found acceptable will be incorporated in a Field Order or Change Order as a change to the CONTRACTOR's scope in accordance with the General Conditions.

2.3 SHOP DRAWINGS

- A. Definition:
 - 1. Shop drawings consist of all drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the EQUIPMENT SUPPLIER to illustrate some portion of the work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams, and other information prepared by a supplier and submitted by EQUIPMENT SUPPLIER to illustrate material or equipment

for some portion of the Work.

2. Shop drawings shall indicate the kind, exact model, size, arrangement, and operation of component materials and devices; materials of construction, external connections, anchorages and supports required; performance characteristics; dimensions, weights, and other information required for installation and correlation with other materials and equipment.
- B. Schedule for Submittal of Shop Drawings:
1. The EQUIPMENT SUPPLIER shall provide schedule information so that the CONTRACTOR can submit a schedule indicating the time and sequence in which Shop Drawings are to be submitted. This schedule shall take into consideration time for delivery and a reasonable time for review of shop drawings. Proposed order and delivery dates shall be incorporated in the Progress Schedule.
 2. Shop drawings will generally be reviewed in the order in which they are received. Drawings marked "Priority" will be reviewed ahead of other shop drawing submittals not so marked which have already been received but are not yet being reviewed. EQUIPMENT SUPPLIER shall be aware that checking of "Priority" shop drawings may delay the review of other drawings which have already been submitted by the EQUIPMENT SUPPLIER and the use of this designation is to be used with discretion.
- C. Contractor's Review and Certification:
1. The CONTRACTOR shall verify that the material and equipment in each shop drawing conforms to the requirements of the Contract Documents. Shop drawings shall comply with the Contract Documents and shall bear an executed statement to that effect by the CONTRACTOR. Shop Drawings without this stamp applied will be returned without review.
- D. Requirement for Complete Shop Drawings:
1. Material in shop drawings shall be in sufficient detail to demonstrate compliance with all requirements of the Contract Documents. Shop drawings shall address material and/or methods of construction, design criteria, performance characteristics, and Special Conditions of the Specifications.
 2. Shop drawings for systems and related equipment shall include information for all components required for a complete and operational system, including electrical, mechanical, and any other information required to indicate how the various components of the system function, and shall be included in the same submittal.
 3. Where statements of certification, written guarantees, extended service agreements or extended warranties as defined in Paragraph I are required, they will be provided with the shop drawing. The effective date of the guarantee and service agreements, however, shall not be until the date specified in the Contract Documents.
 4. Shop drawings shall be clearly marked to show the applicable sections of the specifications and sheet in the drawings. Other identification may also be required on drawings such as layout drawings or schedules to allow the reviewer to determine where a particular item is to be used in the project.
 5. A minimum of two (2) hard-copies of each shop drawing shall be submitted and one electronic copy of the shop drawing shall be posted on the Internet-Based Construction Management System in PDF format. All review comments on shop

drawings by the ENGINEER or OWNER shall be posted on the Internet-Based Construction Management System in PDF format on either a review comment form or comments on the shop drawing.

6. Shop drawings which do not have all of the information required for evaluation will be returned without benefit of review and comment.

E. Review of Shop Drawings:

1. The ENGINEER will review the data for general conformity to the Contract Documents. Comments will be made on items called to the attention of the ENGINEER for review and verification. Markings will be based on this examination and do not constitute a blanket review of the shop drawing. The ENGINEER's review does not relieve the EQUIPMENT SUPPLIER from any responsibility for errors or deviations from the Contract requirements. Shop drawings which contain substantial error or omissions, or which are not clearly legible, will be returned without benefit of review.
2. Shop drawings will be marked in one of the four following ways:
 - a. Reviewed: Shop drawings are acceptable without correction and may be distributed for construction and/or manufacture.
 - b. Furnish as Corrected: Shop drawings are acceptable with minor corrections as marked and may be used with the corrections noted.
 - c. Revise and Resubmit: Shop drawings having significant errors or incomplete data shall be revised and resubmitted for subsequent review after corrections have been made or additional materials are available.
 - d. Rejected: Material or equipment described is not acceptable.

F. Approval of Equal Substitutions

1. Where Contract Documents allow substitution of material or equipment as an approved equal to the specified product, shop drawings shall be provided. Shop drawings shall include supporting data to indicate specifically, on a point-by-point basis for each feature of the design, how the proposed product is equal to or better than the specified product. Deviations from the Contract Documents must be requested and approved as described in Article 2.3 of this Section.

G. Shop Drawings Required

1. Shop drawings are required for all items of equipment or materials where submittals are listed in the individual specification section and for the determination of substitutions for approval as described in Paragraph F of this Article. Only these shop drawings will be reviewed. Shop drawings which are not required may be submitted for "Record Purposes" but may not be reviewed.

H. Owner Selected Options

1. Where selections are to be made by the OWNER for color, texture or finish and shop drawings are required for that product, shop drawings will be submitted for approval of the materials of construction, composition, etc., prior to the selection of finishes by the OWNER. Items requiring selection of finish for which shop drawings are not required shall be furnished as record data. Information shall be provided as soon as possible to allow OWNER adequate time to consider available options for selection. Color chips, samples, etc., for all items are to be assembled and submitted to the OWNER through the ENGINEER for selection of finishes at the same time to allow all

options to be considered and allow selections to be coordinated with other items of finish. The ENGINEER will meet with the OWNER who will determine the finish to be used within 2 weeks, unless additional samples are required for selection. Materials for which shop drawings are required are to be submitted for approval of material quality prior to selection of finish.

I. Certifications, Warranties, and Other Requirements:

1. Where indicated in the Contract Documents the following items as defined below are to be provided as part of the shop drawing:
 - a. Certified Test Report - A report prepared by an approved testing agency on the results of tests performed on materials to indicate their compliance with the specifications. Reports are to be numbered consecutively for reference. Retest required to verify compliance with Contract Documents shall be identified with the same number as the original test with a letter to indicate retest, similar to the numbering system used for Shop Drawings.
 - b. Certification of Local Field Service - A certified letter stating that field service is available from a factory or supplier approved service organization located within an 8-hour drive of the project site or closer as required by the individual technical specifications.
 - c. Extended Warranty - A guarantee of performance for the product or system beyond the warranty described in section 01 78 36-PS Warranties. The Warranty Certificate is to be issued in the name of the OWNER.
 - d. Extended Service Agreement - A contract to provide operations and maintenance for equipment as specified beyond that required to full requirements for warranty repairs; or to perform routine maintenance at some period beyond the warranty period. The Service Agreement is to be issued in the name of the OWNER.
 - e. Certification of Adequacy of Design - A certified letter from the manufacturer of the equipment stating that they have designed the equipment offered to account for structural stability to withstand all imposed loads without deformation, failure or adversely affecting the operational requirements of the unit; and operational capability, including mechanical and electrical equipment sizing to be fully operational in accordance with the conditions specified.
 - f. Certification of Applicator/Subcontractor Qualifications - A certified letter stating that the applicator/subcontractor proposed to perform a specified item of work is duly designated as factory-authorized and trained for the application or installation of the specified product.

2.4 RECORD DATA

- A. Record data shall be submitted to provide information as to the general character, style and manufacturer of the equipment to allow the OWNER to adequately identify the materials or equipment incorporated into the project. Record data shall be provided for all equipment and materials of construction for items for which Shop Drawings are not required.
- B. Record data shall be complete to indicate where the material was incorporated into the project, provide schedules of materials and their use, colors, model numbers and other information which would allow this material to be replaced at some future date. Record

data will be received by the ENGINEER and logged for transmittal to the OWNER. Record data will not be reviewed for comment and no response will be made to the EQUIPMENT SUPPLIER.

2.5 OPERATIONS AND MAINTENANCE MANUALS

- A. For each type of equipment to be furnished and installed under this Contract, the EQUIPMENT SUPPLIER shall prepare an operation and maintenance manual covering:
1. Name, address, and telephone number of nearest competent service organization who can supply parts and service.
 2. Equipment function, normal operating characteristics, and limiting conditions, which reflect "as-built" conditions for the equipment furnished.
 3. Assembly, installation, alignment, adjustment, and checking instructions, including field modification made during installation, startup and testing.
 4. Operating instructions for startup, routine and normal operation, regulation and control, backwash, clean-in-place, shutdown, and emergency conditions.
 5. Preventative maintenance schedule including lubrication and maintenance instructions with quantities and scheduled intervals.
 6. Guide to "troubleshooting".
 7. Parts lists, and predicted life of parts subject to wear. Include spare parts inventory, special storage requirements, and a vendor contact list.
 8. Outline, cross-section, and assembly drawings; engineering data; control schematics and point-to-point electrical and instrumentation wiring diagrams, and reproductions of all equipment nameplates.
 9. Factory test data and performance curves for equipment where factory tests are specified.
 10. Line-by-line programming logic for all programmable logic controllers.
 11. Safety considerations.
- B. The operation and maintenance manuals shall be provided with a table of contents and each individual section shall be separated with a tab for easy reference.
- C. The above information, as applicable, shall be provided for the equipment as indicated in individual specification sections.
- D. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.
- E. Manuals shall be printed on heavy, first quality paper, 8-1/2 x 11 inch size with standard 3-hole punching. Drawings and diagrams shall be reduced to 8-1/2 x 11 inches. Where reduction is not practicable, larger drawings shall be folded separately, and placed in envelopes which are bound into the manual. Each envelope shall bear suitable identification on the outside.
- F. One electronic copy of each manual shall be submitted to the ENGINEER no later than 60 days prior to equipment startup. After review by the ENGINEER, EQUIPMENT SUPPLIER shall prepare four (4) final copies of each operation and maintenance manual and deliver to the ENGINEER not later than 90 days after to placing the equipment into operation. The final manuals shall be bound in stiff three ring binders of appropriate size, but maximum 3-1/2-

inch capacity. A copy of the final manual shall be provided in PDF format on CD-ROM or USB drive and submit on Internet-Based Construction Management System.

- G. All information in the manuals shall be in the English language, with dimensions in US units.

2.6 REQUESTS FOR INFORMATION

- A. When it is necessary for the EQUIPMENT SUPPLIER to request additional information, interpretation of the Contract Documents, or when the EQUIPMENT SUPPLIER believes there is a conflict between the drawings and specifications, he shall identify the conflict and request clarification through the CONTRACTOR using the Request for Information form. Use of this form will allow requests for information to be routed to OWNER, design engineers, design consultants or others through the ENGINEER and allow these requests to be monitored to determine that clarification is provided when needed. Sufficient information shall be attached to permit a written response without further information.
- B. The ENGINEER will log each request and will review the request to determine that the information provided is adequate. If information is not adequate, the request will be returned for additional information. When adequate information is provided, the request will be reviewed and a response made. If a change is required, the ENGINEER will initiate a Proposed Contract Modification. If no change is required the ENGINEER will provide additional information required to help the EQUIPMENT SUPPLIER comply with the Contract Documents.

2.7 SCHEDULE OF VALUES AND PAYMENT ESTIMATES

- A. Payment procedures shall be as described in the front-end documents. For contracts based on lump sum amounts with multiple equipment items, the CONTRACTOR is to submit to the ENGINEER for approval, a breakdown of cost for the Project. The breakdown is to provide adequate detail to allow easy determination of the percentage of completion for partial delivery payment review by the ENGINEER. Specification sections and add or deduct items in the proposal are to be used as a guide for preparing the breakdown. This breakdown is to be incorporated onto a form for the submission of payment request provided by the ENGINEER or in a form approved by the ENGINEER.
- B. The CONTRACTOR is to submit a schedule showing the anticipated schedule of payments for the CONTRACTOR to assist the OWNER in determining when funds are to be made available for payment of periodic payment requests. The EQUIPMENT SUPPLIER shall coordinate with the CONTRACTOR as necessary to provide this schedule.

2.8 EQUIPMENT INSTALLATION REPORT

- A. A written report shall be submitted by the EQUIPMENT SUPPLIER performing the installation check for all major equipment. This report shall certify that: 1) The equipment has been properly installed and lubricated, 2) is in accurate alignment, 3) is free from any undue stress imposed by connecting piping, equipment, or anchor bolts, and 4) has been operated under full load conditions and that it is operating satisfactorily. The report shall also indicate if and what operator training and maintenance instruction was provided and for what specific equipment. A sample form is attached.

2.9 NOTIFICATION BY SUPPLIER

- A. Written notification of the need for testing, observation work by ENGINEER, or intent to

work outside of regular working hours, or the request to shut down the facilities or make utility connections shall be given to the ENGINEER by issuance of a Notification By CONTRACTOR on a form provided by the ENGINEER.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 57 00
TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the Site. Remove temporary facilities when no longer needed.
- B. Construct temporary impounding works, channels, diversions, furnishing and operation of pumps, installing piping and fittings, and other construction for control of conditions at the Site. Remove temporary controls at the end of the Project.
- C. Provide a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Oklahoma Pollutant Discharge Elimination System (OPDES) Construction General Permit (OKR10), file required legal notices and obtain required permits prior to beginning any construction activity.
- D. Comply with all requirements of the Permit, including the development of a SWPPP, filing of the Notice of Intent (NOI) and Notice of Termination (NOT), record maintenance, and posting of the Permit.
- E. Provide labor, materials, equipment, and incidentals necessary to prevent storm water pollution for the duration of the Project. Provide and maintain temporary erosion and sediment control measures to prevent soil erosion and discharge of soil-bearing water runoff to adjacent properties and walkways.
- F. Remove pollution control structures when no longer required to prevent storm water pollution and restore and stabilize areas disturbed during removal.

1.2 QUALITY ASSURANCE

- A. Construct storm water pollution prevention measures prior to the beginning of construction and maintain these during construction until final stabilization has been achieved for the area protected.
- B. Plan and conduct all land-disturbing activities to minimize the area to be exposed at any one time. Minimize the time of exposure, off-site erosion, sedimentation, and adverse water quality impacts.
- C. Manage surface water runoff originating upstream of an exposed area to minimize erosion and sediment loss during the period of exposure.
- D. Install measures to control both the velocity and rate of release so as to minimize erosion and sedimentation of the receiving water body (i.e., ditch, channel, stream) in accordance with regulatory requirements and as directed by the Owner, Construction Manager or the Engineer.
- E. Periodically clean out and dispose of all sediment and other pollutants as necessary to maintain the treatment capacity of each pollution control feature. Clean out and properly dispose of all sediment and other storm water pollutants at the time of completion of the Work.

1.3 SUBMITTALS

- A. Provide copies of notices, records and reports required for Record Data in accordance with SECTION 01 32 33 PROJECT DOCUMENTATION.

1.4 STANDARDS

- A. Provide a storm water pollution prevention plan that complies with Local, State, and Federal requirements. Comply with all requirements of the Oklahoma Department of Environmental Quality (ODEQ) Construction General Permit OKR10 for storm water discharges from construction activities under the OPDES program.

1.5 PERMITS

- A. Post a copy of the Construction Site Notice at the construction site in a location where it is readily available for viewing by the general public and Local, State, and Federal authorities prior to starting construction activities and maintain the posting until completion of the construction activities.
- B. Maintain copies of a schedule of major construction activities, inspection reports, and revision documentation with the storm water pollution prevention plan (SWPPP) required under the OKR10 for Storm Water Discharges from Construction Activities for all projects.
- C. Submit the following to the ODEQ and the Operator of any Municipal Separate Storm Sewer System (MS4) receiving construction site discharge from the Site:
 - 1. Notice of Intent (NOI) at least 14 days prior to beginning construction activity. Construction activity may commence 24 hours after the submittal of an electronic NOI.
 - 2. Notice of Change (NOC) letter when relevant facts or incorrect information was submitted in the NOI, or if relevant information in the NOI changes during the course of construction activity.
 - 3. Notice of Termination (NOT) when the construction project has been completed and stabilized.
- D. Post a copy of the NOI at the construction site in a location where it is readily available for viewing by the general public and Local, State, and Federal authorities prior to starting construction activities and maintain the posting until completion of the construction activities.
- E. Maintain copies of a schedule of major construction activities, inspection reports, and revision documentation with the storm water pollution prevention plan (SWPPP) required under the OPDES General Construction Permit (OKR10) for Storm Water Discharges from Construction Activities for all projects.

1.6 POLLUTION CONTROL

- A. Prevent the contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Provide adequate measures to prevent the creation of noxious air-borne pollutants. Prevent dispersal of pollutants into the atmosphere. Do not dump or otherwise discharge noxious or harmful fluids into drains or sewers, nor allow noxious liquids to contaminate public waterways in any manner.
- B. Provide equipment and personnel and perform emergency measures necessary to contain

any spillage.

- C. Contain chemicals in protective areas and do not dump on soil. Dispose of such materials at off-Site locations in an acceptable manner.
- D. Excavate contaminated soil and dispose at an off-Site location if contamination of the soil does occur. Fill resulting excavations with suitable backfill and compact to the density of the surrounding undisturbed soil.
- E. Provide documentation to the Owner which states the nature and strength of the contaminant, method of disposal, and the location of the disposal Site.
- F. Comply with local, State and Federal regulations regarding the disposal of pollutants.
- G. Groundwater or run-off water which has come into contact with noxious chemicals, sludge, or sludge-contaminated soil is considered contaminated. Contaminated water must not be allowed to enter streams or water courses, leave the Site in a non-contained form or enter non-contaminated areas of the Site.
- H. Pump contaminated water to holding ponds constructed by the Contractor for this purpose, or discharge to areas on the interior of the Site, as designated by the Engineer.
- I. Construct temporary earthen dikes or take other precautions and measures as required to contain the contaminated water and pump to a designated storage area.
- J. Wash any equipment used for handling contaminated water or soil within contaminated areas three times with uncontaminated water prior to using such equipment in an uncontaminated area. Dispose of wash water used to wash such equipment as contaminated water.

1.7 EARTH CONTROL

- A. Stockpile excess soil and other earth not required for backfill at the time of generation in location shown on drawings. Control stockpile material to eliminate interference with Contractor and Owner's operations. Provide silt fence around stockpile to prevent run off of soil. Keep spoil material separate from excess soil stockpile.
- B. Dispose of excess earth and spoil material. Pay cost for disposal unless otherwise noted. Provide written approval by the property owner for all disposal on private property, and approval by the Owner if such disposal affects the use of Site or other easements.

1.8 MAINTENANCE OF WATER

- A. Manage water resulting from rains or ground water at the site. Maintain trenches and excavations free of water at all times. Provide and maintain pumps as necessary to remove excess water. Direct water away from the site to prevent damage to surrounding property.
- B. Manage water during construction to make the construction site workable. Prepare and submit a Water Management Plan for approval. The plan shall describe:
 - 1. Methods to be used to manage water at the site.
 - 2. Contingency plans for heavy rains or floods.
 - 3. Procedures to be used in the event of emergencies.
- C. Perform operations necessary to control water at the site. Lower the water table in the construction area by acceptable means if necessary to maintain the site in a dry and

workable condition at all times. Provide drains, sumps, casings, well points, and other water control devices as necessary to remove excess water.

- D. Maintain standby equipment to provide proper and continuous operation for water management. Monitor the operation on a 24-hour basis to provide continuous operation.
- E. Modify Water Management Plan as required by the Engineer. In the event of failure of the system, flooding of the excavation may be ordered by the Engineer until the system is returned to service.
- F. Ensure that water drainage does not damage adjacent property. The Contractor shall be responsible for the discharge of water from the site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide materials meeting regulatory requirements.

PART 3 - EXECUTION

3.1 CONSTRUCTING, MAINTAINING AND REMOVING TEMPORARY CONTROLS

- A. Maintain controls in accordance with regulatory requirements where applicable, or in accordance with the requirements of the Contract Documents.
- B. The Contractor shall have the sole responsibility for the means, methods, techniques, sequences, and procedures for furnishing, installing and maintaining the erosion and sedimentation control system.
- C. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- D. Remove temporary control when no longer required, but before the Project is complete. Correct any damage or pollution that occurs as the result of removing controls before the point where they are no longer required.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard; product substitutions; and comparable products.

1.2 REFERENCES

- A. Preselection Drawings and general provisions of the Contract, including Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Definitions
 - 1. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
 - b. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - c. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
 - 2. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 3. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 ADMINISTRATIVE REQUIREMENTS – NOT USED

1.4 SUBMITTALS

- A. See Section 01 33 10 "Supplier's Submittals" for requirements.

1.5 COMPARABLE PRODUCTS

- A. If the Specification states that's an Engineer Approved Equal is allowed. Identify product or fabrication or installation method. Include Specification Section number and title and Drawing numbers and titles.
 - 1. ENGINEER'S Action: If necessary, ENGINEER will request additional information or documentation for evaluation within one week of receipt of a comparable product submittal.

1.6 QUALITY ASSURANCE

- A. Design Requirements: Where design is specified; design of installation, systems, equipment, and components, including supports and anchorage, shall be in with provisions of International Building Code by International Code Council. Refer to the drawings for required design load criteria.
- B. Environmental Requirements: Provide products suitable for installation and operation under rated conditions at 830 feet above sea level. Products installed outdoors or in unheated enclosures shall be capable of continuous operation within an ambient temperature range of 10°F to 110°F.
- C. Product installations are defined as equipment furnished for an individual facility installed as part of a single project. Multiple equipment items installed as part of the same project shall not be considered multiple installations. Multiple equipment items installed at the same facility at different times as part of different projects can be considered multiple installations.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent

condensation.

4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Off-site storage of materials and equipment shall be the sole responsibility of the CONTRACTOR.

1.8 SITE CONDITIONS

- A. The equipment, sizes, materials, and arrangements described in this section are based on recommendations by equipment suppliers and shall be considered minimum limits of acceptability. The EQUIPMENT SUPPLIER shall be responsible for design, arrangement, and performance of all equipment supplied under this section.
- B. Environmental Conditions:
 1. All equipment including controls and drives specified herein shall be specifically designed to be installed for this service and the environment encountered in this installation, unless noted otherwise.
 2. The environment will be moist, and corrosive, exhibiting hydrogen sulfide and other corrosive gases encountered in municipal wastewater treatment plants.
 3. All equipment shall be designed and capable of operation outdoors at ambient temperatures of 10°F to 110°F.
 4. Equipment shall be compatible with heat tracing and insulation, which will be furnished and installed by the CONTRACTOR. EQUIPMENT SUPPLIER shall design piping systems with ample clearances and material compatibility to accept required heat tracing and insulation. If additional freeze protection beyond heat tracing and insulation is required it shall be furnished by the EQUIPMENT SUPPLIER. EQUIPMENT SUPPLIER shall coordinate with the CONTRACTOR to provide direction on where heat tracing is required, and shall verify that the CONTRACTOR has provided adequate heat tracing and insulation during startup activities.

1.9 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to OWNER.
 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for OWNER.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Like items of products furnished and installed shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions.
 4. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
 5. OWNER reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 6. Where products are accompanied by the term "as selected," ENGINEER will make selection.
 7. Where products are accompanied by the term "match sample," sample to be matched is ENGINEER'S.
 8. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 9. Regulatory Requirements: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
 10. Safety Guards:
 - a. Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal.
 - b. Use 16-gauge or heavier; galvanized steel, aluminum, coated steel and ½-inch mesh expanded steel.
 - c. For outdoor installations prevent entrance of rain or dripping water.
 11. Electrical Components: Provide Work in accordance with NFPA 70, National Electrical code, and be labeled by a nationally recognized testing laboratory or other agency acceptable to the authority having jurisdiction.
 12. Equipment Finish:
 - a. Provide manufacturer's standard finish and color, except where specific color is indicated.
 - b. If manufacturer does not have a standard color, provide color as approved by ENGINEER.

13. Special Tools and Accessories: Provide to OWNER all special tools and accessories required placing equipment in operation. These include, but not limited to, adequate oil and grease (as required for first servicing of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts required for maintenance.
 14. Lubricant: Provide initial lubricant recommended by manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, start-up, and operation until final acceptance by OWNER.
- B. Fabrication and Manufacture:
1. General Requirements:
 - a. Manufacture parts to U.S.A. standard sizes and gauges.
 - b. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
 - c. Design structural members for anticipated shock and vibratory loads.
 - d. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
 - e. Modify standard products as necessary to meet performance specifications.
 2. Lubrication System Requirements:
 - a. Require no more than weekly attention during continuous operation.
 - b. Convenient and accessible. Oil drains, with bronze or stainless steel valves, and fill-plugs easily accessible from normal operating area or platform. Locate drains to allow convenient collection of oil during changes without removing equipment from its installed position.
 - c. Provide constant-level oilers or oil level indicators for oil lubrication systems.
 - d. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.
- C. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that comply with requirements.
 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements.
 6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed.
 7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional

requirements on Drawings are based on a specific product or system, provide the specified product or system.

8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches ENGINEER'S sample. ENGINEER'S decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, and textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, ENGINEER will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, ENGINEER will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 TOOLS, SPARE PARTS AND MAINTENANCE MATERIALS

- A. See applicable sections for specific requirements.
- B. Schedule:
 1. Ensure shipment and delivery occurs concurrent with shipment of product.
 2. Transfer to OWNER upon acceptance by CONTRACTOR of shipment.
- C. Packaging and Shipment:
 1. Package and ship items to avoid damage during long term storage in original cartons or in appropriately sized, hinged-cover, wood, plastic or metal boxes.
 2. Prominently display on each package: Part number, consistent with Operation and Maintenance Manual identification system; equipment description, quantity of parts; and equipment manufacturer.
- D. Deliver to designation location as directed by Resident Project Representative.

PART 3 - EXECUTION

3.1 WORK IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS

- A. When the specification Section requires the Work to be accomplished in accordance with "manufacturer's instructions", obtain and distribute copies of such instructions to parties involved in the installation. Provide two copies to the Resident Project Representative and maintain one set at the Project site.

- B. Handle, install, connect, clean, condition and adjust products in strict accordance with the manufacturer's instructions and in conformity with the Contract Documents. Do not omit any preparatory step or installation procedures. In case of conflict between job conditions or Contract Documents with manufacturer's instructions notify Resident Project Representative.
- C. Upon completion of installation, obtain Certificate of Installation from manufacturer's representative.

3.2 INSPECTION

- A. Inspect products for signs of pitting, rust decay, or other deleterious effects of storage. Do not install products showing such effects. Remove damaged product from Project site and expedite delivery of identical new product. Delays to Work resulting from product damage, which necessitates procurement of new product, will be considered delays within CONTRACTOR'S control.

3.3 INSTALLATION

- A. Drawings show general locations for product installation, unless specially dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Recoat finish surfaces that are damaged prior to final acceptance of Work.
- E. Do not cut or notch any structural member or building surface without specific approval of ENGINEER.
- F. Handle, install, connect, clean, condition, and adjust product in accordance with Contract Documents and manufacturer's instructions.
- G. Apply field coating in accordance with Contract Documents.
- H. Perform required adjustments, tests, operation checks, and other start-up activities.
- I. Fill lubricant reservoirs and replace consumption during testing, start-up, and operation prior to final acceptance of Work by OWNER.

END OF SECTION



SUBSTITUTION REQUEST (After the Bidding Phase)

Project: _____ Substitution Request Number: _____
 _____ From: _____
 To: _____ Date: _____
 _____ A/E Project Number: _____
 Re: _____ Contract For: _____

Specification Title: _____ Description: _____
 Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
 Manufacturer: _____ Address: _____ Phone: _____
 Trade Name: _____ Model No.: _____
 Installer: _____ Address: _____ Phone: _____

History: New product 2-5 years old 5-10 yrs old More than 10 years old

Differences between proposed substitution and specified product: _____

Point-by-point comparative data attached - REQUIRED BY ENGINEER

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Engineer: _____
 Address: _____ Owner: _____
 _____ Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

Savings to Owner for accepting substitution: _____ (\$ _____).

Proposed substitution changes Contract Time: No Yes [Add] [Deduct] _____ days.

Supporting Data Attached: Drawings Product Data Samples Tests Reports

SUBSTITUTION

REQUEST

(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01 33 10.
- Substitution approved as noted - Make submittals in accordance with Specification Section 01 33 10.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by:

Date:

Additional Comments: Contractor Subcontractor Supplier Manufacturer A/E _____

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SECTION 01 75 25
EQUIPMENT TESTING AND STARTUP

PART 1 - GENERAL

1.1 SUMMARY

- A. EQUIPMENT SUPPLIER's scope of work to be performed under this specification shall be to support installation, testing and startup of all supplied equipment systems.

1.2 REFERENCES – NOT USED

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Service of EQUIPMENT SUPPLIER's Representative
 1. EQUIPMENT SUPPLIER's contracted cost for the equipment shall include the cost of furnishing competent and experienced personnel who shall represent the manufacturers and shall assist the CONTRACTOR, when required, to renovate or install, adjust, and test the equipment in conformity with the Contract Documents.
 2. After the equipment is placed in permanent operation by the CONTRACTOR, EQUIPMENT SUPPLIER's personnel shall make all adjustments and tests required to prove that such equipment is in proper and satisfactory operating condition and shall instruct the OWNER's representatives in the proper operation and maintenance of such equipment or system. Training must be adequate and acceptable to OWNER's representative. The preliminary Equipment O&M must be approved prior to start of training.

1.4 SUBMITTALS

- A. Submit to ENGINEER, for review, start-up and test schedule a minimum of 60 days prior to commencing Work specified in this section.
- B. Submit to ENGINEER an electronic copy and a minimum of two (2) hard copies of field test data and test records for all equipment and systems.

PART 2 - PRODUCTS

- A. CONTRACTOR shall furnish and install initial supply of oil, grease or other consumable required per EQUIPMENT SUPPLIER's instructions to startup, test and place into service the supplied equipment.

PART 3 - EXECUTION

3.1 TESTING AND STARTUP PLAN

- A. Submit a plan that includes a schedule for testing and startup of all equipment and systems provided as part of the Work. Specific Tests for each piece of equipment are detailed in the Equipment Specification Section.
- B. Include in the startup plan:
 1. Sequences.
 2. Lock-out procedures and safety precautions.
 3. Utility requirements.

4. Related items and piping which must be complete and the schedule for completion.
 5. Instrumentation settings.
 6. Operation Support
- C. EQUIPMENT SUPPLIER shall provide a schedule and outline for training of OWNER's personnel. Equipment shall not be turned over to OWNER prior to training of OWNER's personnel. Specifically identify adjustment and maintenance items that must be done in initial 30-day period.

3.2 PREPARATION

EQUIPMENT SUPPLIER shall verify that the CONTRACTOR has performed the following work prior to testing and startup:

- A. Complete equipment installation with controls, safety devices and auxiliary support systems necessary to start the equipment and verify that the equipment functions correctly under no load conditions.
- B. Remove temporary bracing supports and other construction debris that may damage equipment.
- C. Remove protective coatings and oils from new equipment used for protection during shipment and installation.
- D. Flush and fill lubricated systems in equipment in accordance with Manufacturer's instructions.
- E. On new equipment, install temporary connections and devices required to fill, operate, checkout and drain the system.
- F. Check equipment for correct direction of rotation and freedom of moving parts.
- G. Align equipment to Manufacturer's tolerances.
- H. Check installation prior to start-up for conformance to Manufacturer's instructions.
- I. Adjust or modify equipment to make equipment properly operational.
- J. Correct any deficiencies or problems noted in Manufacturer's representative's installation reports.
- K. Complete testing of related piping systems and furnish test reports to ENGINEER.

3.3 TESTING AND STARTUP

SUPPLIER shall perform the following:

- A. EQUIPMENT SUPPLIER with CONTRACTOR assistance as required shall begin checkout, testing, and startup procedures after training of OWNER's personnel and approval by ENGINEER of testing and startup plan. EQUIPMENT SUPPLIER's installation report shall be submitted within 48 hours of startup.
- B. Make final connections to equipment and complete the system installation necessary to apply the system loads to the equipment and verify the equipment functions correctly.
- C. Perform all tests as required by the specifications prior to startup.
- D. Start equipment according to manufacturer's instructions.

- E. Place each piece of equipment in the system in operation until the entire system is functioning.
- F. Operate the system through the design performance range consistent with available flows. Adjust, balance, and calibrate and, in general, check out the equipment, safety devices, controls, and process system to operate within the design conditions.

END OF SECTION

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SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

- A. Drawings and general provisions of the Contract, including Special Conditions and Division 01 Specification Sections, apply to this Section.
- B. Definitions
 - 1. Preliminary Data: Initial and subsequent submissions for ENGINEER'S review.
 - 2. Final Data: ENGINEER accepted data, submitted as specified herein.
 - 3. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.
 - 4. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
 - 5. Subsystem: A portion of a system with characteristics similar to a system.
 - 6. Instructional Manual: Equipment and Operating Data submitted prior to the testing and startup of the equipment, subsystem, or system.
 - 7. Operation and Maintenance Data: The operation and maintenance data submitted to be included in the Operation and Maintenance Manual for the Project.
- C. Related Sections
 - 1. Section 01 33 00 "Supplier's Submittals" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Section 01 70 00 "Demonstration and Training" for submitting operation and maintenance manuals.
 - 3. All other Contract Documents for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing and Scheduling
 - 1. Equipment and System Data (Instructional manual):
 - a. Preliminary Data:
 - 1) Do not submit until ENGINEER has approved Shop Drawings.

- 2) Submit prior to shipment date.
 - b. Final Data: Submit Instructional Manual Formatted data not less than 30 days prior to equipment or system field functional testing. Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of Project.
- B. Coordination
1. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

1.4 SUBMITTALS

- A. Initial Submittal: Submit draft copy of each Operation and Maintenance Data (Manual) at least 60 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. ENGINEER will return one copy of draft and mark whether general scope and content of Manual is acceptable.
- B. Final Submittal: Submit one (1) copy of each Manual in final form at least 30 days before requesting inspection for Substantial Completion. ENGINEER will return copy with comments within 21 days of receipt or notify CONTRACTOR it's accepted.
1. Correct or modify each manual to comply with ENGINEER'S comments. Submit (4) copies of each corrected manual within 21 days of receipt of ENGINEER'S comments. Provide three (3) electronic copies of the final manual in PDF format.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically or by treatment area as directed by ENGINEER. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system or by treatment area as directed by ENGINEER. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents.

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of OWNER.
 4. Name, address, and telephone number of CONTRACTOR.
 5. Name and address of ENGINEER.
 6. Subcontractor, Supplier, Manufacturer, Installer, or Maintenance Contractor's name, address, and telephone number, as appropriate.
 - a. Identify area of responsibility of each.
 - b. Provide name and telephone number of local source of supply for parts, replacement, and service.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL, VOLUME NO. ___ OF ___", Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 - c. Text: Manufacturer's printed data, or neatly typed.
 - d. Three-hole punch data for binding and composition; arrange printing so punched holes do not obliterate data.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch 20-POUND MINIMUM, white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
6. Electronic Media Format:
 - a. Portable Document format (PDF)
 - 1) After all preliminary data has been found to be acceptable, submit operational and maintenance data in PDF format on CD-ROM or USB drive.
 - 2) Files to be exact duplicates of accepted preliminary data. Arrange by specification Section number. Bookmark sections.
 - 3) Files to be fully functional and viewable in most recent version of Adobe Acrobat.
 - b. Manufacturer's Standard Electronic Format:

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 1. Product name and model number.
 2. Manufacturer's name.

3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed and identifies color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.

2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.

2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: If applicable, include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 1. Do not use original Project Record Documents as part of operation and maintenance manuals.

2. Comply with requirements of newly prepared Record Drawings in Section 01 78 39 "Project Record Documents."
- G. Comply with schedule for submitting operation and maintenance documentation.
- H. Maintenance Summary:
1. Compile individual Maintenance Summary Form for each applicable equipment item, respective unit or system and for components or sub-units.
 2. Format:
 - a. Use Maintenance Summary Form include with this Section as a guide.
 - b. Use only 8-1/2 by 11-inch size paper.
 3. Include detailed lubrication instructions and diagrams showing pints be greased or oiled,; recommended type, grade, and temperature range of lubricants and frequency of lubrication.
 4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished with the Operation and Maintenance Data.
 - b. "Unit" is the unit of measure for ordering part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.

3.2 DATA FOR MATERIALS AND FINISHES

- A. Content for Architectural Products, Applied Materials, and Finishes:
1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special-manufactured products.
 2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.
- B. Content for Moisture Protection and Weather Exposed Products:
1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
 2. Instructions for inspection, maintenance, and repair.

3.3 SUPPLEMENTS

- A. Sample forms included after "End of Section" are considered part of this Section.
1. Maintenance Summary Form.

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO: _____

EQUIPMENT ITEM: _____

MANUFACTURER: _____

EQUIPMENT TAG NOS.: _____

WEIGHT OF INDIVIDUAL COMPONENTS (Over 100 Pounds) _____

NAME PLATE DATA (HP, Voltage, Speed, etc.): _____

Manufacturer's Local Representative:

Name: _____ Telephone No. _____

Address: _____

| Maintenance Operation Requirements | Frequency | Lubricant |
|--|---|--|
| List briefly each maintenance operation required and refer to specific information in manufacturer's maintenance manual, if applicable. Also note tools needed for each maintenance operation and safety considerations. | List frequency of each maintenance operation. | Refer by symbol to lubricant required. |
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MAINTENANCE SUMMARY FORM (Continued)

LUBRICANT LIST

| Reference Symbol | Mfgr _____ | Mfgr _____ | Mfgr _____ |
|---|--|------------|------------|
| List symbols used in maintenance requirements | List equivalent lubricants of several manufacturers' | | |
| | | | |
| | | | |
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| | | | |
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| | | | |

RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY

| Part No. | Description | Unit | Quantity | Unit Price |
|----------|-------------|------|----------|------------|
| | | | | |
| | | | | |
| | | | | |
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**SECTION 01 78 36
WARRANTIES**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Preparation and submittal of warranties.
 - 2. Time and schedule of submittals.
 - 3. Transfer of Maintenance responsibility.

1.2 REFERENCES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Sections, apply to this Section.
- B. Related Sections:
 - 1. Section 01 33 10 "Supplier's Submittals"
 - 2. Section 01 75 25 "Equipment Testing and Startup."
 - 3. Section 01 78 23 "Operation and Maintenance Data"
 - 4. Drawings and general provisions of the Contract, including Special Conditions and Division 01 Specification Sections, apply to this Section.
 - 5. Warranties required for specific products or work included in individual technical specification Sections.

1.3 SUBMITTALS

- A. At the end of the project furnish the following warranty summary:
 - 1. Provide two copies of all warranty information in an electronic format on a compact disk (CD) or USB Flash drive.
 - 2. Provide one copy of all warranty information in a commercial quality 8 1/2 x 11-inch three-ring hardback, plastic binder.
 - 3. CDs and binder shall be labeled WARRANTIES with current year, project name, contractor name and telephone number, and equipment supplier name and telephone number.
 - 4. Prepare table of contents in the same sequence as the manual submitted per Section 01 78 23 "Operation and Maintenance Data."
 - 5. Separate each warranty with index tab sheets keyed to the table of contents listing.
 - 6. Behind each index sheet, or within each warranty file, include an information sheet labeled WARRANTIES, with current year, project name, contractor name and telephone number, subcontractor name and telephone number, equipment supplier name and telephone number, manufacturer name and telephone number, and applicable Section number and title.
- B. Preparation
 - 1. Warranty shall be on the company's original forms signed by authorized agent only.
 - 2. No warranty shall start prior to equipment being put into operation.

3. Verify that documents are in proper form, contain full information, and are notarized.
 4. Co-execute submittals when required.
 5. Retain warranties until time specified for submittal.
 6. All of the above shall be included in each submittal.
- C. Conditions
1. Warranty date of beginning shall be the date of Substantial Completion as determined by the applicable technical specification Section. If an item does not have a separate substantial completion date, the project substantial completion data shall be used as the beginning of the warranty period.
 2. Equipment warranty period shall be for a minimum of two years from the warranty date of substantial completion, unless specifically stated otherwise.
- D. Schedule
1. Submittals shall be submitted by the CONTRACTOR in accordance with Section 01 33 00 "Supplier's Submittals."
 2. Provide the responsible subcontractors, suppliers, and manufacturers' warranties in duplicate, within ten days after completion of the applicable item of work.
 3. Warranties shall be submitted prior to final Application for Payment.
 4. Provide a separate letter for each maintenance responsibility transference to include the mutually agreed time and date of the transfer of responsibility.

1.4 SPECIAL EQUIPMENT WARRANTY

- A. Special Equipment Warranty
1. The SUPPLIER shall jointly warrant to the OWNER and CONTRACTOR that all equipment, including all components of the complete assembly furnished by it hereunder, complies in all material respects with the design and specifications of these documents and contains no defects of material or workmanship. In the event of failure of any part or parts of the equipment during the warranty period, due to defects of design, materials, or workmanship, the affected part or parts shall be replaced or repaired at SUPPLIER's option promptly upon notice by the OWNER. All replacement parts shall be furnished, delivered, and installed at the expense of the SUPPLIER.
 2. Unless specifically stated otherwise, the warranty period shall be interpreted as the 24-month period of beneficial use following substantial completion which includes the 30-day startup period and successful completion of the performance testing of the SUPPLIER-furnished equipment by the OWNER as provided below, and shall be exclusive of the time of use of the equipment in installation, testing, adjusting, etc., during the construction period, or of the time in storage, after delivery and prior to installation. All equipment shall be operated for a minimum 30-day startup period and shall successfully complete the performance testing before final acceptance and before the start of the 24-month warranty period. SUPPLIER's warranty, should CONTRACTOR be delayed, will not extend beyond five (5) years (for equipment with a 2-year warranty, extend period for equipment with longer warranties) after receipt of purchase order from the CONTRACTOR, without adjustment in contract price.
 3. If the equipment does not meet the requirements of the Specifications, the SUPPLIER

shall correct or service the equipment at no additional cost to Owner, as necessary to meet the specified requirements. In the event the equipment is unable to meet the specified requirements within the warranty period, the equipment SUPPLIER shall refund an amount equal to the original purchase price of the equipment.

4. The CONTRACTOR shall be responsible for insuring that the SUPPLIER's special equipment warranty is not voided by acceptance of the terms of purchase agreements between the CONTRACTOR and the SUPPLIER. In all events, the CONTRACTOR will be held ultimately responsible for enforcement of the requirements of this warranty at his expense.
5. Payment for equipment as "Materials-On-Hand" will not be made until the OWNER receives an approved Special Equipment Warranty.

PART 2 - PRODUCTS

2.1 WARRANTY CERTIFICATES

- A. The installation contractor shall complete all warranty certificates and register the product with the manufacturer.
- B. Use the date of substantial completion as the installation date.
- C. List the product model, product serial number, and any additional information required by the manufacturer on each certificate.
- D. Provide a copy of the original certificate in lieu of the original certificate in the warranty manual if the manufacturer requires the original copy in lieu of a copy.

PART 3 - EXECUTION

3.1 PRODUCT WARRANTY

- A. The CONTRACTOR shall fill out all product warranty forms during the manufacturer's required time limit.
 1. Failure to do so may result in the OWNER's loss of standard product coverage in which the CONTRACTOR shall become liable for the same coverage and time limit forfeited due to their omission.
 2. The CONTRACTOR shall notify the owner, prior to installation, of all optional extended warranties provided by the manufacturer and make available to the owner the opportunity to purchase the extended warranty.
 3. The CONTRACTOR shall insure that all warranty documents, including copies of completed registration forms, are included in the closeout documents.
- B. Warranty pre-expiration equipment review
 1. The CONTRACTOR, OWNER, and ENGINEER shall conduct an on-site review of equipment and systems covered by warranties.
 - a. This review will be scheduled approximately 2-months prior to expiration of the Warranty.
 - b. The purpose of the review will be to evaluate the condition of the equipment and systems to determine if Warranty repairs of claims are necessary.
 - c. The CONTRACTOR shall cooperate to notify the issuer of the Warranty and to

schedule necessary repairs or corrective actions prior to expiration of the
Warranty.

END OF SECTION

**SECTION 31 05 00
EARTHWORK MATERIALS**

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 provides the requirements for materials used for preparation of roadway fill, subgrade and base; structural subgrade and backfill; utility subgrade, bedding, embedment, and backfill; embankment and levee subgrade and fill; and other related work.

1.3 SUBMITTALS

- A. Submittals for Review.
 - 1. Samples: As required by Engineer, provide one-gallon sample in a sealed container.
 - 2. Contractor Design Mix Determination: Submit proposed design mix design for Controlled Low Strength Material and preliminary results demonstrating the mix design achieves required compressive strength.
- B. Submittals for Information.
 - 1. Source of Materials: Submit name and location of source of materials.
 - 2. Off-Site Borrow Source: Prior to furnishing off-site borrow (soils), provide notarized certification from the landowner stating to the best of landowner's knowledge and belief, the borrow source has never been contaminated by hazardous and/or toxic waste materials.
 - 3. Certified Analysis: Submit test results by independent qualified testing laboratory of material compliance with specifications. Results shall not be more than 30 days old.

1.4 REFERENCES

- A. Definitions.
 - 1. Well-Graded: A mixture of particle sizes that has no specific concentrations or lack thereof of one or more sizes producing a material type which, when compacted.
- B. Reference Standards: Following are standards that may be referenced in this Section.
 - 1. American Concrete Institute, ACI 229. – Controlled Low Strength Materials.
 - 2. ASTM International (ASTM):
 - a. C33 – Standard Specification for Concrete Aggregate.
 - b. C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
 - c. C88 – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - d. C94 – Standard Specification for Ready-Mixed Concrete.
 - e. C117 – Standard Test Method for Material Finer than 75 Micrometer (No. 200) Sieve in Mineral Aggregates by Washing.
 - f. C127 – Standard Test Method for Density, Relative Density (Specific Gravity),

- and Adsorption of Coarse Aggregates.
- g. C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - h. C136 – Standard Test Method for Sieve Analysis of Fine and coarse Aggregates.
 - i. C142 – Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
 - j. C150 – Standard Specification for Portland Cement.
 - k. C535 – Standard Test Method for Resistant to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - l. C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - m. D75 – Standard Practice for Sampling Aggregates.
 - n. D448 – Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
 - o. D1140 – Standard Test Method for Amount of Materials in Soils Finer than the No. 200 (75 micrometer) Sieve.
 - p. D2487 – Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - q. D2940 – Standard Specification for Graded Aggregate Material for Bases or Subbases for highways or Airports.
 - r. D2974 – Standard Test Method for Moisture, Ash, and Organic Matter of Peat and other Organic Soils.
 - s. D4221 – Standard Test Method for Dispersive Characteristics of Clay Soil by Double hydrometer.
 - t. D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - u. D4832 – Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
 - v. D5084 – Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter.
 - w. E11 – Standard Specification for Wire-Cloth and Sieves for Testing Purposes.
3. Oklahoma Department of Transportation, Standard Specifications (ODOT):
- a. Sec. 303 – Aggregate Base
 - b. Sec. 703 – Bases and Miscellaneous Aggregates
 - c. L-18 – Fractured faces
 - d. L-38 – Soft particles
4. American Association of State Highway and Transportation Officials (AASHTO):
- a. T2 – Sampling
 - b. T11 – Material passing No. 200 sieve
 - c. T27 – Sieve analysis
 - d. T87 – Method of preparing samples
 - e. T88 – Particle Size Analysis of Soils
 - f. T89 – Determining liquid limit

- g. T90 – Determining plastic limit and plasticity index
- h. T96 – Los Angeles Abrasion, wear
- i. T180 – Maximum density (Method D)
- j. T210 – Aggregate durability index

1.5 DELIVERY, STORAGE AND HANDLING

- A. Storage and Protection.
 - 1. Stockpile excavated materials and imported materials in designated areas or in areas approved by ENGINEER. Clearly identify stockpiles.
 - 2. Lightly compact top and slop stockpiles to prevent excessive erosion and ponding of water.
 - 3. Store and handle materials in a manner to prevent contamination.
- B. Erosion and Sedimentation Control: Provide silt fences and surface drainage control at material stockpile areas in accordance with the Storm Water Permit.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Various site preparation, earthwork, trenching, and roadway subgrade and base Sections reference the materials listed in the following paragraphs. Not all materials listed are referenced in the Sections for this Project.
- B. Sampling of materials shall be in accordance with ASTM D75.

2.2 GRANULAR MATERIAL

- A. Granular material shall be free flowing, such as sand or hydraulically graded crushed stone fines, or mixed sand and gravel, or sandy loam. The material shall be free from lumps, stones over 2-inches in diameter, clay and organic matter. The imported material shall be classified as GW, GP, GM, GC, SW, or SP according to Unified Soil Classification System, ASTM D2487.

2.3 COARSE AGREGATE

- A. Coarse aggregate shall consist of gravel, crushed gravel, and crushed stone. It shall consist of sound and durable particles, free from frozen materials or injurious amounts of salts, alkali, organic matter of other material either free or as adherent coating, and reasonably well graded between the prescribed limits listed below when tested in accordance with ASTM C136.
- B. Abrasion: It shall not wear more than 40 percent when tested in accordance with ASTM C131 or ASTM C535.
- C. Soundness: When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, the weighted percentage of loss shall not exceed 12 percent.
- D. Amount of material finer than 75-micrometer (No. 200) sieve: Coarse aggregate for embedment shall contain not more than one percent by weight organic matter (other than native bitumen), clays, loam or pebbles coated therewith, and shall contain not more than five percent by weight on any one or combination of slate, schist or soft particles of

sandstone.

- E. Each class of aggregate gradation shall comply with the applicable gradation limits listed in Table No. 1, when tested in accordance with ASTM C136.

Table No. 1 – Coarse Aggregate Gradation

| Sieve Size | Aggregate Size No. 467 (1-1/2 to No. 4) | Aggregate Size No. 4 (1-1/2 to 3/4 in.) | Aggregate Size No. 57 (1 in. to No. 4) | Aggregate Size No. 67 (3/4 in. to No. 4) | Aggregate Size No. 8 (3/8 in. to No. 8) |
|------------|--|--|---|---|--|
| | Amounts Finer than Each Laboratory Sieve Mass Percent | | | | |
| 2 in. | 100 | 100 | ----- | ----- | ----- |
| 1-1/2 in. | 95 to 100 | 90 to 100 | 100 | ----- | ----- |
| 1 in. | ---- | 20 to 55 | 95 to 100 | 100 | ----- |
| 3/4 in. | 35 to 70 | 0 to 5 | ----- | 90 to 100 | ----- |
| 1/2 in. | ---- | ----- | 25 to 60 | ----- | 100 |
| 3/8 in. | 10 to 30 | 0 to 5 | ----- | 20 to 55 | 85 to 100 |
| No. 4 | 0 to 5 | ----- | 0 to 10 | 0 to 10 | 10 to 30 |
| No. 8 | ---- | ----- | 0 to 5 | 0 to 5 | 0 to 10 |
| No. 16 | ---- | ----- | ----- | ----- | 0 to 5 |

Aggregate Size Number and gradation is in accordance with ASTM C33 and ASTM D448.

2.4 FINE AGGREGATE

- A. Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof, complying with the requirements for abrasion, soundness, and impurities as specified for coarse aggregate.
- B. The fine aggregate gradation shall comply with the applicable gradation limits, when tested in accordance with ASTM C136. Fine aggregate shall not have more than 45% passing any sieve and retained on the next consecutive sieve shown in Table No. 2 and, its fineness modulus shall not be less than 2.3 nor more than 3.1.
- C.

Table No. 2 – Fine Aggregate Gradation

| Sieve | Percent Passing |
|---------|-----------------|
| 3/8 in. | 100 |
| No. 4 | 95 to 100 |
| No. 8 | 80 to 100 |
| No. 16 | 50 to 85 |
| No. 30 | 25 to 60 |
| No. 50 | 5 to 30 |
| No. 100 | 0 to 10 |

Gradation in accordance with ASTM C33 Fine Aggregate

- D. Plasticity index shall be less than 6 for material passing No. 30 sieve.

2.5 NATURAL GRAVEL

- A. Natural gravel shall consist of uncrushed stones, washed and screened, complying with the requirements for abrasion, soundness, and impurities as specified for coarse aggregate.
- B. The fine aggregate gradation shall comply with the gradation limits listed in Table No. 3, when tested in accordance with ASTM C136.

Table No. 3 – Natural Gravel Gradation

| Passing or Retained on Sieve | Percent by Weight |
|-------------------------------------|--------------------------|
| Passing 1-1/2 in. | 100 |
| Retained on 3/4 in. | 100 |

2.6 CRUSHED STONE FOR FOUNDATION

- A. Crushed stone for foundations shall comply with the requirements for abrasion, soundness, and impurities as specified for coarse aggregate.
- B. The fine aggregate gradation shall comply with the gradation limits listed in Table No. 4, when tested in accordance with ASTM C136.

Table No. 4 – Crushed Stone Gradation

| Passing or Retained on Sieve | Percent by Weight |
|-------------------------------------|--------------------------|
| Passing 5 in. | 100 |
| Retained on 2 in. | 100 |

2.7 SAND

- A. Sand shall consist of clean, hard, durable, uncoated grains, free from lumps and organic material. All particles shall pass a No. 8 sieve and the material shall have a plasticity index of 12 or less.

2.8 PEA GRAVEL

- A. Pea Gravel: Conforming to ASTM C33, Aggregate Size No. 8, and coarse aggregate graded with 100 percent passing a 3/8-inch sieve and 90 percent retained on a No. 4 sieve.

2.9 CONCRETE ENCASEMENT

- A. Provide Ready mixed concrete prepared in accordance with ASTM C94. Select and proportion ingredients to obtain a minimum compressive strength of 3,000 psi at 28 days.
- B. Materials:
 - 1. Cement: ASTM C150, Type I or Type II.
 - 2. Aggregate: ASTM C33, Size 67 or similar.
 - 3. Fly Ash (if used): ASTM C618, Class C.
 - 4. Water: Clean, potable, free of odor, organics, and deleterious materials.
- C. Slump: Not less than one-inch, cushion portion of embedment; one to three inches for the sides and top of encasement.

2.10 CONTROLLED LOW STRENGTH MATERIAL (FLOWABLE FILL)

- A. Ready mixed flowable fill is a blend of cement, fly ash, fine aggregate, and water. It is designed as a low strength, flowable material requiring no subsequent vibration or tamping to achieve 100% consolidation.
- B. Unless indicated otherwise, select and proportion ingredients to obtain compressive strength between 50 and 150 psi at 28 days in accordance with ASTM D4832
- C. Materials:

1. Cement: ASTM C150, Type I, II, or III.
 2. Aggregate: ASTM C33, Size 8 or fine aggregate.
 3. Fly Ash (if used): ASTM C618, Class C.
 4. Water: Clean, potable, free of odor, organics, and deleterious materials.
- D. The flowable fill mixture shall be mixed either in a pug mill, concrete mixer, or transit mixer and shall a minimum slump of five (5) inches.

2.11 FLEXIBLE BASE

- A. Material Type: Unless otherwise specified, provide either crushed stone or crushed gravel shown on Table 5 and described below:
1. Crushed Stone: Ensure at least 40 percent of the completed Type A or Type B mixture retained on the No. 4 sieve contains uniformly graded, mechanically crushed particles with at least one fractured face.
 2. Crushed Gravel: Ensure 100 percent of the completed Type C or Type D mixture retained on the No. 4 sieve contains uniformly graded, mechanically crushed particles with at least two fractured faces. Ensure the completed Type C mixture contains no more than 15 percent natural sand.
- B. Material Grade: Unless other specified on the Drawings, aggregate used as flexible base material, shall comply with the requirements listed in Table 5, Grade B. Do not use additives such as, but not limited to lime, cement, or fly ash to modify aggregate to meet requirements of Table 5, unless shown on the Drawings.
- C.

Table No. 5 - Aggregate Base Gradation

| Property | | Type A | Type B | Type C | Type D |
|--|----------------------|--------|--------|--------|--------|
| Master Gradation Sieve Size (% Passing) | 3 inch | – | 100 | – | – |
| | 2 inch | – | – | 100 | – |
| | 1.5 inch | 100 | 40-100 | 90-100 | 100 |
| | 1 inch | – | – | 80-100 | 95-100 |
| | 3/4 inch | 40-100 | 30-75 | – | – |
| | 1/2 inch | – | – | 60-80 | 25-60 |
| | 3/8 inch | 30-75 | 25-60 | – | – |
| | No. 4 | 25-60 | 20-50 | 40-60 | 0-10 |
| | No. 8 | – | – | – | 0-5 |
| | No. 10 | 20-43 | 15-35 | 25-45 | – |
| | No. 40 | 8-26 | 7-22 | 15-30 | – |
| | No. 200 ¹ | 4-12 | 3-10 | 0-5 | 0-2 |
| Liquid Limit % Max. ² | | 25 | 25 | 25 | – |
| Plasticity Index % Max. ² | | 6 | 6 | 6 | – |

- 1.
2. Ensure the material passing the No. 200 sieve comprises no greater than two-thirds of the quantity of material passing the No. 40 sieve.
3. ODOT will allow blending of separate aggregates to produce an aggregate mixture if no individual aggregate has a plasticity index higher than 8.

4. For work under ODOT jurisdiction the base material shall comply with the requirements of ODOT Section 703, Type A, Type B, or Type C and the installation shall comply with the requirements of ODOT Section 303 unless otherwise indicated on the Drawings.

2.12 SELECT FILL

- A. Select fill shall be gravel, fine stone cuttings, sand, sandy loam, or loam free from excessive clay. Stone cuttings shall have no dimension greater than two-inches. Use approved material excavated from site or imported material.
- B. Select fill shall have a liquid limit of 35 or less; plasticity index between 5 and 18; and gradation approximately the limits indicated in Table No. 6. Maximum aggregate size: 1-3/4 inches.

Table No. 6 – Select Fill

| Retained on Sieve | Percent by Weight |
|-------------------|-------------------|
| No. 4 | 25 to 50 |
| No. 40 | 50 to 85 |
| No. 200 | 30 to 50 |

2.13 IMPERVIOUS CLAY FILL

- A. Impervious clay fill shall be placed as indicated on the Drawings. The material shall not be used as backfill against walls of structures except in the upper two feet.
- B. The material shall consist of soil materials classified as CH or CL in accordance with ASTM D2487; have a minimum liquid limit of 40; have a minimum plasticity index of 20; have a minimum of 50 percent by weight passing a No. 200 sieve; and shall be free of organics or other deleterious materials.
- C. The material shall have a percent dispersion of less than 20 when tested in accordance with ASTM D4221. The material, when compacted to the recommended moisture and density, shall have permeability less than 1×10^{-6} cm/s (1 ft/yr), as determined by remolded specimens of the actual materials proposed, in accordance with ASTM D5084.

2.14 SITE FILL

- A. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3-inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- B. Material shall have a liquid limit of 40 or less; plasticity index between 4 and 20; and gradation approximately the limits indicated in Table No. 7.

Table No. 7 – Site Fill

| Retained on Sieve | Percent by Weight |
|-------------------|-------------------|
| No. 4 | Less than 35 |
| No. 200 | Less than 65 |

2.15 TOP SOIL

- A. Material shall be natural friable loam; free of subsoil, roots, grasses, and excessive amount of weeds, stone, and foreign matter.

- B. Material shall have an acidity range (pH) between 5.5 to 7.5; an organic matter content between 4 to 25 % in accordance with ASTM D2974; and a gradation complying with Table No. 8.

Table No. 8 – Top Soil

| Retained on Sieve | Percent by Weight |
|-------------------|-------------------|
| No. 4 | Less than 35 |
| No. 200 | Less than 65 |

2.16 UNCLASSIFIED EXCAVATION

- A. All material excavated from site not meeting the requirements for materials specified above.

2.17 MATERIAL QUALITY CONTROL

- A. Sampling of material stockpiles and material sources shall be in accordance with ASTM D75.
- B. Perform gradation analysis in accordance with ASTM C136 for:
 - 1. Coarse and fine aggregate, natural gravel, crushed stone for foundation, sand, select fill, impervious clay fill, earth fill, and topsoil.
- C. Perform abrasion testing in accordance with ASTM C131 or ASTM C535.
 - 1. Coarse and fine aggregate and when requested by ENGINEER for natural gravel and crushed stone for foundation.
- D. Soundness testing in accordance with ASTM C88.
 - 1. Coarse and fine aggregate and when requested by ENGINEER for natural gravel and crushed stone for foundation.
- E. Deleterious materials determination in accordance with ASTM C40, C117, and C142.
 - 1. Coarse and fine aggregate and when requested by ENGINEER for natural gravel and crushed stone for foundation.
- F. Determine liquid limit and plasticity index in accordance with ASTM D4318.
 - 1. Sand for particles passing No. 8 sieve, select fill, impervious clay fill, and earth fill.
- G. Determine pH of topsoil in accordance with ASTM D2974.
- H. Determine permeability (hydraulic gradient) in accordance with ASTM D5084 and percent dispersion in accordance with ASTM D4221 of impervious clay fill materials.
- I. Provide tests results showing flowable fill mix design achieves desired compressive strength.

2.18 CONTAMINATION TESTING AND CERTIFICATION

- A. The CONTRACTOR shall arrange and pay for the services of an EPA approved laboratory to perform a toxic contaminant scan of composite borrow material samples furnished to the site which shall be representative of each separate borrow source in accordance with the U.S. Environmental Protection Agency protocol for the list of contaminants described in 40 CFR, Part 261, Appendix VIII and by EPA Methods SW-846. All costs for contamination testing and certification shall be considered subsidiary to construction, and no separate payment will be made.
- B. The CONTRACTOR, prior to proceeding to furnish soil borrow to the site, shall submit copies

of the results of the laboratory scan to the ENGINEER. The test results shall indicate whether the presence of contaminants is above EPA acceptable levels. Any potential off-site borrow on which scan test results indicate the presence of contaminants above background levels will be rejected as an off-site soil borrow source.

- C. The laboratory performing the scan test for contaminants for the CONTRACTOR shall provide a written certification along with the test, which states that the laboratory is EPA approved and that the tests were performed according to EPA guidelines.
- D. The CONTRACTOR shall obtain a written, notarized certification from the landowner, supplier or manufacturer of each proposed offsite borrow source stating that to the best of the landowner's, supplier's, or manufacturer's knowledge and belief, there has never been contamination of the borrow source site with hazardous or toxic materials. The CONTRACTOR prior to proceeding to furnish soil materials to the site shall submit these certifications to the ENGINEER. The lack of such certification on a potential offsite soil borrow sources will be cause for rejection of that source.
- E. Soil materials derived from the excavation of underground petroleum storage tanks shall not be used as fill on this project.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 31 10 00
SITE CLEARING

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 specifies site clearing activities including trees and vegetation removal and root grubbing, tree protection, topsoil stripping and stockpiling, capping and removing utilities, temporary erosion and sedimentation control measures, and removing minor above- and below-grade site improvements.
- B. This section does not include detailed tree protection and trimming, tree and root pruning, or tree relocation; grading, excavating, backfilling for earthwork and trenching; building and selective demolition; or landscaping.
- C. Related Sections include the following:
 - 1. Section 31 05 00 "Earthwork Materials"

1.3 DEFINITIONS

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter, including stumps, buried logs, and roots greater than two-inch caliber to a depth as specified in the following paragraphs.
- D. Scalping: Removal of sod without removing more than upper 3-inches of topsoil.
- E. Stripping: Removal of topsoil remaining after applicable scalping is completed.
- F. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- G. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.
- H. Project Limits: Areas, as shown or specified, within which work is to be performed.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Salvable Improvements: As applicable, carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Section 31 05 00 "Earthwork Materials".
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Storm Water Pollution Prevention Plan (SWPPP):
 - 1. CONTRACTOR shall obtain a permit to discharge storm water from the construction site from Oklahoma Department of Environmental Quality (DEQ) in accordance with NPDES General Permit No. OKR10 (Permit).
 - 2. The CONTRACTOR shall comply with all requirements of the Permit, including the development of a SWP3, filing of the Notice of Intent (NOI) and Notice of Termination

(NOT), record maintenance, and posting of the Permit.

3. Costs associated with obtaining and compliance with the Permit are the CONTRACTOR'S responsibility.
 4. Submit a copy of the SWP3 and other pertinent DEQ submittals to the ENGINEER and the OWNER two weeks prior to submitting to DEQ.
- B. Temporary Erosion and Sedimentation Control:
1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff to adjacent properties and walkways, according to a sediment and erosion control plan, specific to the site, which complies with the requirements of DEQ, or EPA 832/R-92-005, or requirements of authorities having jurisdiction, whichever is more stringent.
 2. The CONTRACTOR shall have the sole responsibility for the means, methods, techniques, sequences, and procedures for furnishing, installing and maintaining the erosion and sedimentation control system.
 3. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
 5. Close out the SPPP permit with DEQ and provide that receipt to relevant local authorities.

3.3 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: If applicable, do not interrupt utilities serving facilities occupied by OWNER or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify ENGINEER not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without ENGINEER'S written permission.
- C. Excavate for and remove underground utilities as indicated to be removed.

3.4 LIMITS OF CLEARING

- A. As follows, but not to extend beyond Project limits shown on the Drawings.
1. Excavation, Excluding Trenches: 5 feet beyond top of cut slopes.
 2. Trench Excavation: 4 feet from trench centerline, regardless of trench width.
 3. Fill:
 - a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.
 - b. Stripping: 2 feet beyond toe of permanent fill.
 4. Roadways: Clearing and grubbing 20 feet from roadway centerline.
 5. Overhead Utilities: Clearing and grubbing entire width of easements and rights-of-way.
 6. Other Areas: As shown on drawings.
- B. Remove rubbish, trash, and junk from entire area within Project limits.

3.5 BLASTING

- A. Explosives: Do not use explosives.

3.6 BURNING

- A. Burning is not allowed on this Project.

3.7 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
 - 5. Chip removed tree branches and dispose of off-site.
- B. As required, fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.8 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to approximately 6 feet.
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Dispose of excess topsoil as specified for waste material disposal.

3.9 SITE DEMOLITION

- A. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Neatly saw-cut length of existing pavement to remain at the line of demolition before removing existing pavement. Saw-cut faces vertically.
 - 2. Epoxy coat cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.10 DISPOSAL

A. Disposal:

1. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
2. Dispose of stockpiled waste materials within 30-days.
3. When requested by OWNER, provide copies of the landfill receipts for waste material disposal.

END OF SECTION

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SECTION 31 23 16
EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes temporary excavation support and protection systems.

1.2 RELATED SECTIONS:

- A. SECTION 31 05 00 - EARTHWORK MATERIALS
- B. SECTION 31 23 19 - DEWATERING

1.3 SUBMITTALS

A. INFORMATIONAL SUBMITTALS

- 1. Delegated-Design Submittal: For excavation support and protection system indicated to comply with performance requirements and design criteria, include analysis data signed and sealed by the qualified professional engineer, licensed to practice in the state where the Project is constructed, responsible for their preparation.

1.4 PERFORMANCE REQUIREMENTS

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
 - 1. Delegated Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer, licensed to practice in the state where the Project will be constructed, using performance requirements and design criteria indicated.
- B. As a minimum, the Excavation Support and Protection Plan shall address the following items:
 - 1. Provide details of shoring, bracing, sheet piling, soldier piles and lagging, tie backs, and other support systems and provisions for worker protection from hazards of caving ground.
 - 2. Methods and sequencing of installing excavation support.
 - 3. Proposed locations for excavated materials.
 - 4. Minimum lateral distance from the crest of slopes for vehicles, equipment, and stockpiled materials.
 - 5. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 6. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 7. Monitor vibrations, settlements, and movements.

1.5 PROJECT CONDITIONS

- A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of the geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner and Engineer will not be responsible for interpretations or conclusions drawn from the data.

- B. Additional Test Borings. Contractor shall make additional test borings and conduct other exploratory operations necessary for support and protection.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - 1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Engineer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, 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 authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.
- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.
- F. TRENCHES
- G. For excavations exceeding 5 feet in depth, provide adequate safety system meeting requirements of applicable state and local construction safety orders, and Federal requirements.

3.2 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
 - 1. Fill voids immediately with approved backfill compacted to density specified in SECTION 31 05 00 - EARTHWORK MATERIALS.
 - 2. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by

removing excavation support and protection systems.

- B. If the support or stability of existing structures or site improvements is dependent, leave excavation support and protection systems permanently in place. Remove excavation support and protection systems to a minimum depth of 48 inches below overlaying construction and abandon remainder.

END OF SECTION

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SECTION 31 23 19
DEWATERING

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. Section includes construction dewatering.
- B. Dewatering is considered subsidiary to the Bid Item for waterline installation. No separate or additional payment shall be made for the installation, maintenance, or removal of the dewatering system.
- C. Related Sections:
 - 1. Section 31 05 00 "Earthwork Materials" for excavating, backfilling, site grading, and for site utilities.

1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
 - 1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer in Oklahoma, using performance requirements and design criteria expected to be encountered in the field.
 - 2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 5. Remove dewatering system when no longer required for construction.

1.4 SUBMITTALS

- A. Action Submittal. Provide shop drawings for dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria generally expected to be encountered in the field.
- C. Informational submittals
 - 1. Qualification Data: For qualified Installer, land surveyor and professional engineer as applicable.
 - 2. Field quality-control reports.

3. Other Informational Submittals:
 - a. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations, if applicable.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.
- B. Regulatory Requirements: Comply with governing notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: As applicable, do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 1. Notify Engineer no fewer than two (2) days in advance of proposed interruption of utility.
 2. Do not proceed with interruption of utility without ENGINEER's written permission.
- B. Project-Site Information: A geotechnical report has not been prepared for this Project. Contractor is directed to the original boring logs depicted on sheets C-800 through C-804 in the Contract Documents. Dewatering system shall be designed to comply with the performance requirements and design criteria generally expected to be encountered in the field under the project conditions. Owner will not be responsible for interpretations or conclusions drawn from this data.
 1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
- C. Survey Work: If applicable, engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Engineer if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 2. Protect subgrades and foundation soils from softening and damage by rain or water

accumulation.

- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, 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 authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.
- D. Monitor dewatering systems continuously.
- E. Promptly repair damages to adjacent facilities caused by dewatering.
- F. Protect and maintain temporary erosion and sedimentation controls.

3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - 1. Space well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, pipelines and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.
- 3.3 FIELD QUALITY CONTROL
- A. Observation Wells: When shown on Drawings, provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.
1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
 2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
 3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.
- B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION

SECTION 31 23 33
TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Trenching for the pipeline as well as subsequent embedment, backfill and compaction operations, necessary to install the pipe and electrical underground conduit as specified.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM D698: Moisture Density Relationship of Soils using a 5.5 lb. Hammer and a 12-inch drop.
 - 2. ASTM C131: Resistance to Degradation of small sizes and coarse aggregates by abrasion and impact in the Los Angeles Machine.
 - 3. ASTM D4253-00 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - 4. ASTM D4254-00 Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - 5. ASTM D1557-00 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)).
 - 6. ASTM D2922-01 Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- B. Related Sections:
 - 1. Section 01 33 00 – Submittals

1.3 PROTECTION

- A. Protect trees, shrubs and lawn areas to receive planting, and other features remaining as part of final landscaping.
- B. Protect benchmarks and existing structures, roads, sidewalks, paving and curbs against damage from vehicular or foot traffic. Install and maintain bridging, planking and cants to provide access to Work.
- C. Protect excavations by shoring, bracing, sheet piling, underpinning, or by other methods, as required to prevent cave-ins or loose dirt from falling into excavations.
- D. Underpin or otherwise support adjacent structures which may be damaged by excavation Work. This includes service lines and pipe chases.
- E. Notify ENGINEER of any unexpected subsurface conditions.
- F. Where damage could result from continuing Work, discontinue Work in area until ENGINEER notifies the CONTRACTOR of required modifications.
- G. Protect bottom of excavations and soil around and beneath foundations from frost and freezing.
- H. Grade around trenches to prevent surface water runoff into excavated areas.

- I. Protect above or below grade utilities including lateral lines, sprinkler system lines, and all other lines which are to remain. The cost of replacing damaged lines is to be borne by the CONTRACTOR.

1.4 SUBMITTALS

- A. Submit the following information in accordance with the requirements of Section 01 33 00.
 - 1. Shop Drawings:
 - a. Submit detailed sieve analysis data on embedment and backfill material to be placed in pipe zone.
 - 2. Certified Test Report
 - a. Submit soil resistivity for backfill material to be placed in pipe zone.
 - 3. Sample
 - a. Submit sample of materials to be used in pipe zone.

PART 2 - PRODUCTS

2.1 BED AND FILL MATERIALS

- A. A. Embedment: Crushed Stone for Concrete ASTM C-33, #67, CCFRPM and Ductile Iron Pipe Embedment:
 - 1. Crushed stone embedment shall consist of angular sound, durable stone material graded between the prescribed limits:

| Sieve Size | Percent Retained |
|------------|------------------|
| 2" | 0 |
| 1-1/2" | 0 |
| 1" | 0 to 10 |
| 3/8" | 45 to 80 |
| No. 4 | 95 to 100 |

- 2. Crushed stone embedment shall not contain more than 1 percent by weight of organic matter, loam, or clays, or more than 5 percent by weight of any one or combination of slate, shale, schist, or soft particles of sandstone.
- 3. The percent of wear shall not exceed 40 percent when tested in accordance with ASTM C131.

- B. Embedment: ODOT 703.01, Type A Aggregate Base

- 1. Granular bedding for concrete pipe, PVC pipe, flexible pipe, fiberglass manholes and fiberglass structures shall be ODOT 703.01, Type A Aggregate Base with the following gradation:

| Sieve Size | Percent Retained |
|------------|------------------|
| No. 8 | 0 |
| No. 10 | 57 to 80 |
| No. 40 | 74 to 92 |
| No. 200 | 88 to 96 |

- C. Backfill:
 1. Granular backfill shall be sand or hydraulically graded crushed stone fines, or mixed sand and gravel or sandy loam. The material shall be free from lumps, stone over 1-inch in size, clay, and organic matter.
 2. The plasticity index of the fraction passing the No. 40 sieve shall not exceed 10.
- D. Select Material:
 1. Select Materials shall be gravel, fine rock cuttings, sand, sandy loam or loam free from excessive clay.
 2. Select Material shall have a liquid limit less than 40 and a plasticity index less than 20 for the fraction passing the No. 40 sieve.
 3. The percent passing the No. 200 sieve shall not be greater than 35 percent.
 4. Select material may be excavated on site or borrowed from an outside source.
- E. Site Backfill:
 1. Material excavated on site excluding large rock or borrowed from an outside source.
- F. Topsoil:
 1. Imported topsoil shall be friable loam free from subsoil, roots, grass, weeds, stones and foreign matter.
 2. Use topsoil stockpiled on site.
- G. Unclassified Material:
 1. All material excavated on site, not meeting the requirements for topsoil, or fill material.
- H. Concrete:
 1. Concrete shall conform to the Structural general Notes on Sheet S-100.
- I. In addition to all other requirements, material furnished for use as backfill material in the pipe zone for ductile iron, concrete steel cylinder and steel pipe shall have a resistivity of not less than 5,000 ohms-cm. Any material found to have a resistivity less than that required by this specification shall be removed from the project and disposed at the CONTRACTOR's expense. Pipe zone is defined as the zone from the bottom of the excavated trench to 1-foot above the top of the pipe.
- J. Crushed Stone for Trench Foundation
 1. Where crushed stone or coarse gravel is required for drainage of water away from the trench foundation, restorage of trench foundation, or other purposes, it shall be angular crushed stone with the following grading requirements:

| Sieve Size | Percent Retained |
|------------|------------------|
| 5" | 0 |
| 2" | 100 |

PART 3 - EXECUTION

3.1 PREPARATION AND LAYOUT; AND CLEARING AND GRUBBING

- A. Preparation and Layout
 1. Establish extent of excavation by line and elevation. Designate and identify datum

elevations.

2. Set required lines and levels.
3. Maintain benchmarks, monuments and other reference points.

B. Clearing and Grubbing

1. The CONTRACTOR shall do all clearing and grubbing necessary for construction operations. All trees, branches, limbs, and roots shall be removed and disposed of by the CONTRACTOR so as to leave the OWNER right-of-way in a neat and presentable condition. Clearing and grubbing shall be accomplished so as not to injure or damage adjacent property. The blade of the machine used for clearing and grubbing outside the permanent easement, but within the temporary construction easement shall be kept slightly above the ground surface to protect grass roots. Within the limits of the permanent easements, all stumps, roots, etc., shall be removed to a depth of at least two (2) feet below the existing ground surface. Any and all damages outside the limits of the construction right-of-way shall be paid and settled by the CONTRACTOR at his expense.
2. The CONTRACTOR shall abide by all conditions set forth in the Contract Documents and site certificate documents.
3. All materials cleared and grubbed shall be disposed of properly. At the time of final acceptance of the project, the work shall be neat and satisfactory in appearance, free from all weeds, brush, rubbish, stumps, and bushes.
4. No separate measurement and payment will be made for clearing and grubbing but will be considered subsidiary to work required for the project.

3.2 UTILITIES

- A. Known underground utilities are indicated on the Drawings.
- B. Before starting excavation, establish the location and extent of underground utilities occurring in the work area.
- C. As excavation approaches utilities, hand excavate to uncover utilities.
- D. Notify the ENGINEER for direction for removal and/or relocation of utility companies' lines which are in the way of excavation.
- E. Maintain, re-route or extend as required existing utility lines to remain which pass through the work area with the approval of the OWNER. Relocations are at the CONTRACTORS cost.
- F. Protect active utility services uncovered by excavation.
- G. Accurately locate and record abandoned and active lines rerouted or extended on Project Record Documents.

3.3 TRENCHING

- A. Ensure trenching does not interfere with normal 45 degree bearing splay of any foundation.
- B. Excavate in accordance with lines and grades. Excavated material shall be placed adjacent to the work to be used for backfilling if the material meets specifications for embedment and/or backfill.
- C. Trench depths and grading are calculated to provide adequate cover over pipes. Notify ENGINEER if adequate cover is lacking and correct as directed by ENGINEER.

- D. Cut trenches sufficiently wide to enable proper installation of services and to allow for inspection. Trim and shape trench bottoms and leave free of irregularities, lumps and projections. Over excavated trench depths shall be filled to the proper grade with crushed rock at no additional cost to the OWNER.
- E. Trench width in the pipe zone (pipe zone designated as the zone from the trench bottom to at least one (1) foot above the top of the pipe) shall be vertical. The walls of the excavation above this specifically designated pipe zone may be laid back where room permits, as necessary, and shall be constructed as required by the safety laws of OSHA, federal, state, municipal and any other agency having jurisdiction over the Work.
- F. The maximum width of the trench excavation in the pipe zone shall be no more than 36 inches wider than the outside diameter of the pipe barrel. Whenever the prescribed maximum trench width is exceeded, the CONTRACTOR shall use the next higher class of embedment and the next higher class of pipe, at no additional cost to the OWNER.
- G. The minimum width of the trench excavation throughout the pipe zone shall be the outside diameter of the pipe barrel plus 12 inches (6 inches on either side of the pipe).
- H. Do not disturb soil within branch spread of existing trees or shrubs that are to remain. If it is necessary to excavate through roots, perform work by hand and cut roots with a sharp axe.
- I. When complete, request the ENGINEER to inspect excavations. Correct unauthorized excavation as directed, at no cost to the OWNER.
- J. The trench shall be excavated to an even grade to permit the installation of the pipe in such a manner that the full length of the pipe barrel is supported on the proper depth of granular embedment material. The entire foundation area in the bottom of all excavations shall be firm, stable material, and material shall not be disturbed below required grade except as described in this article. Where the character of the foundation materials is such that a proper foundation cannot be obtained at the elevation indicated on the Plans, then, when directed by the OWNER in writing, the CONTRACTOR shall deepen the excavation to where a satisfactory foundation can be obtained.
- K. If the subgrade is soft, spongy, or disintegrated, the materials shall be removed until a firm, stable and uniform bearing is reached and the subgrade brought back to the required grade with crushed stone embedment material compacted in place or with concrete. If the unsatisfactory subgrade condition is due to the CONTRACTOR's failure to make a proper provision for adequate drainage or dewatering of excavations, the expense of replacing any unsatisfactory subgrade shall be borne by the CONTRACTOR. However, if, in the opinion of the OWNER, the unsatisfactory subgrade condition is not the result of the failure of the CONTRACTOR to provide adequate drainage, bailing or pumping facilities and the OWNER orders in writing that the CONTRACTOR make additional excavation and replace unsatisfactory subgrade material with crushed stone embedment material or Class B concrete, then compensation will be made for the additional expense incurred at the unit price provided in the Proposal.
- L. Unsuitable excavated subsoil including perishable, spongy material, large rock, or other material designated by the OWNER shall not be used in backfilling. Unsuitable material shall be disposed of by the CONTRACTOR in a manner approved by the OWNER.

3.4 SHEETING AND SHORING

- A. In caving ground or in wet, saturated or flowing or otherwise unstable materials, the sides of

all trenches and excavations shall be adequately sheeted and braced, to maintain the excavation from slides or cave-ins and to provide safety for workmen.

- B. Sheeting, shoring, and bracing shall stay in place of the pipe zone requires shoring, otherwise it shall be removed. Removal of sheeting, shoring, and bracing shall be performed in a manner to prevent damage to new or existing structures and to avoid cave-ins or sliding of the banks. All holes and voids from the sheeting shall be immediately and completely filled and compacted with suitable materials. All costs associated with the abandonment of sheeting, shoring and bracing shall be borne by the CONTRACTOR.

3.5 DEWATERING

- A. Keep trenches dry. Provide necessary equipment including pumps, piping and temporary drains. Groundwater levels shall be maintained at least two (2) feet below the base of the excavation for the duration of construction.
- B. Direct surface drainage away from excavated areas. Provisions shall be made for the satisfactory disposal of water pumped to prevent damage to public or private property.
- C. Control the grading in and adjacent to excavations to prevent water running into excavated areas or onto adjacent properties or thoroughfares.
- D. Furnish and operate suitable pumps on a 24-hour basis to keep excavations free of water until services have been placed and backfilling is completed.

3.6 BEDDING

- A. Manually place and compact bedding material in loose lift layers not exceeding 8 inches.
- B. Manually shape bedding material to conform to pipe barrel and bell or flanges such that the entire length of the pipe barrel is supported by the bedding material.
- C. Granular backfill and embedment materials shall be placed as shown on the drawings and compacted in 8-inch loose lift layers to a minimum depth of 12 inches over the top of the pipe.

3.7 BACKFILLING

- A. Do not start backfilling until services have been inspected.
- B. Ensure trenches are free of building debris, snow, ice, and water and that ground surfaces are not in a frozen condition.
- C. Backfill systematically and as early as possible to allow maximum time for natural settlement and compaction.
- D. Place and compact backfill materials in continuous layers according to the method of compaction used. Use a method which will not disturb or damage services. No excessively large rocks (1-inch or larger) or debris of any sort shall be used as backfill.
- E. Maintain optimum moisture content (optimum to 2 percent wet of optimum) of fill materials so as to attain required compaction density.
- F. Acceptable backfill from the excavation shall be placed from twelve inches over the pipe to the surface.
- G. Pipe supported on piers that is installed below grade shall have a minimum 12 inches of backfill around pipe consisting of select material as specified herein with no rocks, stones,

clods, etc., larger than 1-inch in size.

- H. Excavated unsuitable material and excess material shall be disposed of by the contractor off site and at an approved location.

3.8 COMPACTION

- A. Compact embedment materials with hand-operated mechanical compaction devices.
- B. All embedment material, which includes material placed in trench bottom for pipe foundation, and all backfill material within the pipe zone shall be compacted to a minimum of 95 percent of maximum dry density defined by ASTM D698 or to a minimum of 75 percent relative density determined by ASTM D4253 and D4254, whichever is applicable.
- C. Outside Paved Areas: Backfill materials shall be thoroughly compacted by mechanical or pneumatic tamping in layers not to exceed 9 inches in compacted thickness. Care must be taken to avoid pipe damage. Compact backfill material to 85 percent (minimum) standard Proctor (ASTM D698).
- D. Within Paved Areas: Backfill under roads shall be mechanically or pneumatically compacted to 95 percent of maximum dry density as defined as ASTM D698 in layers not exceeding 6 inches of compacted thickness.
- E. Remove and replace improperly compacted backfill material at no cost to OWNER.
- F. Water jetting for consolidation will not be permitted.
- G. Compact backfill and embedment materials at moisture contents of optimum to 2 percent wet of optimum for cohesive materials and as necessary to achieve specified density for noncohesive materials. CONTRACTOR shall provide compaction tests at a minimum of every 150 feet of trench length per lift (as directed by the OWNER) and as deemed necessary by the CONTRACTOR to ensure adequate compaction is being achieved. CONTRACTOR'S compaction tests shall be performed at CONTRACTOR'S sole expense and will be considered subsidiary to construction.
- H. Additional Compaction tests at intervals of 500 feet of trench length and vertical intervals of 10 feet of backfill depth may be directed by the OWNER at the OWNER'S expense. If OWNER provided tests determine that the embedment or backfill does not meet the required density the CONTRACTOR shall recompact the embedment until densities are met, or shall remove all embedment and add new embedment to meet the densities. The CONTRACTOR shall pay the cost of all additional retesting required by the OWNER.
- I. Field Density Testing
 - 1. Embedment Test Section: The CONTRACTOR shall coordinate with the OWNER trial test sections. The trial test section shall consist of at least two sections (joints, lengths) of pipe. The pipe shall be installed and the CONTRACTOR shall use his proposed method of placing and compacting the embedment. At least one length of pipe shall be carefully removed to allow the integrity of the embedment along the haunches and below the pipe to be evaluated visually and by in-place density testing to verify that the CONTRACTOR's method will achieve the specified density and uniformity of the embedment. Additional test sections shall be performed for all different embedment materials, if the CONTRACTOR proposes to change methods of placement and compaction. The means, methods, and techniques of placement and compaction shall be the sole responsibility of the CONTRACTOR, and the test sections shall be considered only as a means to verify that the CONTRACTOR's methods are

capable of achieving the specified density. The actual quality of the embedment and backfill, as compacted, shall be the responsibility of the CONTRACTOR and satisfactory results from the test section(s) and field density tests shall not be considered as a guarantee of the quality of the CONTRACTOR's embedment and backfill operations.

3.9 CLEAN UP

- A. Remove surplus fill and spoil materials.

END OF SECTION

SECTION 31 50 00
TRENCH EXCAVATION SAFETY PROTECTION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This item will consist of the basic requirements which the Contractor must comply with in order to provide for the safety and health of workers in a trench. The Contractor shall develop, design and implement the trench excavation safety protection system. The Contractor shall bear the sole responsibility for the adequacy of the trench safety system and providing "a safe place to work" for the workman. Trench safety system shall be submitted to the Owner prior to beginning any excavations on-site.

1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. Standard Specification for Highway Bridges.
 - 2. LRFD Bridge Design Specifications.
- B. Occupational Safety and Health Standards (OSHA):
 - 1. Excavations (29CFR Part 1926, Subpart P), U.S. Department of Labor.
- C. State of Oklahoma Statutes
 - 1. Oklahoma Statutes, Title 63: Public Health and Safety.

1.3 SUBMITTALS

A. INFORMATIONAL SUBMITTALS

- 1. Trench Safety and Excavation Shoring System Plan shall be submitted to the Engineer for record purposes prior to beginning any excavations on-site.

1.4 QUALITY ASSURANCE

A. Licensed Professionals

- 1. The Contractor shall select an engineer to prepare the Trench Safety and Excavation Shoring System Plan based on competence and qualifications and not on the basis of competitive bid and will certify to that effect with the Trench Safety and Shoring Plan Submittal.
- 2. The design of the Trench Safety and Excavation Shoring System Plan shall be performed by or under the supervision of a Professional Engineer licensed to practice in the State of Oklahoma.

1.5 SYSTEM DESCRIPTION

A. Design Requirements:

- 1. The trench excavation safety protection system shall be used for all trench excavations deeper than five (5) feet.
- 2. The Excavating and Trenching Operation Manual of the Occupational Safety and Health Administration, U.S. Department of Labor, shall be the minimum governing requirement of this item and is hereby made a part of this Specification as is written in

its entirety.

3. The Contractor shall, in addition, comply with all other applicable federal, state and local rules, regulations and ordinances.
4. The design of the trench excavation safety protection system shall be performed by or under the supervision of a Professional Engineer licensed to practice in the State of Texas.
5. System shall be site and project specific.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Trench Safety and Excavation Shoring System shall be used for all trenches and excavations deeper than five (5) feet.
- B. Trench Excavations: The Contractor shall Provide vertical or sloped cuts, benches, shield, support systems or other systems providing the necessary protection in accordance with OSHA Standards and Interpretations, CFR Part 1926, Subpart P, "Excavations."
- C. Excavation Shoring: The Contractor shall provide temporary shoring for all excavations required to construction the work. Design the shoring to comply with OSHA Standards and Interpretations, 29 CFR Part 1926, Subpart P, "Excavations". Design structural systems to comply with AASHTO *Standard Specifications for the Highway Bridges* or AASHTO *LRFD Bridge Design Specifications*. Provide vertical or sloped cuts, benches, shields, support systems, or other systems to provide the necessary protection.
- D. Refer to Geotechnical Report by Envirotech Engineering.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 31 70 00
PIPE JACKING, BORING, OR TUNNELING

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. Section provides for pipe installation by jacking, boring, directional boring or drilling, or by tunneling.
- B. Related Sections:
1. Division 31 Section 31 05 00 "Earthwork Materials."
 2. Division 31 Section 31 10 00 "Site Clearing" for site preparation, temporary erosion control measures, tee protection and other related work.
 3. Division 31 Section 31 23 19 "Dewatering" for dewatering requirements.
 4. Division 31 Section 31 23 16 "Excavation Support and Protection"
 5. Division 33 Section 33 05 22 "Steel Casing Pipe"

1.3 REFERENCES AND DEFINITIONS

A. References:

1. ASTM International (ASTM):
 - a. A 36 Specification for Carbon Structural Steel
 - b. A 139 Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)
 - c. A 307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 - d. A 449 Specification for Hex Cap Screws, Bolts, and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
 - e. A 760 Specification for Corrugate Steel Pipe, Metallic-Coated for Sewers and Drains
 - f. C 76 Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - g. C 150 Specification for Portland Cement
 - h. C 869 Specification for Foaming Agents Used in Making Performed Foam for Cellular Concrete
2. American Water Works Association (AWWA):
 - a. C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. for Water Distribution

B. Definitions:

1. Auger Boring: A technique for forming a bore from a drive pit to a reception pit, by means of a rotating cutting head. Spoil is removed back to the drive pit by helically wound auger flights rotating in a steel casing pipe.
2. Bentonite: Colloidal clay sold under various trade names that form slick slurry or gel when water is added. Also known as driller mud.
3. Carrier Pipe: The tube that carries the product being transported and which may go

through casings at highways and railroad crossing. It may be made of steel, concrete, clay, plastic, ductile iron, or other materials.

4. Casing: A pipe used to line bore holes through which a pipe(s) called carrier pipes or ducts are installed.
5. Directional Drilling: A steerable system for the installation of pipes, conduits and cables in a shallow arc using a surface launched drilling rig.
6. Dry Bore: Any drilling or rod pushing system not employing drilling fluid in the process.
7. Pipe Jacking: A system of directly installing pipes behind a shield machine by hydraulic jacking from a drive shaft such that the pipes form a continuous string in the ground.
8. Trenchless Technology: Techniques for utility line installation, replacement, rehabilitation, renovation, repair, inspection, location, and leak detection, with minimum excavation from the ground surface.
9. Tunneling: A construction method of excavating an opening beneath the ground without continuous disturbance of the ground surface and of large enough diameter to allow individuals access and erection of a ground support system at the location of material excavation.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance:

1. Carrier Pipe: Lateral or vertical variation in pipe's final position from the established Drawing line and grade shall not exceed 1-inch per 100-feet, provided such variation shall be regular, only in one direction, and the final grade of the flow line shall be in the direction indicated on the Drawings.
2. Structural Performance: Specified casing pipe thickness based upon the superimposed loads and not upon loads, which may be placed on the pipe resulting from jacking operations. Provide increase strength required to withstand jacking loads.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and manufacture instructions for casing pipe, carrier pipe, spacers, liner plates, and associated components as applicable.
- B. Shop Drawings: For bulkheads, access manholes, overall assembly, and related work as applicable. Include plans, elevations, sections, details, and attachments to other work.
- C. Design Mixes: Concrete, grout, and flowable fill as applicable.
- D. Qualification Data: For qualified Installer.
- E. Welding certificates.
- F. Material Certificates: For each type of material or product from the manufacturer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel.

1.7 PROJECT CONDITIONS

- A. Construction Method: Unless otherwise specifically designated, CONTRACTOR may select jacking, boring, tunneling, or trenchless construction method to be employed.
- B. Permit:
 - 1. For those areas where CONTRACTOR proposes to use trenchless excavation operations in lieu of open cut, it shall be the responsibility of the CONTRACTOR to prepare documentation, obtain approval and required permits.
- C. Operation Restrictions: Conduct operations so as not to interfere with, interrupt, or endanger surface and activity thereon.
 - 1. Minimize subsidence of surface, structures, and utilities above and in vicinity of operations.
 - 2. Support ground continuously to prevent loss of ground and keep perimeters stable.
 - 3. Be responsible for settlement resulting from operations.
 - 4. Repair and restore damaged property to its condition before being disturbed at no cost to the OWNER.
 - 5. Provide 48-hour notice prior to commencement of any jacking, boring, tunneling, or trenchless operations.
- D. Compliance: Comply with applicable ordinances, codes, statutes, rules, and regulations of the jurisdictional agency, the affected Railroad, ODOT, and municipal, state and federal governmental agencies.
- E. Additional Criteria for Work Railroad Property:
 - 1. Do not schedule work until submittals and insurance approval received from Railroad and ENGINEER and permit, if applicable, has been obtained.
 - 2. Provide any additional insurance required by the Railroad or other jurisdiction agency.
 - 3. Comply with AREMA and other Railroad requirements prior to commencing Work.
 - 4. Obtain required Railroad safety training for operators performing Work within Railroad right-of-way, the required flagman, and work authorization from the Railroad. All costs associated with these activities shall be the CONTRACTOR'S responsibility.
 - 5. Place safety, precautionary, and protective devices and services required before Work proceeds.
- F. Safety Requirements:
 - 1. Provide flagman, barricades, lights, warning signs, ventilation, air quality monitoring, and other safety devices and equipment required to ensure the safety of personnel entering area, especially tunneling operations, safeguard traffic and pedestrians.
 - 2. Establish procedure to logging personnel working within the bore or tunnel shaft, if applicable.
 - 3. Compliance with requirements of Division 31 Section 31 23 16 "Excavation Support and Protection".
 - 4. Compliance with OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001) "Safety Requirements for Tunnels, Shafts, and Caissons".

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Material of construction of casing pipe shall be as designated on the Drawings or as required by the jurisdictional agency for type of service.
2. Material of construction for the carrier pipe shall be as designated on the Drawings.
3. Carrier pipe shall be placed inside a casing pipe where foundation conditions (presence of boulders, rubble, or rock) make the direct trenchless installation of the carrier pipe impractical. A casing pipe may also be used if the carrier pipe or conduit is not by itself suitable for trenchless installation.

B. Casing Pipe:

1. Casing pipe shall comply with the requirements of Division 33 Section 33 05 22 "Steel Casing Pipe."

C. Carrier Pipe:

1. Material of construction shall be as shown on the drawings and shall have restrained joints.
2. Carrier pipe shall be the same nominal diameter as the system pipe on either side of the carrier pipe.

D. Casing Spacers:

1. Factory manufactured casing spacers shall be installed on all carrier pipes passing through a casing pipe. Wooden skids will not be allowed as an alternative.
2. Bolt-on style with a shell made of at least two halves, having band material manufactured of minimum 14 gauge hot rolled pickled steel or T-304 stainless steel, and 10 gauge risers.
3. Steel Band and risers shall have a copolymer-based thermoplastic coating finish, 10-15 mil thickness.
4. Spacer 8-inch wide carrier pipe size 24-inch and smaller, 12-inch wide 26-inch and larger.
5. Hardware; T-304 for stainless bands, or electro-plated for steel bands.
6. Liner, EDPM, 0.090-inch thick, hardness Durometer "A" 85-90, Dielectric strength 60,000 VPM, and water adsorption of 1% maximum.
7. Runners, 1-inch or 2-inch wide, glass filled polymer plastic.
8. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Cascade Waterworks Mfg.
 - c. GPT, Inc.

E. Casing End Seals:

1. Manufactured of 1/8-inch thick neoprene rubber, attached using 1/2-inch wide T304 stainless steel bandings 100% non-magnetic worm gear mechanism.
2. Configuration may be pull-on end molded, wrap around with self-curing mastic sealing strips, or zipper configuration.
3. Available Manufacturers:

- a. Advance Products & Systems, Inc.
 - b. Cascade Waterworks Mfg.
 - c. GPT, Inc
- F. Grout:
- 1. Consist of one part Portland cement, ASTM C150, Type I or II, three parts sand, and minimum amount of water to obtain desired consistency.
 - 2. Sand shall consist of clean, hard, durable, uncoated grains, free from lumps and organic material. All particles shall pass a No. 8 sieve and the material shall have a plasticity index of 12 or less.
 - 3. Compressive strength of 100 psi at 28-days.
- G. Controlled Low Strength Material:
- 1. Ready mixed controlled low strength material is a blend of cement, fly ash, fine aggregate, and water. It is designed as a low strength, flowable material requiring no subsequent vibration or tamping to achieve 100% consolidation.
 - 2. Unless indicated otherwise, select and proportion ingredients to obtain compressive strength between 50 and 150 psi at 28 days in accordance with ASTM D4832.
 - 3. Materials:
 - a. Cement: ASTM C150, Type I, II, or III.
 - b. Aggregate: ASTM C33, Size 8 or fine aggregate.
 - c. Fly Ash (if used): ASTM C618, Class C.
 - d. Water: Clean, potable, free of odor, organics, and deleterious materials.
 - 4. The flowable fill mixture shall be mixed either in a pug mill, concrete mixer, or transit mixer and shall a minimum slump of five (5) inches.
- H. Cellular Concrete Backfill:
- 1. Concrete: ASTM C150, Type II.
 - 2. Foaming agents conform to ASTM C 869.
 - 3. Water: Clean, free of organic and other impurities.
 - 4. Minimum 7 and 28 day compressive strength of 300 and 500 psi.
- I. Annular Sand Backfill: Sand for the annular space shall be clean and 100% shall pass a Standard no. 30 sieve.
- J. Miscellaneous Items:
- 1. Surface Settlement Markers:
 - a. Within bituminous pavement areas: "p.k." nails.
 - b. Within nonpaved areas: Wooden nails.
 - c. Within concrete surfaces: Paint.
 - 2. Grout Connections: Provide two inch grout connection regularly spaced at 5-foot centers, alternating at 30 degrees from plumb each side of the vertical centerline.
 - 3. Bulkheads and Access Manholes: Requirements shall be as shown on the Drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. Unless soil borings in the immediate vicinity of the work area are available, CONTRACTOR shall investigate the existing soils and subsurface conditions so the appropriate equipment is provided to counter conditions, which can cause delay such as groundwater, running sand, boulders, or other subsurface conditions.

3.2 CONSTRUCTION BY JACKING

- A. Construct suitable pits or trenches at the jacking and receiving end to a depth no greater than required for placing of the guide and jacking timbers and a horizontal distance no nearer the roadbed than minimum distance shown on the Drawings. Excavation work shall comply with the requirements of Division 31 Section 31 05 00 "Earthwork Materials."
- B. All open pits and trenches shall be braced and shored or their walls sloped preventing caving or sliding of the walls into the open pit or trench complying with requirements of Division 31 Section 31 23 16 "Excavation Support and Protection".
- C. Place pipe on guides for supporting pipe to be jacked and to direct it for proper alignment and grade. Embankment material shall be excavated just ahead of the pipe, removed through the pipe, and the pipe forced through the opening provided.
- D. Excavation for the underside of the pipe, for at least one-third (1/3) of the pipe circumference, shall conform to the contour and grade of the pipe. Excavation for the top half of the pipe shall conform closely to the outside diameter and a clearance greater than 2-inches shall not be permitted. Preferably pipe shall be jacked from the low or downstream end.
- E. All voids between the pipe and the earth shall be filled with grout. Provide grout holes in the pipe. The grouting shall follow immediately upon completion of the jacking operation. Prepare bottom of pits as pipeline foundations in accordance with Division 31 Section 31 23 33 "Trenching, Backfill, and Compaction". Backfill pits and trenches as soon as practical following completion of jacking operations and installation of carrier pipe(s).
- F. Any pipe that cannot be repaired to its original condition or is damaged during jacking operations shall be removed and replaced at CONTRACTOR'S expense.

3.3 CONSTRUCTION BY BORING

- A. Construct suitable pits or trenches at the boring and receiving end to a depth no greater than required for placing of the guide and jacking timbers and a horizontal distance no nearer the roadbed than minimum distance shown on the Drawings. Excavation work shall comply with the requirements of Division 31 Section 31 05 00 "Earthwork Materials."
- B. All open pits and trenches shall be braced and shored or their walls sloped preventing caving or sliding of the walls into the open pit or trench complying with requirements of Division 31 Section 31 23 16 "Excavation Support and Protection".
- C. The hole shall be bored mechanically with a suitable boring assembly designed to produce a smooth, straight shaft and so operated that the completed shaft shall be at the established line and grade. The boring shall be accomplished using either a pilot hole method or a dry hole method.
 - 1. Pilot Hole Method: Bore approximately a 2-inch pilot hole the entire length of the crossing and confirm line and grade. The pilot hole shall serve as the centerline for the larger diameter hole to be bored.
 - 2. Dry Hole Method: Advance casing pipe as augers through the casing pipe remove the

soil. Bentonite may be used as a lubricant.

- D. All voids between the pipe and the earth shall be filled with grout. Provide grout holes in the pipe. The grouting shall follow immediately upon completion of the jacking operation. Prepare bottom of pits and pipeline foundations in accordance with Division 31 Section 31 23 33 "Trenching, Backfill, and Compaction". Backfill pits and trenches as soon as practical following completion of jacking operations and installation of carrier pipe(s).
- E. Any pipe that cannot be repaired to its original condition or is damaged during boring operations shall be removed and replaced at CONTRACTOR'S expense.

3.4 CARRIER PIPE INSTALLATION

- A. Installation:
 - 1. Install carrier pipe to establish lines and grades.
 - 2. Carrier pipe joints within the casing pipe shall be of the restrained type in accordance with applicable pipe specifications. If applicable, exterior and interior joints of the carrier pipe shall be mortar coated and lined in the field as installation progresses.
 - 3. For cast iron or ductile iron, encase pipe in polyethylene in accordance with applicable pipe section.
 - 4. Install casing spacers by placing at each end of the casing pipe and at 6 to 8 feet intervals, and in accordance with manufacturer instructions. There shall be at least two spacers installed on each pipe section.
 - 5. Seal ends of casing and carrier pipe using neoprene casing end seals and stainless steel bands. If overlap seal is employed, bond together the overlapping surfaces with permanent sealing adhesive.
- B. Testing: Hydrostatic testing of the carrier pipe shall be completed prior to the filling of the annular space between the casing and carrier pipe. Testing shall be accomplished in accordance with the applicable pipe section.
- C. Supports: Carrier pipe shall be supported to the quarter point by a concrete cradle across the boring or jacking pit to the first joint in the ditch section at each end.
- D. Additional Pipes or Conduits: Where more than one pipe or conduit, such as irrigation or communication/electrical cables or conduits, in addition to the primary carrier pipe, is shown inside the casing, they shall be bundled and attached to special multiple pipe cluster type spacers as a unit in the quadrant shown on the Drawings.

3.5 CONSTRUCTION BY GUIDED BORING OR DIRECTIONAL DRILLING

- A. Guided boring or directional drilling shall be accomplished according to the standards in "Trenchless Technology Guidelines" published by International Society of Trenchless Technology.

3.6 CONSTRUCTION BY TUNNELING

- A. The tunnel shall be excavated in such a manner and to dimensions necessary to permit placement of supports for excavation. Adequate provisions shall be made for the safety, health, and protection of workers. All equipment operated in tunnel shall be powered by air or electricity. No equipment shall be permitted in tunnel powered by petroleum-based fuel.
- B. Tunnel dimensions shown on Drawings are minimum dimensions. Any excess excavation and subsequent backfill, concrete or grout fill shall be at the expense of the CONTRACTOR.

- C. Provide lighting and ventilation, quick removal of gasses and dust from operations, and means for removal of spoils from the excavations.
- D. Provide suitable steel or timber sheeting, shoring and bracing in accordance with Division 31 Section 31 23 33 "Trenching, Backfill, and Compaction". When installation is complete and with approval of ENGINEER, supports may be left in place, provided they clear the encasement or carrier pipe. No separate payment shall be made for supports left in place.
- E. If the tunnel is to be lined with concrete as a monolithic structure, then the overbreak, if any or voids shall be poured with 4,000 psi concrete.
- F. Install carrier pipe in tunnel to established line and grade. As specified, fill the void space between the carrier pipe and tunnel walls or inside face of tunnel lining with annular sand, cellular concrete or flowable fill.

3.7 FIELD QUALITY CONTROL

- A. Grade and Alignment. Provide field survey data confirming grade and alignment conforms to values shown on the Drawings and within limits of specified in this Section.
- B. Provide test data for materials used in installing casing and carrier pipe, such as grout, concrete, flowable fill, cellular concrete fill, and sand used to fill annular space between carrier pipe and casing.
- C. Provide settlement measurements. During construction, make observations of settlement markers at regular intervals of roadway and railroad tracks. Record and provide information.

END OF SECTION

SECTION 32 01 16
PAVEMENT REPAIR AND RESURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies providing for the repair of existing roadways, curb and gutters, sidewalks, driveways, medians and related facilities not designated for improvements, which have been cut, broken or otherwise damaged during construction.

1.2 REFERENCES

- A. Reference Standards.
 - 1. Oklahoma Department of Transportation: Standard Specifications for Highway Construction (ODOT).
 - a. ODOT Chapter 300 "Bases"
 - b. ODOT Chapter 500 "Structures"
 - 2. City of Midwest City / Midwest City Municipal Authority: Paving Specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sand: Sand free from clay lumps, organic and other deleterious materials, having plasticity index of 12 or less, and totally pass through a No. 8 sieve.
- B. Flexible Base: Comply with the base material requirements of ODOT Chapter 303, Type A.
- C. Controlled Low Strength Fill (Flowable Fill):
 - 1. Select and proportion ingredients to obtain compressive strength between 50 and 150 psi at 28 days in accordance with ASTM D4832.
 - 2. Materials:
 - a. Cement: ASTM C150, Type I, II, or III.
 - b. Aggregate: ASTM C33, Size 7.
 - c. Fly Ash (if used): ASTM C618, Class C.
 - d. Water: Clean, potable, free of odor, organics, and deleterious materials.
 - e. The flowable fill mixture shall be mixed either in a pug mill, concrete mixer, or transit mixer and shall a minimum slump of five (5) inches.

PART 3 - EXECUTION

3.1 MISCELLANEOUS ROADWAY CONSTRUCTION

- A. Where concrete, asphalt, and gravel parking areas, driveways, curbs, medians, and sidewalks have been cut or damaged, replace with material similar to existing as follows:
 - 1. Sawcut concrete or asphalt pavement at the limits of the damaged areas as described in the following subparagraphs.
 - 2. Neatly remove damaged area and portion of underlying subgrade. Replace subgrade with appropriate thickness of flexible base (asphalt or concrete pavement) or bank

sand (sidewalks) material as indicated on the Drawings. Contractor may backfill using flowable fill instead of site material and flexible base material.

3. Provide cast-in-place concrete construction, plain or reinforced, matching existing pavement surface and grade, as indicated on the Drawings. If not shown, reinforcement shall be #4 bars at 12-inch centers each way. Saw cut control joints as applicable and place sealing compound in all joints. Type of finish for the replaced section shall be the same as existing pavement.
4. Place asphalt pavement, matching existing pavement surface and grade, as indicated on the Drawings.
5. For gravel service roads and area, prepared subgrade and place like aggregate materials, compacting and matching existing surface and grade.

3.2 CONCRETE PAVEMENT

- A. When construction requires cutting a concrete or concrete base roadway, saw cut (full depth) pavement two (2) feet wider than the width of trench required for installation of the utility. Leave a minimum of one foot of undisturbed subgrade on each side of the trench to support the concrete pavement.
- B. Unless otherwise specified, backfill the trench using flowable fill above the pipe zone.
- C. Drill existing pavements, epoxy grout dowels in existing pavement, and provide cast-in-place concrete construction, reinforced, matching existing pavement surface, as indicated on the Drawings. Saw cut control joints as applicable and place sealing compound in all joints.
- D. Type of finish for the replaced section shall be the same as existing pavement.
- E. For damaged concrete pavements, remove and replace damaged portion in accordance with ODOT Section 535.

3.3 ASPHALT PAVEMENT AND CONCRETE-BASE ASPHALT PAVEMENT

- A. When construction requires cutting asphalt pavement or concrete-base, asphalt pavement, saw cut (full depth) pavement two (2) feet wider than the width of trench required for installation of the utility. Leave a minimum of one foot of undisturbed subgrade on each side of the trench to support the concrete pavement.
- B. Unless otherwise specified, backfill the trench using flowable above the pipe zone.
- C. Where pavement consists of concrete base with asphalt pavement, drill existing concrete base, epoxy grout dowels in existing pavement, and provide cast-in-place concrete construction, plain or reinforced. Saw cut control joints as applicable and place sealing compound in all joints.
- D. Type of finish for the replaced section shall be the same as existing pavement.
- E. Place asphalt pavement, matching existing pavement surface. Crack seal all joints.
- F. For full depth asphalt pavement, replace base course to match existing asphalt and place surface course, matching existing pavement surface. Crack seal all joints.

3.4 CURBS

- A. For damaged curbs, saw cut and removed damaged curb and gutter section. Prepare

subgrade. Dowel in sides of existing pavement and place concrete, shaping curb section. Seal joint between new curb and existing.

3.5 SIDEWALKS

- A. For damaged sidewalks, saw cut at adjacent expansion of tooled joints, remove and replace damaged portion of sidewalk.

3.6 DRIVEWAYS, PARKING AREAS, AND MEDIANS

- A. When construction requires cutting a concrete area; saw cut (full depth) pavement two (2) feet wider than the width of trench required for installation of the utility. Leave a minimum of one foot of undisturbed subgrade on each side of the trench to support the concrete pavement.
- B. Unless otherwise specified, backfill the trench using flowable above the pipe zone.
- C. Drill existing pavements, epoxy grout dowels in existing pavement, and provide cast-in-place concrete construction, reinforced, matching existing pavement surface, as indicated on the Drawings. Saw cut control joints as applicable and place sealing compound in all joints.
- D. Type of finish for the replaced section shall be the same as existing pavement.

END OF SECTION

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**SECTION 32 91 19
LANDSCAPE GRADING**

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Finish grade subsoil.
- B. Furnish place, level, and compact topsoil in areas to receive sod as specified in Section 32 92 24 – Hydromulch Seeding and Sodding.

1.2 PROTECTION

- A. Protect landscaping and other features remaining as final work.
- B. Protect existing structures, fences, roads, sidewalks, paving, and curbs.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Topsoil shall be stripped and stockpiled for reuse on this project.
- B. Topsoil: Natural friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify site conditions and note irregularities affecting work of this Section.
- B. Beginning work of this Section means acceptance of existing conditions.

3.2 SUBSOIL PREPARATION

- A. Eliminate uneven areas and low spots. Finish grade uniformly to maintain contours shown. Make gradual grade changes blending slopes into level areas. Create drainage swales and berms as shown on the Plans. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove subsoil contaminated with petroleum products.
- B. Scarify subgrade to depth of 4 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

- A. Place topsoil in areas where seeding, sodding, plugging or planting is scheduled.
- B. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- D. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.
- E. Manually spread topsoil around trees, plants and buildings.
- F. Lightly compact roll placed topsoil.

G. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 TOLERANCES

A. Uniformity of Topsoil: Plus or minus 1-inch.

3.5 SCHEDULE OF LOCATIONS

A. The following list identifies compacted topsoil thicknesses for various locations.

1. Seeded Grass: 6 inches.
2. Sod: 4 inches.
3. Shrub Beds: 18 inches.
4. Flower Beds: 12 inches.
5. Planter Boxes: To within 3 inches of box rim.

END OF SECTION

SECTION 32 92 24
HYDROMULCH SEEDING AND SODDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hydromulch seeding of grass is required as shown on the Plans and all areas disturbed by construction activities. Establishment of a uniform, full-coverage of grass is required in all disturbed areas, and other areas indicated on the Plans. Hydromulch seeding is specified for these areas where grass establishment is required.
2. Hydromulch seeding includes mixing fertilizer, grass seed and mulch material with water and spraying the mixture onto tilled topsoil. Seeding includes spreading fertilizer, and grass seed onto tilled topsoil.
3. Furnish all materials, labor and equipment including watering system to establish full coverage grass where specified and to maintain the established areas for 60 days.
4. Bermuda sodding is required for a 3-foot-wide strip adjacent to all structures, on either side of all new roadways and sidewalks, and along existing pavement, sidewalks and structures where the area was disturbed by construction.

1.2 DEFINITIONS

- A. Weeds:** Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:

1. Comply with ODAFF General Permit No. OKG87A000.

B. Performance Requirements:

1. In the designated areas for grass establishment, it shall be the sole responsibility of the CONTRACTOR to establish uniform stand of grass which is defined as not less than 150 growing plants per square foot of seeded area, regardless of adverse climatic or other conditions. The OWNER may stop work if unfavorable conditions are likely until favorable conditions are present.

1.4 SUBMITTALS

A. Product Data:

1. Submit data on fertilizer, seed, and mulch as necessary to show compliance with these specifications. Include source of supply for materials as well as:
 - a. Name, trademark, warranty, analysis, form, and coverage for fertilizer.
 - b. Name, type, germination, purity, germination test results with date of test for seed.
 - c. Name, type, components, and coverage for mulch.

B. Shop Drawings:

1. Submit maintenance instructions, cutting method, minimum and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.5 QUALITY ASSURANCE

- A. Provide seed in containers showing name and type of seed, year of production, net weight, date of packaging, date of germination test, and location of packaging.
- B. Provide fertilizer in containers bearing the name, trademark warranty of producer, the weight and analysis, and form of constituents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged, wet, or moldy packaging is not acceptable. Store in dry location.
- B. Deliver fertilizer in waterproof bags. Store in dry location not in contact with runoff.

1.7 PROJECT CONDITIONS (NOT USED)

1.8 WARRANTY (NOT USED)

1.9 EXPERIENCE REQUIREMENTS (NOT USED)

1.10 MAINTENANCE

- A. Maintenance Service:
 1. For areas where establishment is required per the Plans and per Paragraph 1.03.B.1, maintain the hydromulched areas for the term of the Contract plus 60 days following Final Completion beginning immediately after placement and watering as required until grass is well established and exhibits a vigorous growing condition. Coordinate water requirements with availability of water from OWNER and areas to be seeded at one time.

PART 2 - PRODUCTS

2.1 SEED MIXTURE

- A. Seed Type: Hulled extra fancy grade, common Bermuda (*Cynodon dactylon*).
- B. Seed Quality:
 1. All seed shall meet the requirements of the Oklahoma Seed Law including labeling requirements for showing pure live seed (PLS = purity x germination), name and type of seed. All seed shall be treated with a fungicide. Seed, which has become wet, moldy or otherwise damaged in transit or storage, will not be acceptable. Seed shall be new crop seed (harvested within 1 year prior to planting), free of other weed seed to the limits allowable under the Oklahoma Seed Law. The seed shall have a germination and purity that will produce a pure live seed content of not less than 85 percent.

2.2 FERTILIZER

- A. Fertilizer shall be a commercial product uniform in composition, free flowing, and suitable for application with standard equipment. The fertilizer shall comply with the applicable State fertilizer laws and shall be delivered in bags or other convenient containers, each fully

labeled and bearing the name, trademark, and warranty of the producer. Fertilizer applied during the initial planting shall have analysis ratio of 20-20-20 also containing traces of sulfur, iron and zinc. Fertilizer used in the second application shall have an analysis ratio of 12-4-8. The figures in the analysis represent the percent of nitrogen, phosphorus, and potash nutrients, respectively as determined by methods of the Association of Official Agricultural Chemists. Fifty percent or greater of the nitrogen required shall be in the form of nitrate nitrogen. The remaining nitrogen may be in the form of urea nitrogen.

- B. In the event it is necessary to substitute a fertilizer of a different analysis or form, the total amount of nutrients applied per 1000 square feet shall equal or exceed that specified for each nutrient.
- C. Fertilizer which has become caked or exposed to excess humidity or mixture will not be acceptable.

2.3 HYDROMULCH

- A. Hydromulch material for areas requiring grass establishment shall be Second Nature Hydroseeding Mulch as manufactured by Central Fiber Corporation, or approved equivalent. Mulch shall be manufactured of natural fiber stock free of plastics and foreign materials. Mulch shall have a green non-toxic dye, disperse rapidly in water to form a homogeneous slurry and shall remain in suspension. It shall have a water holding capacity of not less than 1300 gms water per 100g fiber.

2.4 MULCH:

- A. Furnish straw mulch free of weeds and spread at the recommended rate to adequately cover all areas which are broadcast seeded and indicated to be mulched.

2.5 SOIL MATERIALS

- A. Topsoil: Topsoil shall be 4 inches in depth. Refer to material requirements in Section 31 05 00 "Earthwork Materials."

2.6 ACCESSORIES

- A. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass. Plant effluent may be used.
- B. Erosion Fabric: Jute matting, open weave, where shown on Plans or where slope is steeper than 3:1.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that prepared soil base is ready to receive the work of this Section that topsoil has been placed and final grading is acceptable to OWNER.
- B. Beginning of installation means acceptance of existing site conditions.

3.2 FINAL GRADING

- A. Comply with the requirement in Section 32 91 19 "Landscape Grading" for final grading, subsoil preparation and placement of topsoil prior to seeding. All areas to be seeded shall have sufficient topsoil placed prior to seeding.

- B. Smooth areas that have become gullied; and loosen or retil areas that have become compacted since completion of grading to a depth of 6 inches.

3.3 FERTILIZING

- A. Apply initial fertilizer in accordance with manufacturer's instructions at a minimum rate of 15 lb per 1000 sf with hydromulch mixture.
- B. A second application of fertilizer shall be applied to the establishment areas between 45 and 60 days from seeding, at a rate of 8 pounds per 1000 sf.

3.4 SEEDING

- A. For hydromulch (grass establishment) areas, hydromulch mixture containing the seed, fertilizer, mulch and water shall be prepared in accordance with the following quantities. Mixture shall be applied to planting area using conventional "Hydromulch" equipment. For seeded areas, seed and fertilizer shall be spread with mechanical spreaders to obtain the specified rates.

| Component | Rate per 1000 sf |
|------------------|-------------------------|
| Grass seed | 2.5 pounds |
| Fertilizer | 15 pounds |
| Water | As Needed |
| Paper Fiber | As recommended by |
| Mulch | manufacturer |

- B. Planting Season:
 - 1. March 1 to August 31.
 - 2. Seeding shall not be done during periods other than listed above.
- C. For areas to be established, apply water with a fine spray immediately (within 24 hours) after each area has been seeded and mulched. Saturate to 4 inches of soil. Water daily as often as necessary for 4 weeks to establish grass.

3.5 SEED PROTECTION

- A. Cover seeded slopes where grade is steeper than 4 inches per foot with erosion fabric. Roll fabric onto slopes without stretching or pulling. Cover hydromulched areas as recommended to obtain establishment of grass.
- B. Lay fabric smoothly on surface, bury top end of each section in 6-inch deep excavated topsoil trench. Provide 12-inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.
- C. Secure outside edges and overlaps at 36-inch intervals with stakes.
- D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- E. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.
- F. No heavy equipment shall be moved over planted area unless area is to be retilled and reseeded.

3.6 MAINTENANCE FOR HYDROMULCHED AREAS

- A. The CONTRACTOR shall mow grass as required.
- B. CONTRACTOR shall water as required to establish grass and to prevent grass and soil from drying out for the initial 60-day period.
- C. CONTRACTOR shall control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- D. Prior to the second fertilizer application, CONTRACTOR shall reseed areas which show bare spots of 2 square feet or larger. Minimum of 95 percent coverage shall be required for OWNER acceptance.
- E. CONTRACTOR shall maintain grass and reseed as required to establish 95 percent coverage (within a minimum of 60 days) or 150 plants per square foot.
- F. Protect seeded areas with warning signs during maintenance period, if necessary.

END OF SECTION

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SECTION 33 05 07.13
HORIZONTAL DIRECTIONAL DRILLING

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 work shall include equipment, materials, and labor for the complete and proper installation of underground Fused PVC pipe utilizing using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring. This shall also include all testing, restoration of underground utilities, and erosion and sedimentation control and restoration.

1.3 REFERENCES AND DEFINITIONS

- A. References:
 - 1. ASTM International (ASTM):
 - a. D1784 Specification for Rigid PVC Compounds and Chlorinated PVC Compounds
 - b. D2152 Test Method for Degree of Fusion of Extruded PVC Pipe and Molded Fittings by Acetone Immersion
 - c. D2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
 - d. D3139 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
 - e. F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pressure Pipe
 - 2. American Water Works Association (AWWA):
 - a. C900 – Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch through 48-inch (100 mm through 1200 mm), for Water Distribution
 - 3. Related Specification Sections include, but are not necessarily limited to:
 - a. Division 01 General Requirements
 - b. Section 33 05 31.23 Piping System, Fusible PVC Pipe

1.4 PERFORMANCE REQUIREMENTS

- A. Quality Assurance: The requirements set forth in this document specify a wide range of procedural precautions necessary to provide the very basic, essential aspects of a proper directional bore installation and are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification. Adherence to the specifications contained herein, or the ENGINEER approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the CONTRACTOR of their ultimate responsibility for the satisfactory completion of the work

authorized under the Contract.

1. Installer's Qualifications: Installation shall be by a competent, experienced CONTRACTOR or SUB-CONTRACTOR. The installation CONTRACTOR shall have a satisfactory experience record of at least 3 years engaged in similar work of equal scope. If patented processes are involved based on the pipe selection, the installer shall be licensed, trained and in good standing with the pipe manufacturer.
2. Performance Requirements: Lateral or vertical variation in the final position of the carrier pipe from the line and grade established by the plans shall be permitted only to the extent of 4 percent, provided that such variation shall be regular and only in the direction that will not detrimentally affect the function of the carrier pipe.
3. Certification: Pipe products shall have been tested and approved by an independent third-party laboratory for continuous use at rated pressures.
4. Design Criteria: The maximum allowable load for PVC pipe installations shall produce a maximum deflection of 4 percent.

1.5 SUBMITTALS

A. Submittals shall include:

1. Work Plan: Prior to beginning work, the CONTRACTOR shall submit to the ENGINEER a work plan as record data detailing the procedure and schedule to be used to execute the project. The work plan should include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of sub-contractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), all excavation locations, interfering utilities, and flow bypass, an erosion and sedimentation control plan and contingency plans for possible problems. Work plan should be comprehensive, realistic and based on actual working conditions for the project.
2. Equipment: CONTRACTOR will submit specifications on directional drilling equipment as record data. Equipment shall include but not be limited to: drilling rig, butt fusion welding apparatus, mud system, mud motors (if applicable), down-hole tools, guidance system, rig safety systems. Calibration records for guidance equipment shall be included. Specifications for any drilling fluid additives that CONTRACTOR intends to use or might use will be submitted.
3. Material: Provide shop drawings of the pipe with material specifications, including size, type, diameter and manufacturer's data and certifications on piping and jointing methods. The shop drawing shall include a Certificate of Adequacy of Design stating the pipe and fittings are satisfactory for the loads which will be imposed during for all loading conditions.
4. CONTRACTOR shall maintain a daily project log of drilling operations and a guidance system log along with a fusion report for all butt fused welding of joints with a copy given to ENGINEER and INSPECTOR at completion of project.

1.6 DELIVERY AND STORAGE

- A. Store PVC pipe material so that there is no exposure to sunlight.

1.7 JOB CONDITIONS; PERMIT AND EASEMENT REQUIREMENTS

- A. Where the work is in the public right-of-way the CONTRACTOR will secure the appropriate permits or easements. The CONTRACTOR shall observe regulations and instructions of the right-of-way Owner as to the methods of performing the work and take precautions for the safety of the property and the public. Negotiations and coordination with the right-of-way Owner shall be carried on by the CONTRACTOR, not less than 5 days prior to the time of his intentions to begin work on the right-of-way.
- B. Comply with the requirements of the permit and/or easement. If required by the Right-of-Way Owner, obtain Protective Liability Insurance.
- C. Construction along roads and public areas shall be performed in such manner that does not interfere with the operations of the roads.
- D. Barricades, warning signs, and flagmen, when necessary and specified, shall be provided by the CONTRACTOR.
- E. No blasting shall be allowed.
- F. Existing pipelines and underground conduits are to be protected. The CONTRACTOR shall verify location and elevation of any pipelines, telephone cable and fiber optics before proceeding with the construction and shall plan his construction so as to avoid damage to the existing pipe lines or telephone cables. Verification of location (vertical and horizontal) of existing utilities shall be the complete responsibility of the CONTRACTOR.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General:
 - 1. The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the crossing, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be re-used, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, trained and competent personnel to operate the system.
 - 2. All equipment shall be in good, safe operating condition with sufficient supplies, materials, and spare parts on hand to maintain the system in good working order for the duration of this project.
 - 3. Fusible PVC pipe shall be supplied per Section 33 05 31.23, Fusible PVC Pipe.
- B. Drilling System:
 - 1. Drilling Rig: The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pullback operations. The rig shall be grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm which automatically sounds when an electrical current is detected.

2. Drill Head: The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.
 3. Pressure Tool: A pressure tool shall be used on the drill stem for the pilot hole, and monitored by the Mud Engineer to mitigate Inadvertent Releases from occurring.
 4. Mud Motors (if required): Mud motors shall be of adequate power to turn the required drilling tools.
 5. Drill Pipe: Shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.
- C. Guidance System:
1. A Magnetic Guidance System (MGS) or proven gyroscopic system shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at all depths up to 100 feet and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate to plus or minus 2 percent of the vertical depth of the bore hole at sensing position at depths up to 100 feet and accurate within 1.5 meters horizontally.
 2. The Guidance System shall be of a proven type and shall be operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic anomalies on the surface of the drill path and shall consider such influences in the operation of the guidance system if using a magnetic system.
- D. Drilling Fluid Mud System:
1. Mixing System: A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid. The drilling fluid reservoir tank shall be of sufficient size for making the bore. Mixing system shall continually agitate the drilling fluid during drilling operations.
 2. Drilling Fluids: Drilling fluid shall be composed of clean water and appropriate additives. Water shall be from an authorized source with a pH of 8.5 to 10. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No potentially hazardous material may be used in drilling fluid.
 3. Delivery System: The mud pumping system shall have a minimum capacity to maintain correct boring alignment and be capable of delivering the drilling fluid at a constant pressure. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and conveyed to the drilling fluid recycling system. A berm, minimum of 12 inches high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system to prevent spills into the surrounding environment. Pumps and or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage and recycling facilities.
 4. Drilling Fluid Recycling System: The drilling fluid recycling system shall separate sand, dirt, and other solids from the drilling fluid to render the drilling fluid reusable. Spoils separated from the drilling fluid will be stockpiled for later use or disposal.
- E. Other Equipment:

1. Pipe Rammers: Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of ENGINEER. The ENGINEER or Inspector must be onsite when a pipe rammer is used.
 2. Restrictions: Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the ENGINEER prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the conditions of the project.
- F. Piping Materials:
1. Water Main:
 - a. Pipe Material: C900 CLASS 235 (DR-18) – Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch through 48-inch (100 mm through 1200 mm), for Water Distribution
 - b. Pipe Markings: Pipe shall be legibly marked in permanent ink with the manufacturer and trade name, nominal size and DR rating/pressure class, hydrostatic proof test pressure, manufacturer date code.
 2. Tracer Wire:
 - a. Buried piping shall be installed with a continuous, insulated TW, THW, THWN, or HMWPE insulated copper, 10 gauge or thicker wire for pipeline location purposes by means of an electronic line tracer.
 - 1) Installed wires along the entire length of the pipe.
 - 2) Insulation color shall match the color of pipe being installed.
 - 3) Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.
 - b. Tracer wire to be installed via horizontal directional drilling shall be rated by manufacturer for horizontal directional drilling applications.
 - c. Manufacturer:
 - 1) Copperhead Industries
 - 2) Or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. The ENGINEER and Inspector must be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Inspector is present at the job site and agrees that proper preparations for the operation have been made.
- B. The approval for beginning the installation shall in no way relieve the CONTRACTOR of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.

3.2 PERSONNEL REQUIREMENTS

- A. All personnel shall be fully trained in their respective duties as part of the directional

drilling crew and in safety. The operator of the drilling rig must have at least 3 years directional drilling experience. A responsible representative who is thoroughly familiar with the equipment and type work to be performed, must be in direct charge and control of the operation at all times. In all cases the supervisor must be continually present at the job site during the actual Directional Bore operation. The CONTRACTOR shall have a sufficient number of competent workers on the job at all times to ensure the Directional Bore is made in a timely and satisfactory manner.

- B. Mud Engineer: The CONTRACTOR shall have a trained Mud Engineer with at least 3 years engaged in similar work of equal scope. The Mud Engineer shall be present for the pilot hole and all subsequent ream bores. The pilot drill pressures shall be monitored by the Mud Engineer using a pressure tool placed on the drill stem, in order to mitigate any occurrences of Inadvertent Releases. The pressure tool is not required on subsequent reamer passes.

3.3 DRILLING PROCEDURES

- A. Site Preparation: Prior to any alterations to work-site, CONTRACTOR shall photograph or video tape entire work area, including entry and exit points, one copy of which shall be given to INSPECTOR and one copy to remain with CONTRACTOR for a period of 1 year following the completion of the project. Work sites shall be within right-of-way and shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. CONTRACTOR shall confine all activities to designated work areas.
- B. Drill Path Survey: Entire drill path shall be accurately surveyed by the CONTRACTOR with entry and exit stakes placed in the appropriate locations within the areas determined in the field with the INSPECTOR. Locate existing utilities in advance of boring operations. The CONTRACTOR shall be responsible for repairing damage to existing utilities at no additional cost to the Owner. Repair of existing utilities shall proceed until complete and the existing utility is back in service. If CONTRACTOR is using a magnetic guidance system, drill path shall be surveyed by the CONTRACTOR for any surface magnetic variations or anomalies.
- C. Environmental Protection: CONTRACTOR shall place silt fence between all drilling operations and any drainage, wetland, waterway or other area designated for such protection by contract documents, state, federal and local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. CONTRACTOR shall adhere to all applicable environmental regulations. Fuel may not be stored in bulk containers within 200 feet of any water-body or wetland.
- D. Safety: CONTRACTOR shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner.
- E. Pilot Hole:
 - 1. Pilot hole shall be drilled on bore path with no deviations greater than 4 percent horizontally or vertically over a length of 100 feet. If pilot hole does deviate from bore path more than 4 percent, CONTRACTOR shall notify ENGINEER, who may require CONTRACTOR to pull-back and re-drill from the location along bore path before the deviation. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, CONTRACTOR shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds

as measured by a March funnel and then wait another 30 minutes.

2. If mud fracture or returns loss continues, CONTRACTOR will cease operations and notify the ENGINEER. The ENGINEER and CONTRACTOR will discuss additional options and work will then proceed accordingly.
 3. Reaming: Upon successful completion of pilot hole, CONTRACTOR will ream bore hole to a minimum of 25 percent greater than outside diameter of pipe using the appropriate tools. CONTRACTOR will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.
- F. Pull-Back:
1. After successfully reaming bore hole to the required diameter, CONTRACTOR will pull the pipe through the bore hole. In front of the pipe will be a swivel and reamer to compact bore hole walls. Pull loads shall not exceed the limits shown in the following tables. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole.
 2. During pull-back operations CONTRACTOR will not apply more than the maximum safe pipe pull pressure at any time. In the event that pipe becomes stuck, CONTRACTOR will cease pulling operations to allow any potential hydro-lock to subside and will recommence pulling operations. If pipe remains stuck, CONTRACTOR will notify Inspector to discuss options and then work will proceed accordingly.

3.4 FUSIBLE PVC JOINING

- A. The pipe shall be assembled and joined at the site using the thermal butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of the pipe and/or fusing equipment.
- B. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. When cool, all weld beads shall then be removed from the outside surface such that the joint surfaces shall be smooth. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the Inspector prior to insertion. All defective joints shall be cut out and replaced at no cost to the Owner. Any section of the pipe with a gash, blister, abrasion, nick, scar or other deleterious fault greater in depth than 5 percent of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the INSPECTOR shall be discarded and not used.
- C. Terminal sections pipe that are joined within the insertion pit shall be connected with a full circle pipe repair clamp. The butt gap between pipe ends shall not exceed 1/2 inch.

3.5 PIPE TESTING

- A. Following successful pull-back of pipe, CONTRACTOR will test pipe using potable water

according to the City's / Authority's requirements. A calibrated pressure recorder will be used to record the pressure during the test period. This record will be submitted to ENGINEER.

3.6 SITE RESTORATION

- A. Following drilling operations, CONTRACTOR will de-mobilize equipment and restore the worksite to original condition. All excavations will be backfilled and compacted to 95 percent of original density.

END OF SECTION

**SECTION 33 05 22
STEEL CASING PIPE**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the minimum requirements for manufacturing, furnishing, and transporting Steel Casing Pipe to be installed by Open Cut or By Other than Open Cut.

1.2 RELATED SECTIONS

- A. Division 31 Section 31 71 00 – Pipe Jacking, Boring, or Tunneling

1.3 MEASUREMENT AND PAYMENT

- A. Reference specification Section 01 29 00 Measurement and Payment.

1.4 REFERENCES

A. Reference Standards

1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
2. ASTM International (ASTM):
 - a. A139, Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS Sizes 4 and Over).
3. American Water Works Association (AWWA):
 - a. C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied.
 - b. C206 Standard for Field Welding Steel Water Pipe

1.5 SUBMITTALS

A. Action Submittals

1. Shop Drawings
 - a. No shop drawings required for Auger Boring
 - b. For Tunneling, provide the following:
 - 1) Furnish details for Steel Casing Pipe outlining the following:
 - a) Grout/lubrication ports
 - b) Joint details
 - c) Other miscellaneous items for furnishing and fabricating pipe
 - 2) Submit calculations in a neat, legible format that is sealed by a Licensed Professional Engineer in Oklahoma, consistent with the information provided in the geotechnical report, and includes:
 - a) Calculations confirming that pipe jacking capacity is adequate to resist the anticipated jacking loads for each crossing with a minimum factor of safety of 2.

- b) Calculations confirming that pipe capacity is adequate to safely support all other anticipated loads, including earth and groundwater pressures, surcharge loads, and handling loads.
- c) Calculations confirming that jointing method will support all loading conditions.

B. Informational Submittals

- 1. Product Data
 - a. Interior and Exterior Coating
 - 1) Material data
 - 2) Field touch-up procedures

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery, Handling, and Storage

- 1. Prior to delivery of the pipe, end/internal bracing shall be furnished and installed, as recommended by the manufacturer, for protection during shipping and storage.
- 2. Deliver, handle and store pipe in accordance with the Manufacturer's recommendations to protect coating systems.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Design Criteria

- 1. The Contractor is fully responsible for the design of Steel Casing Pipe that meets or exceeds the design requirements of this Specification and that is specifically designed for installation by the intended trenchless method.
- 2. For Steel Casing Pipe utilized for tunneling projects, consider the following:
 - a. Design of the casing pipe shall account for all installation and service loads including:
 - 1) Jacking loads
 - 2) External groundwater and earth loads
 - 3) Traffic loads
 - 4) Railroad Loads
 - 5) Practical consideration for handling, shipping and other construction operations
 - 6) Any other live or dead loads reasonably anticipated
 - b. Design shall be sealed and signed by a registered Professional Engineer licensed in the State of Oklahoma.
 - c. The allowable jacking capacity shall not exceed 50 percent of the minimum steel yield stress.
 - d. Steel Casing Pipe shall have a minimum wall thickness as specified on the Drawings.
- 3. Steel Casing Pipe shall be provided with inside diameter sufficient to efficiently install the required carrier pipe with casing spacers per project Plans.

- a. Allowable casing diameters are shown on the Drawings for each crossing.
4. Furnish in lengths that are compatible with Contractor's shaft sizes and allowable work areas.
5. Random segments of pipe will not be permitted for straight runs of casing.
 - a. Closing piece segments, however, shall be acceptable.
6. When required by installation method, provide grout/lubricant ports along the pipe at intervals of 10 feet or less.
 - a. Ports and fittings shall be attached to the pipe in a manner that will not materially affect the strength of the pipe nor interfere with installation of carrier pipe.
 - b. Plugs for sealing the fittings shall be provided by the Contractor and shall be capable of withstanding all external and internal pressures and loads without leaking.

B. Materials

1. Provide new, smooth-wall, carbon steel pipe conforming to ASTM A139, Grade B.
2. Dimensional Tolerances
 - a. Furnishing and installing Steel Casing Pipe with dimensional tolerances that are compatible with performance requirements and proposed installation methods that meet or exceed the specific requirements below:
 - 1) Minimum wall thickness at any point shall be at least 87.5 percent of the nominal wall thickness.
 - 2) Outside circumference within 1.0 percent or 3/4 inch of the nominal circumference, whichever is less.
 - 3) Outside diameter of the pipe shall be within 1/8 inch of the nominal outside diameter.
 - 4) Roundness such that the difference between the major and minor outside diameters shall not exceed 0.5 percent of the specified nominal outside diameter or 1/4 inch, whichever is less.
 - 5) Maximum allowable straightness deviation of 1/8 inch in any 10-foot length.
 - 6) Grout coupling location and spacing as per Section 31 70 00 – Pipe Jacking, Boring, or Tunneling
3. All steel pipe shall have square ends.
 - a. The ends of pipe sections shall not vary by more than 1/8 inch at any point from a true plane perpendicular to the axis of the pipe and passing through the center of the pipe at the end.
 - b. When pipe ends have to be beveled for welding, the ends shall be beveled on the outside to an angle of 35 degrees with a tolerance of $\pm 2\frac{1}{2}$ degrees and with a width of root face $1/16$ inch $\pm 1/32$ inch.
4. Steel Casing Pipe shall be fabricated with longitudinal weld seams.
 - a. All girth weld seams shall be ground flush.

C. Finishes

1. Provide outside of Steel Casing Pipe with a coal-tar protective coating in accordance with the requirements of AWWA C203.
 - a. Touch up after field welds shall provide coating equivalent to those specified above.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install Steel Casing Pipe for By Other than Open Cut in accordance with Section 31 70 00 Pipe Jacking, Boring, or Tunneling.
 1. Steel Casing Pipe connections shall be achieved by full penetration field butt welding or an integral machine press-fit connection (Permalok or equivalent) prior to installation of the pipe, depending on the type of carrier pipe.
 2. Allowable joint types for each crossing are shown on the Drawings.
 3. Field butt welding a square end piece of steel pipe to a 35-degree beveled end of steel pipe is acceptable.
 4. Integral machined press-fit connections shall be installed in accordance with the manufacturer's installation procedures and recommendations.
- B. Carrier pipe shall be installed inside Steel Casing Pipe in accordance with Section 31 70 00 Pipe Jacking, Boring, or Tunneling.

END OF SECTION

SECTION 33 05 24
INSTALLATION OF CARRIER PIPE IN CASING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for the installation of carrier pipe into steel casings at locations shown on the Drawings
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 01 General Requirements
 - 2. Section 31 70 00, Pipe Jacking, Boring, or Tunneling
 - 3. Section 33 05 22 Steel Casing Pipe

1.2 MEASUREMENT AND PAYMENT

- A. Reference specification Section 01 29 00 Measurement and Payment.

1.3 REFERENCES

- A. Definitions
 - 1. Carrier Pipe: Permanent pipe for operational use that is used to convey flows
 - 2. Casing: A steel pipe installed by trenchless methods that supports the ground and provides a stable underground excavation for installation of the carrier pipe
- B. Reference Standards
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - 2. ASTM International (ASTM):
 - a. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - b. C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or [50 mm] Cube Specimens).
 - 3. International Organization for Standardization (ISO):
 - a. 9001, Quality Management Systems – Requirements.
 - 4. Occupational Safety and Health Administration (OSHA)
 - a. OSHA Regulations and Standards for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavation.

1.4 SUBMITTALS

- A. Action Submittals
 - 1. Shop Drawings
 - a. Submit Work Plan describing the carrier pipe installation equipment, materials and construction methods to be employed.
 - b. Casing Spacers/Isolators

- 1) Detail drawings and manufacturer's information for the casing isolators/spacers that will be used.
 - a) Include dimension and component materials and documentation of manufacturer's ISO 9001:2000 certification.
 - 2) Alternatives to casing spacers/isolators may be allowed by the Owner on a case-by-case basis.
 - 3) For consideration of alternate method, submit a detailed description of method including details.
 - c. End seal or bulkhead designs and locations for casing/liners.
 - 1) Annular Space (between carrier pipe and casing) Grouting Work Plan and Methods including:
 - a) Grouting methods
 - b) Details of equipment
 - c) Grouting procedures and sequences including:
 - i. Injection methods
 - ii. Injection pressures
 - iii. Monitoring and recording equipment
 - iv. Pressure gauge calibration data
 - v. Materials
 - d. Grout mix details including:
 - 1) Proportions
 - 2) Admixtures including:
 - a) Manufacturer's literature
 - b) Laboratory test data verifying the strength of the proposed grout mix
 - c) Proposed grout densities
 - d) Viscosity
 - e) Initial set time of grout
 - f) Data for these requirements shall be derived from trial batches from an approved testing laboratory.
 - 3) Submit a minimum of 3 other similar projects where the proposed grout mix design was used.
 - 4) Submit anticipated volumes of grout to be pumped for each application and reach grouted.
 - 5) For pipe installations greater than 36-inches, without hold down jacks or a restrained spacer, provide buoyant force calculations during grouting and measures to prevent flotation.
 - 6) Calculations sealed by a licensed Engineer in the State of Oklahoma.
 - 7) Description of methods and devices to prevent buckling of carrier pipe during grouting of annular space, if required
2. Informational Submittals
- a. Product Data

- 1) Casing Isolators/Spacers
 - a) Material Data
- 2) Grout Mix
 - a) Material Data

B. All submittals shall be approved by the Owner prior to delivery.

1.5 TOLERANCE

A. Pipe Circularity

$$(D_h - D_v) / D_v \leq 0.005$$

Where,

D_v is the pipe diameter measured vertically and

D_h is the pipe diameter measured horizontally, immediately before encasement in grout.

1. Pipe Alignment in Tunnel
 - a. Line: Within 0.3 foot of theoretical alignment.
 - b. Grade: Within 0.33 foot of theoretical grade.
 - c. Corrections to line and grade: No greater than 1 inch in 10 feet, or sufficient to prevent ponding, whichever is less.

1.6 DOCUMENTATION

- A. Provide Record Data in accordance with Contract Requirements. Documents for the installation of pipe in tunnels shall be prepared and sealed by a Professional Engineer licensed in the State of Oklahoma and include:
1. Working Drawings and Methods Statements: Detail means and methods for transporting, handling, storing, protecting, installing, supporting and blocking the pipe in place at its final location. Include the following:
 - a. Preparations for installing pipe sections, including details of mock-up pipe section assembly.
 - b. Methods for cleaning areas where pipe is to be placed and grade control.
 - c. Details of pipe carriers, prefabricated runners, cradles, internal supports, tie-downs, bracing, backfill concrete lift height, and other methods for preventing flotation while placing annular backfill.
 - d. Sequence and methods for installing pipe sections in the tunnel and fit up of joints.
 - e. Sequence and methods for encasing pipe section in backfill. Coordinate with requirements for grout ports or other outlets in pipe that are used to monitor the advance of backfill.
 - f. Details for effecting tie-ins (if any) to buried pipeline reaches.

1.7 QUALITY ASSURANCE

A. Certifications

1. Casing isolator/spacer manufacturer shall be certified against the provisions of ISO9001:2000.
- B. Qualifications. The Contractor or its installer shall demonstrate experience installing similar pipe on at least three tunnels using similar methods and procedures proposed for this project. Submit project name and details, contract, and phone number for the three projects, completed within the last 5 years.
- C. Letter of Certification. Certification that proposed pipe transportation, internal and external pipe supports, blocking details to prevent flotation, and backfilling procedures are in accordance with manufacturer's recommendations and will not damage pipe. Provide calculations demonstrating that pipe will not be damaged during backfilling operations due to flotation. Calculations shall be prepared by and sealed by a Professional Engineer registered in the State of Oklahoma.
- D. Quality Control Plans. Methods for achieving minimum specified tolerances for line and grade, pipe ovalization to specified limits, and providing the minimum annular clearance.
- E. Record Keeping. Daily records submitted no later than the beginning of the following working day and integrated with the requirements of Section 31 71 19 Tunneling.
 1. Number and classification of men and equipment.
 2. Beginning and ending stations or elevations of pipe lining, and station or elevation where joint work has been completed.
 3. Testing, including time, location, and results of tests.
 4. Notation of any downtime or interruption to production, including length of time and reason.
 5. Maintain and submit daily logs of grouting operations.
 - a. Include:
 - 1) Grouting locations
 - 2) Pressures
 - 3) Volumes
 - 4) Grout mix pumped
 - 5) Time of pumping
 - b. Note any problems or unusual observations on logs.
- F. Grout Strength Tests.
 1. Contractor may perform testing for 24-hour and 28-day compressive strength tests for the cylinder molds or grout cubes obtained during grouting operations.
 2. Contractor may perform field sampling during annular space grouting.
 - a. Contractor may collect at least 1 set of 4-cylinder molds or grout cubes for each 100 cubic yards of grout injected but not less than 1 set for each grouting shift.
 - b. Contractor may perform 24-hour and 28-day compressive strength tests per ASTM C39 (cylindrical specimens) or ASTM C109 (cube specimens).
 - c. Remaining samples shall be tested as directed by Owner.
- G. Safety
 1. The Contractor is responsible for safety on the job site.

- a. Perform all Work in accordance with the current applicable regulations of the Federal, State and local agencies.
- b. In the event of conflict, comply with the more restrictive applicable requirement.
2. No gasoline powered equipment shall be permitted in jacking shafts and receiving shafts/pits.
 - a. Diesel, electrical, hydraulic and air powered equipment is acceptable, subject to applicable local, State and Federal regulations.
3. Methods of construction shall be such as to ensure the safety of the Work, Contractor's and other employees on site and the public.
4. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are underground.
 - a. Perform all required air and gas monitoring.
 - b. Ventilation system shall provide a sufficient supply of fresh air and maintain an atmosphere free of toxic or flammable gasses in all underground work areas.
5. Perform all Work in accordance with all current applicable regulations and safety requirements of the federal, state and local agencies.
 - a. Comply with all applicable provisions of OSHA 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations.
 - b. In the event of conflict, comply with the more stringent requirements.
6. If personnel will enter the pipe during construction, the Contractor shall develop an emergency response plan for rescuing personnel trapped underground in a shaft excavation or pipe.
 - a. Keep on-site all equipment required for emergency response in accordance with the agency having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Design Criteria and Materials

1. Carrier pipe shall be installed within the horizontal and vertical tolerances as indicated in PART 3 of this Specification, incorporating all support/insulator dimensions required.
2. Grout of annular space
 - a. For water line installation:
 - 1) Fill annular space between the carrier pipe and primary liner with grout.
 - 2) Limit pressure on annular space to prevent damage to pipe or liner. Place in lifts to avoid pipe flotation. Define limiting and estimated required pressure range. Provide and monitor open ended, high point tap or equivalent vent at bulkhead opposite of point grouting.
3. Grout Mixes
 - a. Low Density Cellular Grout (LDCC)
 - 1) Annular space (between sewer carrier pipe and casing/liner) grout shall be

LDCC.

- 2) The LDCC shall be Portland cement-based grout mix with the addition of a foaming agent designed for this application.
- 3) Develop 1 or more grout mixes designed to completely fill the annular space based on the following requirements:
 - a) Provide adequate retardation to completely fill the annular space in 1 monolithic pour.
 - b) Provide less than 1 percent shrinkage by volume.
 - c) Compressive Strength
 - d) Minimum strength of 10 psi in 24 hours, 300 psi in 28 days
 - e) Design grout mix with the proper density and use proper methods to prevent floating of the carrier pipe.
 - f) Proportion grout to flow and to completely fill all voids between the carrier pipe and the casing or liner.

4. End Seals

- a. Provide end seals as shown in the Drawings at each end of the casing or liner to contain the grout backfill or to close the casing/liner ends to prevent the inflow of water or soil.
- b. Design end seals to withstand the anticipated soil or grouting pressure and be watertight to prevent groundwater from entering the casing.
- c. Available Manufacturers:
 - 1) Advance Products & Systems
 - 2) Cascade Waterworks Mfg.
 - 3) GPT, Inc.

5. Casing Spacers/Insulators

- a. Provide casing spacers/insulators to support the carrier pipe during installation and grouting (where grout is used). Casing spacers are required on poly coated tunnel pipe. Wooden skids will not be allowed as an alternative
- b. Casing Spacers/Isolators material and properties:
 - 1) Shall be minimum 14 gage
 - 2) Coated Stainless Steel
 - 3) Bolt on style type with a shell made of at least two halves
 - 4) Suitable for supporting weight of carrier pipe without deformation or collapse during installation
- c. Available Manufacturers:
 - 1) Advance Products & Systems
 - 2) Cascade Waterworks Mfg.
 - 3) GPT, Inc.
- d. Provide restrained-style casing spacers to hold all pipes stable during grouting operations and prevent floating or movement.
- e. Provide dielectric strength sufficient to electrically isolate each component from one another and from the casing.

- f. Design risers for appropriate loads, and, as a minimum:
 - 1) Provide 10 gage steel risers
- g. Band material and criteria
 - 1) Provide polyvinyl chloride inner liner with:
 - a) Minimum thickness of 0.09 inches
 - b) Durometer "A" of 85-90 hardness
 - c) Minimum dielectric strength of 60,000 volts
- h. Runner material and criteria
 - 1) Provide pressure-molded glass reinforced polymer or UHMW with:
 - 2) Minimum of 2 inches in width and a minimum of 11 inches in length.
 - 3) Attach to the band or riser with 3/8-inch minimum welded steel or stainless steel studs.
 - 4) Runner studs and nuts shall be recessed well below the wearing surface of the runner
 - a) Fill recess with a corrosion inhibiting filler.
- i. Riser height
 - 1) Provide sufficient height with attached runner allow a minimum clearance of 2 inches between the outside of carrier pipe bells or couplings and the inside of the casing liner surface.
- j. Mortar Bands
 - 1) Mortar bands are an allowable option for mortar coated tunnel pipe.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General

1. Carrier pipe installation shall not begin until the following tasks have been completed:
 - a. All required submittals have been provided, reviewed and accepted.
 - b. All casing/liner joints are watertight, and no water is entering casing or liner from any sources.
 - c. All contact grouting is complete.
 - d. Casing/liner alignment record drawings have been submitted and accepted by Owner to document deviations due to casing/liner installation.
 - e. Site safety representative has prepared a code of safe practices and an emergency plan in accordance with applicable requirements.
2. The carrier pipe shall be installed within the casings or liners between the limits indicated on the Drawings, to the specified lines and grades and utilizing methods which include due regard for safety of workers, adjacent structures and improvements, utilities and the public.

B. Control of Line and Grade

1. Install Carrier pipe inside the steel casing within the tolerances required by Paragraph 1.5.

2. Check line and grade set up prior to beginning carrier pipe installation.
 3. Perform survey checks of line-and-grade of carrier pipe during installation operations.
 4. The Contractor is fully responsible for the accuracy of the installation and the correction of it, as required.
 - a. Where the carrier pipe installation does not satisfy the specified tolerances, correct the installation, including if necessary, redesign of the pipe or structures at no additional cost to Owner.
- C. Installation of Carrier Pipe
1. Pipe Installation
 - a. Remove all loose soil from casing or liner.
 - b. Grind smooth all rough welds at casing joints.
 2. Installation of Casing Spacers
 - a. Provide casing spacers, insulators or other approved devices to prevent flotation, movement or damage to the pipe during installation and grout backfill placement.
 - b. Assemble and securely fasten casing spacers to the pipeline to be installed in casings or tunnels.
 - c. Correctly assemble, evenly tighten and prevent damage during tightening of the insulators and pipe insertion.
 - d. Install spacers in accordance with manufacturer's recommendations.
 - e. Install carrier pipe so that there is no metallic contact between the carrier pipe and the casing.
 - f. Carrier pipe shall be installed without sliding or dragging it on the ground or in the casing/liner in a manner that could damage the pipe or coatings.
 - g. Coat the casing spacer runners with a non-corrosive/environmentally safe lubricant to minimize friction when installing the carrier pipe. Coat steel spacers to withstand anticipated loading conditions. Designed by manufacturer and submitted to Engineer for review and approval.
 - h. The carrier pipe shall be electrically isolated from the carrier pipe and from the casing.
 - i. Grade the bottom of the trench adjacent to each end of the casing to provide a firm, uniform and continuous support for the pipe. If the trench requires some backfill to establish the final trench bottom grade, place the backfill material in 6-inch lifts and compact each layer.
 - j. After the casing has been placed, pump dry and maintain dry until the casing spacers and end seals are installed.
 3. Insulator Spacing
 - a. Maximum distance between spacers is to be 6 feet.
 - b. For 18 and 20-foot-long joints, install a minimum of 4 spacers.
 - 1) Install 2 spacers within 1 foot on each side of the bell or flange.
 - 2) Remaining 2 spacers shall be spaced equally.
 - c. If the casing or pipe is angled or bent, reduce the spacing.

- d. The end spacer must be within 6 inches of the end of the casing pipe, regardless of size of casing and pipe or type of spacer used.
4. After installation of the carrier pipe:
- a. Mortar inside and outside of the joints, as applicable
 - b. Verify electrical discontinuity between the water carrier pipe.
 - 1) If continuity exists, remedy the short, by all means necessary including removing and reinstalling the carrier pipe, prior to applying cellular grout.
 - c. If hold down jacks or casing spacers are used, seal or plug the ends of the casing.
 - d. If steel pipe is used and not welded prior to installation in casing/liner, welding of pipe will only be allowed after grouting of annular space is complete.
- D. Installation of Bulkheads
- 1. Construct bulkheads of material to withstand imposed grout pressure without leakage. Provide adequate venting. If temporary bulkhead is used, remove prior to backfilling shaft. If masonry bulkhead is constructed, leave in place.
 - 2. Grout annular space between carrier pipe and casing as indicated in this Specification.
- E. Annular Space Grouting
- 1. Prepare pipe as necessary to prevent the pipe from floating during grouting operation as necessary.
 - 2. Mixing of Grout
 - a. Mix material in equipment of sufficient size to provide the desired amount of grout material for each stage in a single operation.
 - 1) The equipment shall be capable of mixing the grout at the required densities for the approved procedure and shall be capable of changing the densities as required by field conditions.
 - 3. Backfill Annular Space with Grout
 - a. Prior to filling of the annular space, test the carrier pipe in accordance with the following:
 - 1) General: Test cellular concrete compressive strength in accordance with ASTM C495, and mimicking in-situ pressures except that cylinders shall be cast using Styrofoam molds. Plastic molds will not be permitted. Test specimen shall not be oven cured. Specimen shall be capped with plaster of Paris, not sulfur caps.
 - 2) Pre-Produced Testing: Take on set comprising four cylinders for each proposed mix. Perform compressive strength tests on one set of samples at 56 days.
 - 3) Production Testing: Perform production testing at the batch plant and at the placement location as specified in this Section.
 - b. Verify the maximum allowable pressure with the carrier pipe manufacturer and do not exceed this pressure.
 - c. After the installation of the carrier pipe, the remaining space (all voids) between the casing/liner and the carrier shall be filled with LDCC grout.
 - 1) All surfaces of the exterior carrier pipe wall and casing/liner interior shall

be in contact with the grout.

- 2) Grout shall be pumped through a pipe or hose.
 - 3) Use grout pipes, or other appropriate materials, to avoid damage to carrier pipe during grouting.
4. Injection of LDCC Grout
 - a. Grout injection pressure shall not exceed the carrier pipe manufacturer's approved recommendations or 5 psi (whichever is lower).
 - b. Pumping equipment shall be of a size sufficient to inject grout at a volume, velocity and pressure compatible with the size/volume of the annular space.
 - c. Once grouting operations begin, grouting shall proceed uninterrupted, unless grouting procedures require multiple stages.
 - d. Grout placements shall not be terminated until the estimated annular volume of grout has been injected.
 5. Block the carrier pipe during grouting to prevent flotation during grout installation.
 6. Protect and preserve the interior surfaces of the casing from damage.

3.2 FIELD QUALITY CONTROL

- A. Letter of Certification. Certification that proposed pipe transportation, internal and external pipe supports, blocking details to prevent flotation, and backfilling procedures are in accordance with manufacturer's recommendations and will not damage pipe. Provide calculations demonstrating that pipe will not be damaged during backfilling operations due to flotation. Calculations shall be prepared by and sealed by a Professional Engineer registered in the State of Oklahoma.
- B. Quality Control Plans. Methods for achieving minimum specified tolerances for line and grade, pipe ovalization to specified limits, and providing the minimum annular clearance.
- C. Record Keeping with the requirements of Section 31 70 00, Pipe Jacking, Boring, or Tunneling.
 1. Number and classification of men and equipment.
 2. Beginning and ending stations or elevations of pipe lining, and station or elevation where joint work has been completed.
 3. Testing, including time, location, and results of tests.
 4. Notation of any downtime or interruption to production, including length of time and reason.
 5. Maintain and submit logs of grouting operations.
 6. Include:
 - a. Grouting locations
 - b. Pressures
 - c. Volumes
 - d. Grout mix pumped
 - e. Time of pumping
 7. Note any problems or unusual observations on logs.
- D. Grout Strength Tests

1. Owner will perform testing for 24-hour and 28-day compressive strength tests for the cylinder molds or grout cubes obtained during grouting operations.
2. Owner will perform field sampling during annular space grouting.
 - a. Owner will collect at least 1 set of 4-cylinder molds or grout cubes for each 100 cubic yards of grout injected but not less than 1 set for each grouting shift.
 - b. Owner will perform 24-hour and 28-day compressive strength tests per ASTM C39 (cylindrical specimens) or ASTM C109 (cube specimens).
 - c. Remaining samples shall be tested as directed by Owner.

E. Safety

1. The Contractor is responsible for safety on the job site.
 - a. Perform all work in accordance with the current applicable regulations of the Federal, State and local agencies.
 - b. In the event of conflict, comply with the more restrictive applicable requirement.
2. No gasoline powered equipment shall be permitted in jacking shafts and receiving shafts/pits.
 - a. Diesel, electrical, hydraulic and air powered equipment is acceptable, subject to applicable local, State and Federal regulations.
3. Methods of construction shall be such as to ensure the safety of the work, Contractor's and other employees on site and the public.
4. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are underground.
5. Perform all required air and gas monitoring.
6. Ventilation system shall provide a sufficient supply of fresh air and maintain an atmosphere free of toxic or flammable gasses in all underground work areas.
7. Perform all work in accordance with all current applicable regulations and safety requirements of the federal, state and local agencies.
 - a. Comply with all applicable provisions of OSHA 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations.
 - b. In the event of conflict, comply with the more stringent requirements.
8. If personnel will enter the pipe during construction, the Contractor shall develop an emergency response plan for rescuing personnel trapped underground in a shaft excavation or pipe.
 - a. Keep on-site all equipment required for emergency response in accordance with the agency having jurisdiction

3.3 OWNER ACCESS

- A. Allow the Owner's Representative access to the work at all times

3.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle, transport, and store pipe sections in accordance with manufacturer's recommendations.

- B. Do not use cables or chains to load and unload pipes
- C. Support stored pipe at a minimum on the quarter points along the pipe length.
- D. Do not drag or skip pipe. Prefabricated runners are permitted provided coatings are not damaged.
- E. Align pipe sections using jacks or others suitable devices without damaging the pipe.

END OF SECTION

SECTION 33 05 31.23
PIPING SYSTEM, FUSIBLE PVC PIPE

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. Section Includes:
1. Fusible polyvinyl chloride piping systems, 4-inch through 36-inches, for potable water and non-potable water.
- B. Related Work:
1. This Section contains material requirements for pipe, fittings, specials, and appurtenances for fusible polyvinyl chloride piping systems.

1.3 REFERENCES

- A. References: Following is a list of standards, which might be referenced in this Section:
1. American National Standards Institute (ANSI):
 - a. A21.10 – Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
 - b. A21.11 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - c. A21.53 - Standard for Ductile-Iron Compact Fittings for Water Service
 2. American Water Works Association (AWWA):
 - a. C605 – Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
 - b. C651 - Standard for Disinfecting Water Mains
 - c. C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 60 in. (100mm through 1200mm), for Water Distribution
 - d. M23 - AWWA Manual of Supply Practices PVC Pipe—Design and Installation
 - e. M28 – AWWA Manual-Rehabilitation of Water Mains
 3. ASTM International, Inc. (ASTM):
 - a. A193 – Specification for Alloy-Steel and Stainless-Steel bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
 - b. A194 – Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both
 - c. A307 – A307 – Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength
 - d. A563 – A563 – Specification for Carbon and Alloy Steel Nuts
 - e. C923 - Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals

- f. D1784 – Specification Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - g. D1785 – Specification Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
 - h. D2241 – Specification Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
 - i. D2665 – Specification Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
 - j. F477 – Specification Elastomeric Seals (Gaskets) for Joining Plastic Pipe
 - k. F1417 – Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
- 4. National Science Foundation (NSF):
 - a. NSF 14 – Plastics Piping System Components and Related Materials
 - b. NSF 61 - Drinking Water System Components--Health Effects
 - 5. UNI-BELL Pipe Manufacturers Association (UNI-BELL):
 - a. PUB 6 - Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe
 - b. PUB 8 - Recommended Practice for the Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe (Nominal Diameters 6-12 Inch)
 - 6. Plastics Pipe Institute (PPI): TR-2 PVC Range Composition Listing of Qualified Ingredients

1.4 QUALITY ASSURANCE

- A. Manufacturer: Fusible polyvinylchloride pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in AWWA C900 and applicable sections of ASTM D2241. Testing priority shall be in conformance with AWWA C900.
- B. Installer: Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

1.5 SUBMITTALS

- A. The following product data shall be provided by the Contractor prior to fabrication of the pipe.
 - 1. Pipe Size
 - 2. Dimensionality
 - 3. Pressure Class per applicable standard
 - 4. Color
 - 5. Recommended Minimum Bending Radius
 - 6. Recommended Maximum Safe Pull Force
 - 7. Fusion Technician qualification indicating conformance with this specification.
- B. The following As-Recorded Data shall be furnished by the Contractor after the installation of

the pipe.

1. Approved datalogger device reports
2. Fusion joint documentation containing the following information:
 - a. Pipe Size and Thickness
 - b. Machine Size
 - c. Fusion Technician Identification
 - d. Job Identification
 - e. Fusion Joint Number
 - f. Fusion, Heating and Drag Pressure settings
 - g. Heat Plate Temperature
 - h. Time Stamp
 - i. Heating and Cool Down Time of Fusion
 - j. Ambient Temperature

1.6 WARRANTY

- A. The pipe shall be warranted for one year per the pipe supplier's standard terms.
- B. In addition to the standard pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.

PART 2 - PRODUCTS

2.1 FUSIBLE POLYVINYL CHLORIDE PIPE

- A. Fusible polyvinylchloride plastic material for pipe shall conform to AWWA C900, ASTM D1785, and cell classification 12454. Pipe shall be in accordance with ASTM D2241 for IPS standard dimensions as indicated in these specifications.
 1. Pipe shall be manufactured with 100% virgin resin.
 2. Pressure Pipe: Compound formulation shall be in accordance with PPI TR-2/2006.
 3. Manufactured in standard 40' nominal lengths, or custom lengths as specified.
- B. 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.
- C. Pipe Color:
 1. Potable Water Service: Blue
 2. Non-Potable Water Service: Purple
 3. Wastewater Service: Green
- D. Pipe shall be marked per AWWA C900 and shall include as a minimum:
 1. Nominal size
 2. PVC
 3. Dimension Ratio, Standard Dimension Ratio or Schedule
 4. AWWA pressure class or rating
 5. AWWA Standard designation number

6. NSF-61 mark verifying suitability for potable water service
 7. Extrusion production-record code
 8. Trademark or trade name
 9. Cell Classification 12454 and/or PVC material code 1120 may also be included.
- E. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- F. NSF Certified: All surfaces and materials in contact with water, or in contact with a chemical being applied to water that is being treated for potable water use and conveyance, shall conform to NSF-14 and NSF-61 and certified by an organization accredited by ANSI.

2.2 FUSION JOINTS

- A. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written instructions for this procedure. Joint strength shall be equal to the pipe as demonstrated by testing requirements. All fusion joints shall be completed as described in this specification.

2.3 CONNECTIONS AND FITTINGS, PRESSURE PIPE APPLICATIONS

- A. Ductile Iron Mechanical Fittings: Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard ductile iron fittings conforming to ANSI A21.10 and ANSI A21.11.
- B. Restrained connections to fusible polyvinylchloride pipe may be made using a restrained retainer gland product for DIPS or IPS sizing, as well as for MJ or flanged fittings.
1. Available Manufacturers:
 - a. EBAA Iron – Megalug Series 2000PV, 2000SV, 2100, or Series 2200
 - b. Smith-Blair – Cam-Lok, 111/120 series
 2. Bends, tees and other ductile iron fittings shall be restrained with the use of mechanical restraints as indicated on the drawings.
 3. Ductile iron fittings and retainer glands must be installed per the manufacturer's recommendations.
- C. PVC Gasketed, Push-On fittings:
1. Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard PVC pressure fittings conforming to AWWA C900.
 2. Acceptable fittings for use joining fusible polyvinylchloride pipe to other sections of PVC pipe shall include gasketed PVC, push-on type couplings and fittings, including bends, tees, and couplings as shown in the drawings.
 3. Bends, tees and other PVC fittings shall be restrained with the use of mechanical restraints as indicated on the drawings.
 4. PVC gasketed, push-on fittings and mechanical restraints, if used, must be installed per the manufacturer's recommendations.
- D. Sleeve-Type Couplings:
1. Available Manufacturers:
 - a. Mechanical couplings for restrained:

- 1) EBAA Iron Series 3800
2. Sleeve-type mechanical couplings shall be manufactured for use with PVC pipe, and shall be restrained as indicated on the drawings and in these specifications.

2.4 TRACER WIRE

- A. Buried piping shall be installed with a continuous, insulated TW, THW, THWN, or HMWPE insulated copper, 10 gauge or thicker wire for pipeline location purposes by means of an electronic line tracer.
 1. Installed wires along the entire length of the pipe.
 2. Insulation color shall match the color of pipe being installed.
 3. Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.
- B. Tracer wire to be installed by methods other than open cut shall be rated by manufacturer for the method of installation by which they are being installed.

PART 3 - EXECUTION

3.1 DELIVERY AND OFF-LOADING

- A. All pipes shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Owner or Engineer.
- B. Each pipe shipment shall be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify Owner or Engineer immediately if damage is found. Each pipe shipment shall be checked for quantity, proper size, color and type.
- C. Pipe should be loaded, off-loaded and otherwise handled in accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed.
- D. Off-loading devices such as chains, wire rope, chockers, or other pipe handling implementations that may scratch, nick, cut, or gouge the pipe are strictly prohibited.

3.2 HANDLING AND STORAGE

- A. Any length of pipe showing a crack, or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits or acceptable length of pipe shall be determined by the Owner or the Engineer.
- B. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the Owner or Engineer.
- C. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.
- D. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or

otherwise abrade the piping in any way.

E. Pipe shall be stored and stacked per the pipe manufacturer's guidelines.

3.3 FUSION PROCESS

A. General Requirements:

1. Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's recommendations.
2. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier. Training records for qualified fusion technicians shall be available to Owner or Engineer upon request.
3. Each joint fusion shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine. Joint data shall be submitted as part of the As-Recorded information, in accordance with this specification.
4. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following properties, including the following elements:
 - a. Heat Plate: Heat plates shall be in good condition with no deep gouges or scratches within the pipe circle being fused. Plates shall be clean and free of any contamination. Heater controls shall properly function, and cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's recommendations.
 - b. Carriage: Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.
 - c. Data Logger: Pipe supplier's recommended and compatible software shall be used. Protective case shall be utilized for the hand-held wireless portion of the unit. Data logger operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.
5. Other equipment specifically required for the fusion process shall include the following:
 - a. Pipe rollers shall be used for support of pipe to either side of the machine
 - b. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement and /or windy weather.
 - c. An infrared (IR) pyrometer for checking pipe and heat plate temperatures.
 - d. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
 - e. Facing blades specifically designed for cutting fusible polyvinyl chloride pipe.

B. Joint Recording: Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of

thermoplastic pipe. The software shall register and/or record the parameters required by the manufacturer and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

3.4 INSTALLATION

A. Fusion and Layout:

1. All fusion of the pipe shall occur at surface level. No fusion will be completed in the excavated area or trench.
2. Pipe lengths shall be fused in their entirety and staged prior to installation in the trench. Fused pipe lengths shall be determined by Contractor preference, manufacturer's recommendations and site constraints.

B. Excavation and Trenching: Excavation and Trenching shall be done in accordance with City of Midwest City / Midwest City Municipal Authority Standards.

C. Pipe Installation:

1. Fused lengths of pipe shall be installed by lowering into the trench or excavation, using approved strapping per these specifications. The lowering operation once initiated shall proceed until the entire length of the fused section of pipe is installed.
2. Coordination of lifting equipment shall ensure that the fused pipe does not exceed the bending and buckling limitations of the pipe, per the manufacturer's recommendations.
 - a. Three pick points shall be utilized at all times and shall be staged per the manufacturer's recommendations.
 - b. Under no circumstances will the pipe be "dropped" or "rolled" into the trench or excavation.
3. If the length of the fused pipe is longer than what the available equipment can lower into the trench or excavation at one time, equipment shall be staged so that lowering shall begin at one end of the installation, and proceed along the trench or excavation, so that the entire fused length is installed without exceeding the bending limitations of the fused pipe.
4. Pipe may also be installed by dragging it into the end of the trench via a sloped section that is constructed so as not to exceed the bending radius of the pipe. Pipe may be pulled by the use of a pull head and winch or piece of construction machinery as recommended by the pipe supplier.
5. Fused pipe shall be bedded and backfilled per the drawings, these specifications and all applicable jurisdictional standards. Lengths of fused polyvinylchloride pipe shall be bedded and removed from direct sunlight for a period of at least two minutes per inch-diameter before any connections are made. This period of thermal equalization of the pipe is to assure proper connections may be installed.
6. The fusible polyvinylchloride pipe shall be handled with care to minimize the possibility of it being cut, kinked, gouged, or otherwise damaged. The use of cables or hooks will not be permitted.
7. Sections of the fusible polyvinylchloride pipe damaged, cut, or gouged shall be repaired by cutting out the section of damaged pipe and then rejoining.
8. The fusible polyvinylchloride pipe will be installed in a manner so as not to exceed

the recommended bending radius.

9. Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force, according to the pipe supplier, will not be exceeded.

3.5 PREPARATION PRIOR TO MAKING CONNECTIONS INTO EXISTING PIPING SYSTEMS

- A. Approximate locations for existing piping systems are shown on the drawings or detailed in the specifications. Prior to making connections into existing piping systems, the Contractor shall:
 1. Field verify location, size, piping material and piping system of the existing pipe.
 2. Obtain all required existing piping manufacturer(s) approved fittings (i.e., saddles, sleeve type couplings, flanges, tees, etc., as shown).
 3. Have installed all temporary pumps and/or pipes in accordance with established connection plans.
 4. Have on hand necessary pipe stoppers, pancake flanges or other items which may be necessary should an existing valve or appurtenance fail to seal properly.
- B. Unless otherwise approved by the Engineer, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.

3.6 FIELD QUALITY CONTROL

- A. Cleaning, testing, and disinfection of piping systems shall be done in accordance with City of Midwest City / Midwest City Municipal Authority Standards.
- B. Tracer Wire Testing: Upon completion of the directional bore, the Contractor shall demonstrate that the wire is continuous and unbroken through the entire run of the pipe.
 1. Demonstration shall include full signal conductivity (including splices) when energizing for the entire run in the presence of Engineer.
 2. If the wire is broken, the Contractor shall repair or replace it. Pipeline installation will not be accepted until the wire passes a continuity test.

3.7 TAPPING FOR PORTABLE AND NON-PORTABLE WATER APPLICATIONS

- A. Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. NO DIRECT TAPPING WILL BE PERMITTED. Tapping shall be performed in accordance with the applicable sections for Saddle Tapping per Uni-Pub-8.
- B. Tapping sizes shall be limited to the following maximum tapping diameters and methods for the nominal pipe diameters as indicated in the table below:

| Nominal Pipe Size (in.) | Nominal Tap Size (in.) | | | | | | | | |
|-------------------------|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| | ¾ | 1 | 1 ½ | 2 | 4 | 6 | 8 | 10 | 12 |
| 4 | NTP | RH | RH | RH | X | | | | |
| 6 | NTP | NTP | RH | RH | X | X | | | |
| 8 | NTP | NTP | RH | RH | RTS | X | X | | |
| 10 | NTP | NTP | RH | RH | RTS | X | X | X | |
| 12 | NTP | NTP | RH | RH | RTS | RTS | X | X | X |
| 14 | NTP | NTP | RH | RH | RTS | RTS | X | X | X |
| 16 | NTP | NTP | NTP | NTP | RTS | RTS | RTS | X | X |
| 18 | NTP | NTP | NTP | NTP | RTS | RTS | RTS | X | X |
| 20 | NTP | NTP | NTP | NTP | RTS | RTS | RTS | RTS | X |
| 24 | NTP | NTP | NTP | NTP | RTS | RTS | RTS | RTS | RTS |
| 30 | NTP | NTP | NTP | NTP | NTP | NTP | RTS | RTS | RTS |
| 36 | NTP | NTP | NTP | NTP | NTP | NTP | RTS | RTS | RTS |
| NTP | Normal Tapping Procedures | | | | | | | | |
| RH | Restraining Harness | | | | | | | | |
| RTS | Restrained Tapping Sleeve | | | | | | | | |
| X | Tapping is Not Allowed | | | | | | | | |

- C. All other connections requiring a larger diameter shall be made with a pipe connection as specified and indicated on the drawings.
- D. Equipment used for tapping shall be made specifically for tapping PVC pipe:
 1. Tapping bits shall be slotted “shell” style cutters, specifically made for PVC pipe. ‘Hole saws’ made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
 2. Manually operated or power operated drilling machines may be used.
- E. Taps may be performed while the pipeline is filled with water and under pressure (‘wet’ tap), or when the pipeline is not filled with water and not under pressure (‘dry’ tap).

END OF SECTION

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SECTION 33 11 13.13
PIPING SYSTEM, DUCTILE IRON PIPE

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. Section provides requirements for ductile iron piping system for exposed and buried applications and includes:
1. Mechanical joint, push-on and flanged ductile iron pipe, sizes 4-inch through 30 inch.
 2. Mechanical joint and flanged ductile iron fittings, sizes 4-inch through 30-inch.
 3. Gaskets and fasteners.
 4. Protective coatings, linings and encasements.
- B. Related Sections:
1. Refer to Division 00 and Division 40 for information regarding submittals; coordination; material delivery, handling, and storage; projection conditions; design requirements; other materials; installation of piping systems; field testing; and related work.
 2. This Section contains material requirements for pipe, fittings, specials, and appurtenances for the ductile iron piping systems, as well as Part 1 – General and Part 3 – Execution additional requirements not specified in the above referenced Section.

1.3 REFERENCES

- A. American Water Works Association (AWWA):
1. C104/A21.4 – Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 2. C105/21.5 – Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids.
 3. C110-C21.10 – American National Standard for Gray-Iron and Ductile-Iron Fittings, 3-inch through 48-inch for Water and Other Liquids.
 4. C111/A21.11 – American National Standard for Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
 5. C115/A21.15 – American National Standard for Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges.
 6. C150/A21.50 – American National Standard for the Thickness Design of Ductile Iron Pipe.
 7. C151/A21.51 – American National Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water and Other Liquids.
 8. C153/A21.10 – Ductile-Iron Compact Fittings for Water Service.
 9. C600 – Installation of Ductile Iron Water Mains and Their Appurtenances.
 10. C606 – Grooved and Shouldered Joints.

11. M41 – Manual Ductile Iron Pipe and Fittings.
- B. ASTM International, Inc. (ASTM):
1. A48 – Specification for Gray Iron Castings.
 2. A193 – Specification for Alloy-Steel and Stainless Steel bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
 3. A194 – Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, of Both.
 4. A307 – Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.
 5. A320 – Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low Temperature Service.
 6. A536 – Specification for Ductile Iron Castings.
 7. A563 – Specification for Carbon and Alloy Steel Nuts.
 8. A674 – Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or other Liquids.
 9. D1330 – Specification for Rubber Sheet Gaskets.
- C. National Sanitation Foundation (NSF):
1. NSF/ANSI 61 – Drinking Water Components – Health Effects.
- D. International Organization for Standardization (ISO):
1. ISO 8179 – Ductile Iron Pipes, Fittings, Accessories and their Joints – External Zinc-Based Coating

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
1. Prior to the fabrication of the pipe and laying shop drawings, the Contractor shall submit fabrication and lay drawings to the Engineer as shop drawings showing the northing, easting, and top of pipe elevation at each joint location where the proposed pipe connects to existing pipes.
 2. Prior to the fabrication of the pipe, submit fabrication and lay drawings to the Engineer as Shop Drawings. Shop drawings shall include a complete description of the pipe offered, including cuts, tabulated layout and pertinent design data. Shop drawings shall reference stationing on the plan/profile sheets and shall incorporate changes necessary to avoid conflicts with existing utilities and structures and adjustments necessary to make tie-ins. Details for the design and fabrication of all fittings and specials and provisions for thrust shall be included. Manufacturer and Contractor shall field verify pipe tie-in connections for adequate thrust restraint.
 3. In addition to lay drawings as required above, provide modified vertical profile as needed to incorporate standard fitting angles required in the plans. This includes at minimum a markup of the plan and profile drawings with revised pipe elevations, fitting locations (stations) and angles. Pipe shall maintain a minimum cover of 5 feet and not introduce any new high points in the profile.
 4. Schedule of materials furnished.

- C. Material Certificates:
 - 1. Certificate of Compliance with all applicable and appropriate reference standards certifying that all pipe, fittings, and specials, and other products and materials furnished, comply with the applicable provision of the Specification.
 - 2. Certification of Adequacy of Design: The Certificate of Adequacy of Design shall show the necessary provisions required in the design of the pipe to comply with applicable sections of this Specification. A Professional Engineer registered in the state where the Project is located shall seal the Certificate of Adequacy of Design.
- D. Hydraulic Thrust Restraint – Provide calculations detailing the restraint required for all pipe assemblies, fittings, valves, and plugs. Calculations shall detail the restrained joint length required at all necessary points on the piping schedule. Separate details including materials, size, assembly ratings and pipe attachment methods shall be provided. Thrust restraint requirements shall be prepared and sealed by a Professional Engineer licensed in the State of Oklahoma.
- E. Field quality-control test reports.
- F. Prior to final completion, submit as-built, top-of-pipe survey as Record Data. Top-of-pipe survey shall include station and top-of-pipe elevation for each pipe joint. Survey information shall be provided on the Contractor’s “As-Built” drawings.

1.5 PROJECT REQUIREMENTS

- A. Restrained Pipe and Fitting Joints, Buried Piping:
 - 1. Restrained joints shall be used for a sufficient distance from each bend, tee, elbow, plug, or other fitting to resist thrust that will develop at the design pressure.
 - 2. CONTRACTOR shall provide restraint length calculations in accordance with AWWA M41 based on the laying conditions, soil conditions, depth of cover, and pressures as follows to determine the number of restrained joints that will be required.
 - a. Design Pressure: 150 psi
 - b. Suggested soil parameters, unless otherwise specified: Coh-gran as indicated in Table 8-2 of the latest edition of M41.
 - c. Unit Weight of Soil: 60 pcf (maximum value used)
 - d. Height of cover: as shown in plans
 - e. Safety factor: 1.5
 - 3. For the purposes of thrust restraint, design pressures shall be the working pressure shown, plus the additional surge allowance for potable water, service water, and pump discharge piping. The design pressure for joint restraint shall be 1.5 times the pressure class.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. General: Ductile iron with a thickness design for the pressures and laying conditions complying with the requirements of AWWA C150 and the manufactured in accordance with AWWA C151.
 - 1. Comply with the following minimum thickness class, unless otherwise indicated in the

Pipe Schedule.

- a. Pressure Class 200 psi, pipe 8-inch and larger.
- B. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- C. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Gaskets: AWWA C111, rubber.
- D. Flanged-Joint, Ductile-Iron Pipe: AWWA C151, flanged ends.
 1. Flange Joints: Comply with the requirements of AWWA C115.
 - a. Class 250 as designated on Drawings or Pipe Schedule.
 2. Bolting:
 - a. ASTM A193 or ASTM A320, Type 304 stainless steel bolts; ASTM A194, Type 316, nuts; and washers of the same material as the bolts. Nuts shall be PTFE coated.
 - b. Gaskets:
 - 1) Flange, Flat Face: Full-faced, AWWA C111, 1/8-inch thick rubber, factory cut.

2.2 SPECIAL PIPE FITTINGS

- A. Flange adapter: For joining steel pipe to cast iron, provide Dresser Style 127 or equal. Gasket to be Buna-S, Grade 27.
- B. Reducing and Transition Coupling: Required for making reduction in sizes of piping; changing classes of piping; or joining steel and cast iron pipe, provide Dresser Style 62 or equal.

2.3 PROTECTIVE COATINGS, LININGS, AND ENCASEMENT

- A. Pipe and Fittings Interior:
 1. Mortar: Unless otherwise specified in the Piping Schedule, all ductile iron pipe and fittings shall be provided with a cement-mortar lining in accordance with AWWA C104. An asphaltic seal coat shall be applied over the cement-mortar lining in accordance with AWWA C104.
- B. Pipe and Fittings Exterior:
 1. Provide exterior coating of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m² of pipe surface area.
 2. Finishing Layer (Topcoat): A finishing layer of asphalt paint or synthetic resin topcoat compatible with zinc shall be applied. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils.
 3. Any necessary repairs to the zinc coating shall be made in accordance with ISO 8179.

- C. Encasement for Underground Metal Piping: ASTM A674 or AWWA C105.
 - 1. Form: Tube.
 - 2. Material: V-Bio Enhanced Polyethylene Encasement.
 - 3. Polyethylene encasement shall consist of three layers of coextruded linear low-density polyethylene fused into a single thickness of not less than 8 mils.
 - 4. The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of antimicrobial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.
- D. Color: Black.

2.4 INSULATED CONNECTIONS

- A. Provide dielectric insulation kits, including gaskets, insulating sleeves and washers for each bolt and nut, where flanges are to be cathodically insulated. Refer to the Contract Documents for the individual locations. Metal hardware such as backup washers shall be Type 304 stainless steel. Refer to Division 40 Section 40 46 00 "Corrosion Monitoring" for additional information.

2.5 ADDITIONAL SPARE PARTS

- A. At completion of construction, Contractor shall provide the following spare parts to the OWNER.
 - 1. 2 solid sleeves
 - 2. Full circle clamp

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Laying Buried Pipe:
 - 1. Install pipe to the lines, grades and elevations shown on the Drawings, complying with the requirements of AWWA C600.
 - 2. Unless otherwise shown on the Drawings, bury lines 12 inches and smaller with a minimum cover of 4-feet and lines 14 inches and larger with a minimum cover of 5-feet.
 - 3. Do not lay pipe in water, or when the trench or weather is unsuitable for work. Keep water out of trench until jointing is complete. When work is not in progress, close ends of pipe and fittings securely so no trench water, earth or other substances will enter pipes or fittings.
 - 4. Keep the inside of the pipe free from foreign matter during operations by plugging or other approved method.
 - 5. Provide pipe bedding in accordance with the Drawings and Section 31 23 33 "Trenching, Backfill, and Compacting". Place pipe so that the full length of each section rests solidly upon the pipe bed, with recesses excavated to accommodate bells and joints. Take up and relay pipe when the grade or joint is disturbed after laying.
 - 6. Lay pipe with bells facing the direction of the laying except when making enclosures.
 - 7. Buried pipe and fittings shall be V-Bio Enhanced Polyethylene Encasement wrapped in

accordance with AWWA C105 Installation Method A or Ductile Iron Pipe Research Association Modified Installation Method A.

B. Restrained Joints:

1. Thrust blocks will not be allowed as the primary method of restraint. The CONTRACTOR, at his option, may install thrust blocking in addition to individual joint restraint, but it shall not constitute a replacement for individual joint restraint.
2. Fittings:
 - a. Unless otherwise indicated on the drawings, the CONTRACTOR shall use mechanical restrained pipe joints or push on style at all buried fittings (no thrust blocks). The length of pipe requiring thrust restraint shall be calculated as described in Chapter 13 of AWWA M41.
 - b. All restrained joints shall have a working pressure equal to or greater than the pipe pressure class.
 - c. Mechanical joint restraint
 - d. Mechanical joints shall be mechanically restrained
 - 1) Available manufacturer:
 - a) Ebaa Iron Series 1100 MEGALUG
 - b) Approved equal
3. Pipe Joints:
 - a. Unless otherwise indicated on the drawings, the CONTRACTOR shall use restrained bell and spigot pipe to achieve the restrained joint length required for the pipe design. Push on style with boltless pipe joints. All restrained joints shall have a working pressure equal to or greater than the pipe pressure class.
4. Exposed pipe:
 - a. Unless otherwise indicated on the drawings, all exposed pipe shall be flanged.
5. CONTRACTOR shall design restrained joints based on the specified pressures as shown in the Piping Schedule or Drawings and in accordance with AWWA M41.
6. The design for restrained joints, including the length necessary to resist the design thrust, for the embedded conditions, shall be performed and sealed by a Professional Engineer in the state where the Project is being constructed.
7. CONTRACTOR shall bear all costs for the design and will not receive reimbursement from the OWNER.

3.2 HYDROSTATIC TESTING

- A. Installed pipeline shall be hydrostatically tested in accordance with Division 40 Section 40 05 03, "Field Testing of Piping Systems." Reports shall be submitted as an informational submittal in accordance with Section 1.4.E.

3.3 FIELD QUALITY CONTROL

- A. All piping systems shall be thoroughly cleaned and flushed, and all construction debris or foreign material removed. The CONTRACTOR shall provide all temporary connections, equipment and the like for cleaning.

3.4 SITE CLEAN-UP

- A. All excavations shall be backfilled and compacted per the Contract Documents. All disturbed areas shall be restored to preconstruction conditions or better and to the lines and grades shown in the Contract Documents. All disturbed areas shall be seeded or sodded per the Contract Documents. Any disturbed pavement will be repaved to as good or better condition per the Contract Documents.

3.5 PIPING SCHEDULE

- A. As shown on the Drawings.

END OF SECTION

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SECTION 33 11 13.19
PIPING SYSTEM, POLYVINYL CHLORIDE (PVC)

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. Section provides requirements for PVC piping systems for exposed and buried applications, pressure and gravity applications and includes:
1. Polyvinyl Chloride (PVC) pressure pipe and fittings in sizes 1/2-inch through 48-inch.
 2. PVC, Schedule 40 and 80, pressure pipe and fittings.
 3. PVC gravity sewer and drain pipe and fittings.
- B. Related Work:
1. This Section contains material requirements for pipe, fittings, specials, and appurtenances for PVC piping systems, as well as Part 1 – General and Part 3 – Execution additional requirements not specified in the above referenced Section.

1.3 REFERENCES

- A. References:
1. American Waterworks Association (AWWA):
 - a. C110 – Standard for Ductile-Iron and Gray-Iron Fittings, 3-In. Through 48-In. (76 mm Through 1,219 mm) for Water
 - b. C111 – American National Standard for Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
 - c. C153 – Ductile-Iron Compact Fittings for Water Service
 - d. C219 – Standard for Bolted, Sleeve-Type Couplings for Plain-End Pipe
 - e. C900 – Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-in. – 60-in. (100 mm-1,500 mm)
 - f. C907 – Standard for Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4-in. Through 12-in. (100 mm Through 300 mm)
 - g. F477 – Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - h. F1417 – Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
 - i. F1668 – Guide for Construction Procedures for Buried Plastic Pipe
 - j. F1674 – Test Method for Joint Restraint Products Used With PVC Pipe.
 2. ASTM International, Inc. (ASTM):
 - a. D1785 – Specification for Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedule 40, 80, and 120
 - b. D2466 – Specification for Poly(Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 40

- c. D2467 – Specification for Poly(Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 80
 - d. D2564 – Specifications for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
 - e. D3034 – Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and fittings
 - f. F477 – Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
 - g. F679 – Specification for Poly(Vinyl Chloride)(PVC) Large-Diameter Gravity Sewer Pipe and Fittings
 - h. F794 – Specification for Poly(Vinyl Chloride)(PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
 - i. F891 - Specification for Coextruded Poly(Vinyl Chloride)(PVC) Plastic Pipe With a Cellular Core
 - j. F493 – Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
3. National Science Foundation (NSF):
- a. NSF/ANSI 61 – Drinking Water Systems Components – Health Effects

1.4 SUBMITTALS

- A. Comply with Section 01 33 10 “Supplier’s Submittals.”
- B. Product Data: For each type of product indicated.
- C. Shop Drawings:
 - 1. Pipe layout drawings shall include plan, elevations, sections, details, and attachments to other work.
 - 2. Pipe layout schedule/drawings including pipeline stationing, elevation, and restrained joint locations.
 - 3. Schedule of materials furnished.
 - 4. Pipe layout drawings and data shall clearly indicate where pipe requiring special provisions are to be located, connections to equipment, valves, and related items.
 - 5. Thrust restraint calculations signed and sealed by a Professional Engineer licensed in the state where the project is to be constructed.
- D. Material Certificates:
 - 1. Certificate of Compliance with all applicable and appropriate reference standards certifying that all pipe, fittings, and specials, and other products and materials furnished, comply with the applicable provision of the Specification.
 - 2. Certification of Adequacy of Design: The Certificate of Adequacy of Design shall show the necessary provisions required in the design of the pipe to comply with applicable sections of this Specification. A Professional Engineer registered in the state where the Project is located shall seal the Certificate of Adequacy of Design.
- E. Field quality-control test reports.

1.5 PROJECT REQUIREMENTS

- A. Restrained Pipe and Fitting Joints, Buried Piping:
1. Restrained joints shall be used for a sufficient distance from each bend, tee, elbow, plug, or other fitting to resist thrust that will develop at the design pressure. Unless otherwise indicated on the drawings, the CONTRACTOR shall use mechanical restrained pipe joints and fittings (no thrust blocks).
 2. CONTRACTOR shall provide restraint length calculations in accordance with AWWA M23 based on the laying conditions, soil conditions, depth of cover, and pressures to determine the number of restrained joints that will be required. The calculations shall be performed and sealed by a Professional Engineer in the state where the Project is being constructed.
 3. For the purposes of thrust restraint, design pressures shall be the working pressure shown, plus the additional surge allowance for potable water, service water, and pump discharge piping. The design pressure shall be 1.5 times the design test pressure indicated for all other piping.
 4. CONTRACTOR shall bear all costs for the restraint length design/calculations and will not receive reimbursement from the OWNER.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS, 4-INCH THROUGH 12-INCH, PRESSURE

- A. PVC Pressure Pipe: AWWA C900, Class 150 and/or Class 200 (as shown on Drawings or in Pipe Schedule), with bell end with gasket, and with spigot end.
1. Comply with UL 1285 for fire-service mains if indicated.
 2. PVC Fabricated Fittings: AWWA C900, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110 or C153 ductile iron glands, rubber gaskets, and 316 stainless steel bolts with epoxy coating per AWWA C116.
 - a. Gaskets: AWWA C111, rubber.
 5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Glands, Gaskets, and Bolts: AWWA C110 or C153, ductile- or gray iron glands, rubber gaskets, and 316 Stainless Steel Bolts.
 6. PVC Integral Joint Restraint System:
 - a. Integral joint restraint system located in the bell designed for integration into PVC pipe manufactured to AWWA C900 and performance when tested in accordance with ASTM F1674.
 - b. Consists of a ductile iron casing that sits adjacent to the ASTM F477 gasket in the bell; casing is molded into the raceway of the bell during pipe belling; and a ductile iron grip-ring is inserted into the casing after factory hydro-testing.
 - c. Available Manufacturer: BullDog™ Integral Joint Restrain System.
 7. PVC Mechanical Joint Restraint System:
 - a. EBAA IRON Megalug Series

- b. Or approved equivalent
- 2.2 PVC PIPE AND FITTINGS, 14-INCH THROUGH 48-INCH, PRESSURE
 - A. PVC Pressure Pipe: AWWA C900, Class 150 and/or Class 200 (as shown on Drawings or in Pipe Schedule), with bell end with gasket, and with spigot end.
- 2.3 PVC FABRICATED FITTINGS: AWWA C900, WITH BELL-AND-SPIGOT OR DOUBLE-BELL ENDS. INCLUDE ELASTOMERIC GASKET IN EACH BELL.
 - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.
 - 2. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 3. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- 2.4 PVC PIPE AND FITTINGS, 6-INCH AND SMALLER, PRESSURE
 - A. PVC Pipe and Fittings: ASTM D 1785, Schedule 40 and Schedule 80 pipe, with plain ends for solvent-cemented joints or threaded ends conforming to ASTM D 2466, Schedule 40 or ASTM D 2467, Schedule 80, socket-type or threaded fittings. Use Schedule 80 for all pipes to be threaded. Use Schedule 80 for all pipes to be threaded.
 - B. Solvent Cement: As recommended by the pipe and fitting manufacturer conforming to D2564 for PVC piping systems and ASTM F493 for CPVC piping systems.
- 2.5 PVC PIPE AND FITTINGS, GRAVITY SEWER AND DRAIN
 - A. PVC Cellular-Core Pipe and Fittings: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness pipe with ASTM D 3034, SDR 35, socket-type fittings for solvent-cemented joints.
 - B. PVC Sewer Pipe and Fittings, NPS 15 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 and Larger: ASTM F 679, T-1 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.
- 2.6 JOINING MATERIALS
 - A. Refer to Division 40 Section "Piping System, Basic Materials and Methods" for commonly used joining materials.
 - B. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- 2.7 PIPING SPECIALTIES
 - A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings:

1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - a. Standard: AWWA C219.

2.8 CORROSION-PROTECTION PIPE FITTINGS ENCASEMENT

A. Encasement for Underground Metal Pipe Fittings: ASTM A 674 or AWWA C105.

1. Form: Sheet or tube.
2. Material: LLDPE film of 0.008-inch minimum thickness or high-density, cross-laminated PE film of 0.004-inch minimum thickness.
3. Color: Black.

2.9 INSTALLATION, CLEANING, AND TESTING

- A. Comply with the requirements of Division 40 Section 40 05 00 "Piping System, Basic Materials and Methods."

2.10 PIPING SCHEDULE

- A. Piping Schedule shall as shown on the Drawings.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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**SECTION 33 13 00
DISINFECTION OF POTABLE WATER PIPING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Disinfection of water piping for potable water.
 - 2. Testing.
 - 3. Bacteriological and Disinfection Reports.

1.2 RELATED SECTIONS

- A. Section 33 11 13.13 Piping System, Ductile Iron Pipe
- B. Section 33 11 13.19 Piping System, Polyvinyl chloride (PVC) PIPE
- C. Section 33 11 13.23 Piping System, Fusible PVC Pipe
- D. Section 40 05 03 Field Testing of Piping Systems

1.3 REFERENCE STANDARDS

- A. American Water Works Association (AWWA):
 - 1. C651 – Standard for Disinfecting Water Mains.
 - 2. C652 – Standard for Disinfection of Water Storage Facilities

1.4 SUBMITTALS

- A. ACTION SUBMITTALS
 - 1. Submit a schedule of the proposed sequence for cleaning and method of sterilization to be used or list of the equipment to be used, and the sterilizing agent and quantities to be used, location and/or sizes of fill, blown down connections, sources of test water, and proposed plan to dispose of test water.
- B. INFORMATIONAL SUBMITTALS
 - 1. Disinfection Report: Accurately record the items listed below and submit five (5) copies of the report.
 - a. Type and form of disinfection used.
 - b. Date and time of disinfectant injection start and time of completion.
 - c. Test locations.
 - d. 16 hours apart samples or samples 15 minutes apart after a 16-hour rest period disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - e. Date and time of flushing in ppm for each outlet tested.
 - 2. Bacteriological Report: Accurately record the items listed below and submit five (5) copies of the report.
 - a. Data issued, project name, and testing laboratory name, address, and telephone number.
 - b. Time and date of water sample collection.

- c. Name of person collecting samples.
- d. Test locations.
- e. 16 hours apart samples or samples 15 minutes apart after a 16-hour rest period disinfectant residuals in ppm for each outlet tested.
- f. Coliform bacteria test results for each outlet tested.
- g. Certification that water conforms, or fails to conform, to bacterial standards of Oklahoma Department of Environmental Quality.
- h. Bacteriologist's signature.

1.5 QUALITY ASSURANCE

- A. Testing Laboratory: DEQ certified approved for examination of drinking water in compliance with applicable legislation of the State of Oklahoma.
- B. Piping, tanks, and equipment to be cleaned, inspected and disinfected shall be isolated from the finished water (potable water) at all times and shall be placed into service by the OWNER following receipt of acceptable test reports.
- C. Regulatory Requirements: Conform to applicable Oklahoma DEQ Title 252 statutes for work of this section.

PART 2 - PRODUCTS

2.1 REQUIREMENTS

- A. Provide all equipment, temporary connections, taps, valves, piping, pumps, hoses, chemicals, and test equipment to accomplish the work, including taps to line. Provide adequate provisions to the line for sampling.
- B. Disinfection agents shall be chlorine solution prepared from liquid chlorine, sodium hypochlorite, or calcium hypochlorite.
- C. After completion of purging and disinfection, remove surplus pipe at the chlorination and sampling locations, plug the remaining pipe, back, and complete all appurtenant work required to secure the pipeline.

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractor shall exercise care at all times during construction to prevent contaminated material from entering the structures and pipelines in the potable water system.
- B. All facilities and piping designed to hold or transport process water shall be cleaned, inspected, and hydrostatic tested including piping, basins, and channels, prior to disinfection.
- C. The finished water piping, together with valves and meters, all potable water, service water, and chemical piping shall be disinfected with chlorine solution as specified herein following cleaning and testing. All surfaces shall be cleaned or washed and disinfected, even though there is no visible evidence of necessity thereof.
- D. Disinfection shall be in accordance with the applicable disinfection procedure described in

AWWA C651 and C652. as well as in accordance with the Oklahoma DEQ Title 252 Statutes and the requirements of this section. Where conflicts exist, the Engineer shall determine the appropriate procedures.

3.2 PIPELINE DISINFECTION

- A. Preparation: Verify that piping system has been cleaned, inspected, and pressure tested. Flush out line, completely replacing its entire volume with potable water.
- B. Purging: Purging may be accomplished by flushing.
 - 1. Flushing Method: If the "flushing" method of purging is used, the Contractor shall be required to prepare the main by installing blow-offs at locations and sized as indicated on Drawings.
 - a. Before disinfection, flush all foreign matter from the pipeline. Provide hoses, temporary pipes, ditches, etc., as required to dispose of flushing water without damage to adjacent properties. Flushing velocities shall be at least 3.0 fps per AWWA C651. For large diameter pipe where it is impractical or impossible to flush the pipe at 3.0 fps velocity, clean the pipeline in-place from the inside the main carefully by brushing and sweeping, and then flush the line at a lower velocity. WARNING: OSHA requirements for confined space needs to be addressed before entering the pipeline.
 - b. After flushing is complete and satisfactory test results are received at the direction of the Resident Project Representative, the Contractor shall proceed with disinfection.
- C. Disinfection: Disinfection of the pipeline shall be accomplished by the of the "slug" or "continuous feed" method in accordance with the Owner or regulatory agency requirements. The free chlorine amounts shown are the minimum and liquid chlorine, sodium hypochlorite, or calcium hypochlorite granulated shall be used as the source of chlorine.
 - 1. Slug Method:
 - a. For this method, refer to AWWA C651 (Disinfecting Water Mains).
 - b. Water from the existing disinfection system or other approved source shall be controlled to flow into the section to be sterilized at a constant rate.
 - c. Inject treatment disinfectant at a point not more than 10-feet downstream from the beginning of the new conduit through a corporation stop or other approved connection inserted in the horizontal axis of the newly laid pipe.
 - d. Water entering the conduit shall receive a dose of chlorine such that the water shall have not less than 100-mg/L free chlorine. The chlorine shall be applied continuously and for a sufficient time to develop a solid column or "slug" of chlorinated water that shall expose all interior surfaces to the "slug" for at least 3-hours.
 - e. Operate all valves, hydrants, and other appurtenances during disinfection to assure that the disinfecting mixture is dispersed into all parts of the line, including dead ends, and similar areas that otherwise may not receive the disinfecting solution.
 - f. Do not allow the chlorinated water to flow into conduits in 'active' services.

- g. The heavy chlorinated water shall be flushed from the system and disposed of in an approved manner.
- h. If there is any question that damage to fish life, plant life, physical installations, or other downstream water uses of any type may occur by chlorinated-waste discharge, than an adequate amount of reducing agent should be applied to water being disposed of in order to neutralize the chlorine residual remaining in the water.

2. Continuous Feed Method:

- a. Water from the existing disinfection system or other approved source shall be controlled to flow into the section to be sterilized at a constant rate.
- b. Inject treatment disinfectant at a point not more than 10-feet downstream from the beginning of the new conduit through a corporation stop or other approved connection inserted in the horizontal axis of the newly laid pipe.
- c. The water being used to fill the line shall be controlled to flow into the section to be sterilized very slowly, and the rate of application of the chlorinating agent shall be in such proportion of the rate of water entering the line that the chlorine dose applied to the water entering the line and released at the opposite end shall have a minimum chlorine concentration of 100-mg/L or a level determined by ODEQ.
- d. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Use check valves if necessary.
- e. All valves shall then be closed, and the chlorine solution shall remain in the line for a minimum of 24 hours.
- f. Operate all valves, hydrants, and other appurtenances during disinfection to assure that the disinfecting mixture is dispersed into all parts of the line, including dead ends, and similar areas that otherwise may not receive the disinfecting solution.
- g. Do not allow the chlorinated water to flow into conduits in 'active' services.
- h. A minimum residual of 10-mg/L free chlorine shall be present in the main following the 24-hour holding period.
- i. The water shall remain in the conduit until the chlorine residual is less than 4 mg/L. after this residual is achieved the water may be discharged into the drainage system.
- j. Remove the chlorine solution and flush the line with potable water. Comply with regulations and obtain necessary approvals for disposal or discharge of chlorine solution and flushing water.

D. Sampling:

- 1. The Owner will take samples from the sterilized line through a suitable point in accordance with AWWA C651 (not at a fire hydrant) and submit to the testing laboratory.
- 2. Provide analysis and testing of treated water for bacteriological quality in accordance with AWWA C651.
- 3. Two (2) consecutive set of acceptable samples collected from the new conduit shall

be, taken at least 16 hours apart, or two sets collected 15 minutes apart after at least a 16 hour rest period.

4. At least one (1) set of samples shall be collected from every 1000 linear-feet of new conduit or at the next available sampling point beyond 1000 linear-feet as designated by the design Engineer, plus one (1) set from the end of the line and at least one (1) set from each branch.
 5. A standard heterotrophic plate count (HPC) test may be required at the option of the purchaser because new mains do not typically contain coliform bacteria, but often contain HPC bacteria. The sterilized portion of the line shall be placed in service, if the results of two consecutive tests conform to the bacterial standards.
 6. If the samples show unsatisfactory quality, the sterilization process shall be repeated until satisfactory results are obtained.
 7. Replace permanent system devices removed for disinfection.
- E. Scheduling: Perform scheduling and disinfection activity with startup, testing, adjusting, and balancing, and demonstration procedures, including coordination with related systems.

3.3 DISPOSAL OF DISINFECTING WATER

- A. The disinfecting water shall be dechlorinated before being released to natural drainage ways in accordance with AWWA C651. Release neutralized disinfecting water at a controlled rate so as not to damage downstream facilities.
- B. Contractor shall coordinate with Owner to dispose of disinfecting water to the sewer.

END OF SECTION

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SECTION 40 05 03
FIELD TESTING OF PIPING SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

- A. Provide all necessary labor, materials and equipment, including test pumps and gauges, as well as temporary valves and piping to perform the testing operations of piping systems as specified herein.
- B. All water pipelines will be tested.
- C. CONTRACTOR's Responsibility:
 - 1. Take such precautions as required to prevent damage to lines and appurtenances being tested.
 - 2. Repair any damage resulting from tests.
 - 3. Repair and retest all items which do not pass the tests as specified herein.
 - 4. Conduct all tests in the presence of the ENGINEER, and to the satisfaction of the ENGINEER, OWNER and all State and local authorities having jurisdiction.
 - 5. All necessary pumps, water, pipe connections, meters, gauges, and any necessary apparatus to perform and conduct the tests shall be furnished by the CONTRACTOR. CONTRACTOR shall furnish all necessary equipment and make all tests at CONTRACTOR's expense without separate measurement and payment, but said expense shall be subsidiary to installation of pipe.
- D. Test pressures are specified at the end of this section.
- E. Water used for testing purposes shall be potable water only.

1.2 REFERENCE STANDARDS

- A. Gray and ductile cast-iron water mains and appurtenances, AWWA C600, as applicable.

1.3 SUBMITTALS

- A. Submit record data describing proposed testing methods, procedures, and apparatus for ENGINEER's record, prior to testing.
- B. Submit the design calculation and details of all test plugs required for testing.
- C. Conform to any other applicable requirements of Section 01 33 10 "Supplier's Submittals".
- D. Submit a certified test report for each test to ENGINEER certifying the test pressures, duration of the test, leakage and pertinent observations and comments.

1.4 GENERAL SEQUENCE OF WORK

- A. Obtain the OWNER's approval of proposed testing methods, procedures, and apparatus, before performing any test.
- B. Upon receipt of the OWNER's approval, submit a schedule of testing dates and times at least 24 hours in advance of testing.
- C. Perform tests as specified herein.

1.5 DEFINITIONS

- A. "Pressure lines" shall refer to ductile iron, HDPE, CCIP, PVC, BWP, CCFRP, steel, and other such pipes designed to operate in a full condition, with the system's energy grade line at or above the top of the pipe during normal operating conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

1.1 TESTING OF PRESSURE LINES

A. General:

1. Allow concrete blocking to cure for at least 7 days before testing.
2. Backfill and compact soil behind all blocking.
3. Backfill over pipe to extent necessary to restrain the piping. Backfill shall extend to within 1-foot of proposed final grade.
4. Under no condition shall hydrostatic testing be performed against OWNERS valves.
5. Conduct water leakage test after completing hydrostatic pressure tests.
6. Lines which fail to hold the specified test pressure for at least two hours or which exceed an allowable leakage rate specified below, shall be repaired to the satisfaction of the ENGINEER and retested at the CONTRACTOR's expense.
7. It is the sole responsibility of the contractor to supply and design all test plugs required for hydrostatic testing.

B. Procedures for Leakage and Hydrostatic Pressure Tests:

1. Slowly fill isolated section of line with water.
2. Insure that all air has been expelled through air and vacuum release valves, taps, or connections shown on Plans for permanent piping, valves, or accessories. Do not make additional taps solely for air expulsion purposes unless approved by ENGINEER. No additional compensation will be made for additional taps.
3. Apply specified test pressure based on the elevation of the lowest section of line under test and corrected to elevation of test gauge. Duration of test shall be 2 hours.
4. Allow concrete pipe to stand full of water at least 12 hours before starting leakage test.
5. At the end of the two hours of the test, the entire route of the pipeline shall be inspected to locate any leaks or breaks. Any defective joints, cracked or defective pipe, fittings, or valves discovered in consequence of this pressure test shall be removed and replaced with sound material in the manner provided and the test shall be repeated until satisfactory results are obtained. Any and all noticeable leaks shall be repaired regardless of whether the actual leakage is within the allowable. The pipe shall be retested over a period of two hours.
6. All pipe shall be tested for leakage by a hydrostatic pressure test. Lines shall be filled slowly, with a maximum velocity of 1-foot per second, while venting all air. If permanent air vents have not been installed, the CONTRACTOR shall install corporation cocks at all high points to expel air during initial filling and testing of the lines.

- a. The duration of each leakage test shall be two hours unless otherwise specified, and during the test the line shall be subjected to a continuous pressure of 150 psig at the lowest elevation.
- b. Leakage is defined as the net quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain pressure within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air in the pipeline has been expelled. No installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{ND(P)^{0.5} \times T}{7400}$$

Where

- L = allowable leakage, total gallons in the two-hour period
- N = number of joints in the length of pipeline tested
- D = nominal diameter of the pipe, inches
- P = average test pressure during the leakage test, psig
- T = Time of Test in Hours (2)

- c. The test pressure shall be applied by means of a pump connected to the pipe and to an approved water container, or other approved method, for accurate measurement. The test pressure shall be maintained (by additional pumping, if necessary) for the specified time. While the line is under pressure, the system and all exposed pipe, fittings, valves, and hydrants shall be carefully examined for leakage. All defective elements shall be repaired or replaced and the test repeated until all visible leakage has been stopped and the allowable leakage requirements have been met.
- 7. On completion of tests, any newly installed, approved taps shall be tightly plugged with brass fittings.
 - 8. Thoroughly purge all compressed air lines after testing.

3.2 TEST PRESSURES FOR PRESSURE LINES

- A. Piping shall be tested to pressures shown on Plans. If not shown, test water pipeline at 188 psi.

END OF SECTION

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SECTION 40 05 14
PIPE COUPLINGS AND EXPANSION JOINTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Flexible couplings, flange coupling adapters, insulated transition couplings, dismantling joints, expansion joints, and restraining hardware for above items.

1.2 QUALITY ASSURANCE

- A. Factory Assurance:
 - 1. Test each item for mechanical and material defects per manufacturer's standard practice.
 - 2. Hydrostatically test each item to 150 percent of its maximum allowable working pressure.

1.3 SUBMITTALS

- A. Shop Drawings, Product Data and Samples:
 - 1. Comply with the general requirements of Section 01 33 10 "Supplier's Submittals" and supplemental requirements below.
- B. Submit the following items for each type flexible coupling, flanged coupling, adaptor, and expansion joints.
 - 1. Description and illustration of construction.
 - 2. List of materials.
 - 3. Description of factory-applied protective coatings.
 - 4. Dimensions.
 - 5. Pressure rating.
 - 6. For expansion joints only, the movement, force, and spring rate capabilities.
 - 7. Shop drawings for restraining systems such as tie bolt assemblies. Drawings to show layout, dimensions, number and size of bolts, and lug details.
 - 8. Manufacturer's installation instructions.
 - 9. Manufacturer's epoxy lining and coating system for wastewater application including certificate of approval for wastewater. Catalog cuts and other information for all products proposed.
- C. Product data described in the previous paragraph may be submitted in the form of catalog bulletins or other standard manufacturer literature and drawings as long as all the data specified are furnished. If catalog bulletins are submitted, they are to be marked up to show the styles, options, and other data which are applicable.
- D. If CONTRACTOR elects to use more couplings and expansion joints than are shown on Drawings, submit piping layout drawings showing the location of each proposed additional unit and describing the type of each such unit. Use of additional units is subject to ENGINEER's approval.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of the General Conditions.

PART 2 - PRODUCTS

2.1 FLEXIBLE COUPLINGS

- A. Flexible couplings to be mechanical compression type with sleeve two end rings, center ring, two resilient wedge-shaped gaskets, and a set of bolts and nuts to draw the two follower glands together. Shall include insulating boot when connecting two dissimilar metals.
- B. Construction:
 - 1. Center ring: Carbon steel
 - 2. End rings: Carbon steel
 - 3. Gaskets:
 - a. Resilient rubber compound suitable for sewage service.
 - b. Meets requirements of AWWA C219 and ASTM D2000
 - 4. Insulating Boot:
 - a. EPDM
 - 5. Bolts and nuts:
 - a. 304 Stainless Steel. Nuts shall be PTFE coated.
 - b. Number and size as required for size and type coupling and as recommended by manufacturer for test pressure.
 - 6. Working pressure of 100 psi
- C. Factory Painting:
 - 1. Apply epoxy-type protective coating system to interior and exterior of couplings including center ring. Coating to be manufacturer's epoxy system suitable for wastewater service complete with prime and finish coats.
 - 2. All surfaces except for bolts, nuts, and gaskets shall be epoxy coated and lined.
- D. Manufacturer and Model:
 - 1. Romac Industries – Style 400RG
 - 2. Or approved equivalent.

2.2 FLANGED COUPLING ADAPTERS

- A. Flanged coupling adapters to consist of a body or sleeve with pipe flange on one end and compression-type coupling on the other end. Compression coupling to consist of follower, resilient wedge-shaped gasket, and a set of bolts to draw follower against gasket. All flanged coupling adapters shall include restraining systems unless otherwise noted on drawings.
- B. Construction:
 - 1. Body and follower: Epoxy Coated Carbon Steel
 - 2. End rings: Epoxy Coated Carbon Steel
 - 3. Flange: ANSI Class 125 or 250 flat face. Match class to that of piping system.
 - 4. Gasket:
 - a. Resilient rubber compound suitable for sewage service.
 - b. Meets requirements of AWWA C219 and ASTM D2000
 - 5. Bolts and nuts:

- a. 304 Stainless Steel. Nuts shall be PTFE coated.
 - b. Number and sized to suit specified piping system test pressure.
- 6. Working pressure of 100 psi
- C. Restraining System:
 - 1. Restraining or harnessing system to be as specified for flexible couplings
- D. Factory Painting:
 - 1. Apply epoxy-type protective coating system to interior and exterior of couplings including center ring. Coating to be manufacturer's epoxy system suitable for wastewater service complete with prime and finish coats.
 - 2. All surfaces except for bolts, nuts, and gaskets shall be epoxy coated and lined.
- E. Number and size for tie bolts and anchor studs or locking pins to suit specified piping system test pressure. Minimum of two diametrically opposed restraints required for restrained adapters.
- F. Manufacturer and Model:
 - 1. Romac Industries – Model RFCA
 - 2. Or approved equivalent.

2.3 INSULATED STEEL TRANSITION COUPLING

- A. The insulated steel transition coupling shall consist of a body or sleeve with compression-type couplings on each end. Compression coupling to consist of follower, resilient wedge-shaped gasket and a set of bolts to draw the follower against the gasket. On one end, the gasket will extend beyond the end of the pipe preventing any metal-to-metal contact. The coupling shall allow for the joining of different outside diameters of pipe.
- B. Construction:
 - 1. Body and follower: ASTM A53C Carbon Steel
 - 2. End rings: AISI C 1020 Carbon Steel or ASTM A-536 Ductile Iron
 - 3. Gasket:
 - a. Resilient rubber compound suitable for sewage service.
 - b. Meets requirements of AWWA C219 and ASTM D2000
 - 4. Insulating Boot:
 - a. Buna-N
 - 5. Bolts and nuts:
 - a. 304 Stainless Steel. Nuts shall be PTFE coated.
 - b. Number and sized to suit specified piping system test pressure.
 - 6. Working pressure of 100 psi
- C. Factory Painting:
 - 1. Apply epoxy-type protective coating system to interior and exterior of couplings including center ring. Coating to be manufacturer's epoxy system suitable for wastewater service complete with prime and finish coats.
 - 2. All surfaces except for bolts, nuts, and gaskets shall be epoxy coated and lined.
- D. Manufacturer and Model:

1. Smith-Blair Style 417
2. Or approved equivalent.

2.4 SLEEVE TYPE COUPLING

- A. The sleeve type coupling shall be a joint restraint to prevent axial separation between two plain ends of same or dissimilar materials. (Internal pipe wall stiffeners shall be used when restraining HDPE.) The coupling shall incorporate individually actuating gripping surfaces to restrain, and have torque limiting twist off nuts.
- B. Construction:
 1. Body: ASTM A536 Ductile Iron
 2. End rings: AISI C 1020 Carbon Steel or ASTM A-536 Ductile Iron
 3. Gasket:
 - a. Resilient rubber compound suitable for water service.
 - b. Meets requirements of AWWA C219, AWWA C111/A21.11, and ASTM D2000
 4. Bolts and nuts:
 - a. 304 Stainless Steel. Nuts shall be PTFE coated.
 - b. Number and sized to suit specified piping system test pressure.
 5. Working pressure of 150 psi
- C. Factory Painting:
 1. Apply epoxy-type protective coating system to interior and exterior of couplings including center ring. Coating to be manufacturer's epoxy system suitable for wastewater service complete with prime and finish coats.
 2. All surfaces except for bolts, nuts, and gaskets shall be epoxy coated and lined.
- D. Manufacturer and Model:
 1. EBAA Iron Series 3800
 2. Or approved equivalent.

2.5 DISMANTLING JOINT

- A. Dismantling joint to consist of a body or sleeve with pipe flange on one end and a separate flanged coupling body with an end ring. A resilient wedge-shaped gasket is located between the end ring and the flanged coupling body and is compressed using bolts to draw the end ring against the flange. All dismantling joints shall include tie rods unless otherwise noted on drawings.
- B. Construction:
 1. Flanged Spool: AWWA C207 Class D
 2. End Ring and Body: ASTM A536 Ductile Iron
 3. Gasket:
 - a. Resilient rubber compound suitable for sewage service.
 - b. Meets requirements of AWWA C219 and ASTM D2000
 4. Bolts and nuts:
 - a. 304 Stainless Steel. Nuts shall be PTFE coated.
 - b. Number and sized to suit specified piping system test pressure.

5. Tie Rods: 304 Stainless Steel
 6. Working pressure of 100 psi
- C. Factory Painting:
1. Apply epoxy-type protective coating system to interior and exterior of couplings including center ring. Coating to be manufacturer's epoxy system suitable for wastewater service complete with prime and finish coats.
 2. All surfaces except for bolts, nuts, and gaskets shall be epoxy coated and lined.
- D. Manufacturer and Model:
1. Romac Industries – Model DJ400
 2. Or approved equivalent.

2.6 VICTAULIC AGS COUPLING

- A. Victaulic Advanced Groove System (AGS) coupling to consist of a split-ring body with an interior gasket to seal over the joining end of each pipe.
- B. Construction:
1. Split Ring: ASTM A536 Ductile Iron
 2. Gasket:
 - a. Grade "T Nitrile
 3. Bolts and nuts:
 - a. 316 Stainless Steel. Nuts shall be PTFE coated.
 - b. Number and sized to suit specified piping system test pressure.
 4. Working pressure of 100 psi
- C. Factory Painting:
1. Fusion Bonded Epoxy Coating
 2. All surfaces except for bolts, nuts, and gaskets shall be epoxy coated and lined.
- D. Manufacturer and Model:
1. Victaulic AGS Flexible Coupling – Style W77

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
1. Inspect each coupling, adaptor, and expansion joint for damage and defects before installation and replace defective items.
 2. Install each item in accordance with the Drawings, TECHNICAL SPECIFICATIONS, approved piping layout shop drawings, and approved manufacturer's installation instructions.
 3. CONTRACTOR may provide additional flexible couplings, flanged coupling adapters, and expansion joints over and above those shown on Drawings to facilitate installation of piping.
 - a. Use of such additional items is to be approved by the ENGINEER prior to installation.

- b. Additional joints are to be at no expense to the OWNER.
 - 4. Verify that inside diameters of flexible couplings and flanged coupling adapters are compatible with outside diameters of piping with which couplings or adapters are being used.
- B. Flexible Couplings:
- 1. Clean and lubricate pipe ends before installation.
 - 2. Leave a gap between the pipe ends to permit pipe expansion and increase flexibility of the joint. Gaps between pipe ends to be approximately as follows:
 - a. 12-inch diameter and smaller: 1-inch ±.
 - b. 14-inch diameter through 36-inch: 1-1/2-inch ±.
 - c. Over 36 inches: 2-inch.
 - 3. Tighten bolts in manner and to torques prescribed by manufacturer.
- C. Field Painting:
- 1. Touch up factory finishes which have been damaged.
 - 2. Apply protective coating to bolts and nuts after tightening. Use same coating system as that specified for adjoining piping.
- D. Testing:
- 1. Joints are tested as a part of the overall piping system.
 - a. See Section 40 05 03 "Field Testing of Piping Systems".

END OF SECTION

SECTION 40 05 61
VALVES, GATE

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. Section Includes:
 - 1. The CONTRACTOR shall furnish labor, materials, equipment and incidentals necessary to install gate valves and appurtenances, including valve boxes, operators, bolts, nuts and gaskets completely as specified herein.

1.3 REFERENCES

- A. The applicable provisions of the following standards shall apply as if written here in their entirety:
 - 1. American National Standards Institute (ANSI)/NSF:
 - a. B16.1 – Cast Iron Pipe Flanges and Flanged Fittings
 - b. Standard 61
 - 2. American Water Works Association (AWWA):
 - a. C-111 – Rubber-Gasket Joints
 - b. C-500 – Gate Valves for Water and Sewer Systems
 - c. C-509 – Resilient Seated Gate Valves for Water and Sewage Systems
 - 3. ASTM International:
 - a. A-126 – Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - b. A-536 – Standard Specification for Ductile Iron Castings

1.4 SYSTEM DESCRIPTION (NOT USED)

1.5 SUBMITTALS

- A. Product Data:
 - 1. Comply with the general requirements of Division 1 and the supplemental requirements below.
 - 2. Submit one drawing or illustration showing unit construction for each type and size valve used.
 - 3. Submit the following information for each valve:
 - a. Description including type of valve, type of operator and accessories included.
 - b. Size and end connections.
 - c. Maximum non-shock working pressure for which valve is designed.
 - d. Materials of construction and coatings for valves, operators and accessories.
 - e. K or Cv value.
 - f. Manufacturers' make and model.

4. Submit the following information for geared operators:
 - a. Type of gearing.
 - b. Type of lubrication.
 - c. Input torque required to develop required output torque.
 - d. Orientation and dimensions of operator.
 - e. Manufacturers' make and model.
 5. If catalog bulletins are used to communicate above information, mark out inapplicable information.
 6. Location of nearest stocking distributor.
 - a.
- B. Shop Drawings
1. Special Equipment Warranty as in the Special Conditions.
 2. Operation and Maintenance Data:
 3. Comply with the requirements of Specification 01 33 10 "Supplier's Submittals".
 4. Installation reports as specified in Specification 01 33 10 "Supplier's Submittals".
- C. Samples (NOT USED)
- D. Quality Assurance/ General Submittals
1. Affidavits:
 - a. Submit affidavits of compliance with the reference standards including AWWA, ANSI, NSF 61, and ASTM.
 2. Valve manufacturer shall provide certification from an independent testing laboratory that its valve can operate through 1000 cycles at unbalanced closing pressure (working pressure) and flow to open discharge without causing damage to any of the epoxy coating on the body or rubber coating on the gate.

1.6 QUALITY ASSURANCE

- A. All gate valves shall conform to AWWA Standard C509 unless otherwise specified. Valves larger than 12 inches shall be manufactured and tested to meet the requirements of AWWA C509 unless otherwise specified.
- B. Gate Valves, when not able to be installed in a vertical position, shall conform to AWWA C500
- C. Gate valve sizes larger than 12-inch shall be manufactured in accordance to AWWA C509. Body thickness and stem thickness will conform to AWWA C500.
- D. Each valve shall have manufacturer's name plate in stainless steel or cast into body or bonnet showing the pressure ratings, serial and model numbers, year manufactured and other pertinent data.
- E. Manufacturers of gate valves shall demonstrate a minimum of 5 years experience for the design of gate valves, with at least 1-year experience in the design of resilient seated gate valves (AWWA C509) being furnished. References shall be furnished upon request.
- F. Valve supplier shall maintain a complete stock of spare parts in the State of Oklahoma and shall be capable of delivering parts within 48 hours of receipt of request.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of the Special Conditions and manufacturer's recommendations.

1.8 PROJECT CONDITIONS (NOT USED)

1.9 WARRANTY

- A. The equipment will be warranted for one year after installation and substantial compliance of this equipment.

1.10 EXPERIENCE REQUIREMENTS

- A. Manufacturers of gate valves shall demonstrate a minimum of 10 years of experience in similar applications for sizes of valves being furnished. References shall be furnished upon request.

1.11 MAINTENANCE (NOT USED)

PART 2 - PRODUCTS

2.1 GENERAL

- A. Suitable for potable water. Renewable parts not to be of a lower quality than specified.
- B. Obtain all gate valves, extensions, and associated manual operators from a single manufacturer.
- C. All valves for potable water service shall comply with NSF 61 standards.
- D. Valve operators to turn to left, counterclockwise, to open and to right, clockwise, to close.
- E. End connections on valves shall be as shown in the Plans..
- F. All flanges shall conform to the standard specification of the American National Standards Institute (ANSI), Class 125 unless otherwise noted.
- G. All mechanical joints shall conform to ANSI/AWWA C111/A21.11
- H. Paint valves and operators as shown on the plans and specification in Division 9. Painting colors to be selected by OWNER.
- I. Valve body and bonnet shall be coated on all exterior and interior surfaces with a fusion-bonded epoxy conforming to the requirements of AWWA C550. All linings and coatings must be suitable for potable water application.
- J. Furnish geared operators for all valves four inches and larger, unless otherwise specified. Valves located in Combination Air Valve Vaults and Blow-Off Valve Vaults shall be furnished with a bevel gear operator with a 2-inch square nut.
- K. Furnish geared operators with the following features unless otherwise specified.
 - 1. Weatherproof enclosure.
 - 2. Grease lubricated design.
 - 3. Operate with an input force of not more than 80 pounds pull.
- L. Valves shall utilize 316 stainless steel valve stem extensions with 2-inch square nut and valve boxes with covers.

2.2 RESILIENT-SEATED GATE VALVE DETAILS

- A. Provide valves as shown on the Plans.

- B. Orientation of valve shall be installed as shown in the drawings.
- C. Non-rising stem
- D. Non-shock working pressure: 200 psig through 12 inches, 150 psig for 14 inches and larger
- E. Valve body: Ductile iron with full round port opening and integrally cast guides; smooth valve bottom with no recessed areas; bonnet cover.
- F. Gate shall be completely covered with rubber on all interior and exterior ferrous surfaces. The rubber shall be secured to the gate body, including the part which houses the stem nut. The rubber must be suitable for potable water application.
- G. Stem: Valve stem shall be cast, forged, or rolled bronze.
- H. Stem seals: Double O-ring, Buna-N protected by grit and dust cap.
- I. Stem nut: Brass or bronze.
- J. Nylon bushing and teflon washer for friction protection.
- K. Interior coating: 2-part fusion bonded epoxy coating.
- L. Acceptable Manufacturers:
 - 1. American Flow Control
 - 2. Mueller Company
 - 3. Clow Valve
 - 4. M&H Valve
 - 5. Kennedy Valve
 - 6. US Pipe

2.3 OPERATORS

- A. Buried Service:
 - 1. 3-inch and Larger:
 - a. Non-rising stem with stainless steel shaft extension and wrench nut. Minimum extension stem diameter shall be 1-inch or diameter of valve shaft, whichever is larger.
 - b. Provide valve box, bonnet and cover.
- B. Wrench nut operator shall comply with the requirements of applicable AWWA Standard previously reference.

2.4 ACCESSORIES

- A. Gate valve should have a stem extension as shown in the drawings.
- B. Include additional accessories as specified in Division 40.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Construction Contractor shall install the valves in accordance with the following requirements:
 - 1. Installation shall be in accordance with the plans, approved shop drawings and the manufacturers instructions.

2. Install valves and valve operators to provide for ease of access and operation.
 3. Install buried valve by carefully lowering into position in such a manner to prevent damage to any part of the valves. The valve shall be placed in proper position and shall be securely held until all connections have been made. All buried pipe and appurtenances shall be wrapped in polyethylene encasement in accordance with AWWA C105.
- B. The Equipment Manufacturer shall furnish all accessories and hardware necessary for installation.

3.2 FIELD QUALITY CONTROL

- A. The Equipment Manufacturer shall perform the following services:
1. Inspect the completed installation and note deficiencies.
 2. Assist the CONTRACTOR during start-up, adjusting, and site testing of completed installation as required.
 3. Instruct OWNER personnel in the operations and maintenance of the equipment.
- B. Testing: All valves shall be tested by manufacturer in accordance with AWWA C500.

END OF SECTION

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SECTION 40 05 78.13
VALVES, AIR RELEASE AND VACUUM RELEASE

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. Section Includes the following valves for water and/or sewerage service:
 - 1. Combination air release and vacuum valves
- B. Related Sections:
 - 1. Refer to Divisions 1 and 33 for information regarding submittals; quality assurance; coordination; material delivery, handling, and storage; projection conditions; design requirements; other materials; installation of piping systems; field testing; and related work.

1.3 STANDARDS

- A. The applicable provisions of the following standards shall apply as if written here in their entirety:
 - 1. American National Standards Institute (ANSI)/ NSF:
 - a. ANSI/NSF Standard 61
 - 2. American Water Works Associations (AWWA):
 - a. AWWA C512 – Air Release, Air/Vacuum and Combination Air Valves for Water Works Service.

1.4 WARRANTIES

- A. Contractor shall provide the Manufacturer’s standard warranty for all valves in the Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Vent-O-Mat
 - 2. Approved Equal

2.2 GENERAL:

- A. Standard: Manufactured and tested in accordance with AWWA C512 “Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.”
- B. Valves used in potable water service shall be certified to NSF 61 “Drinking Water Systems Components – Health Effects.”
- C. Valve End Connections: 1-inch and smaller, threaded; 2-inches and larger, flanged, ANSI B16.1, Class 125 for cast iron, Class 150 for ductile iron and stainless steel, or Class 250 as required, unless otherwise noted.

- D. Valve and flange connections shall have a minimum working pressure of 150 psi.
- E. Valves shall be hydraulically tested at 1.5 times their rated cold water pressure.
- F. Exterior of valve shall receive a coating of universal metal primer which is FDA approved for potable water.

2.3 COMBINATION AIR VALVES, (CAV), 1-INCH THROUGH 12-INCH:

- 1. Description: Air release valves shall be surge dampening, slam preventing, automatic float operated valves designed to exhaust large quantities air during the filling of a piping system and open during draining or if a negative pressure occurs. It also shall release accumulated pockets of air while the system is in operation.
- 2. Materials: Body and cover constructed of AISI 316L Stainless Steel; orifice, special design float constructed of ASTM A240 T316 stainless steel or High Density Polyethylene; nozzle shall be AISI 316 SS and seat shall be EPDM or Buna-N; stainless steel fasteners.
- 3. Internals shall be removable through the top cover.
- 4. Valve size and options shall be as listed in the Valve Schedule.
- 5. Products:
 - a. Vent-O-Mat Series RBX (Model # 025 RBX 19 2 1 S6)

2.4 ACCESSORIES

- A. Shut-off Valve: For isolation of the valves from the piping, provide a full-ported, stainless steel ball valve for threaded inlets and AWWA Class 150B butterfly valve with quarter-turn gear actuator for flanged inlets.
- B. Options: When specified in the Valve Schedule one or more of the following options:
 - 1. Cross Contamination and Security Protection (CCSP): When valves installed in vaults or flood prone locations, provide an inflow preventer to prevent the introduction of contaminated water through the air valve outlet.
 - 2. Anti-Slam Device (ASD): Valves, 2-inch and larger, provide to prevent valve pressure surges due to column separation or rapid changes in velocity and pressure.
 - 3. Screen Outlet (SO): Provide a stainless steel screened outlet for outdoor locations.
- C. Identification: Provide valve identification tags in accordance with Division 10 Section 10 90 00 "Identification, Stenciling, and Tagging."
- D. Refer to Division 40 Section 40 05 00 for additional accessories and requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 40 Section 40 05 05 for execution requirements for the installation, field quality control, and manufacturer's services.

3.2 VALVE SCHEDULE

- A. Refer to Drawings for type, end connections, and locations for all valves.

END OF SECTION

AIR RELEASE AND AIR/VACUUM VALVE SCHEDULE

| Mark | Pipeline # | Location (STA) | Type | Service | Size (Inches) | Orifice Size (Inches) | Pressure (psi) | | Details |
|------|------------------|----------------|------|---------------|---------------|-----------------------|----------------|------|-------------------|
| | | | | | | | Max. | Min. | |
| 1 | 12" Primary WL | 9+89.67 | CAV | Potable Water | 2 | | 200 | 5 | MWC Water (C-900) |
| 2 | 12" Primary WL | 26+45.91 | CAV | Potable Water | 2 | | 200 | 5 | MWC Water (C-900) |
| 3 | 12" Primary WL | 32+60.00 | CAV | Potable Water | 2 | | 200 | 5 | MWC Water (C-900) |
| 4 | 12" Secondary WL | 15+95.75 | CAV | Potable Water | 2 | | 200 | 5 | MWC Water (C-900) |
| 5 | 12" Secondary WL | 33+35.00 | CAV | Potable Water | 2 | | 200 | 5 | MWC Water (C-900) |
| 6 | 12" Secondary WL | 38+00.00 | CAV | Potable Water | 2 | | 200 | 5 | MWC Water (C-900) |
| | | | | | | | | | |
| | | | | | | | | | |

Type:

AV = air release valve

SAV = sewage air release valve

AVV = air vacuum valve

SAVV = sewage air/vacuum valve

CAV = combination air vacuum valve

SCAV = sewage combination air/vacuum valve

CAVSC = combination air and vacuum valve with surge check

VRV = vacuum relief valve

Orifice Size: Pertains to air release valves and single body combination valves.

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SECTION 40 12 16.40
MISCELLANEOUS VALVES AND APPURTENANCES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnishing and installation of miscellaneous valves, cocks and stops for station service including operators, valve boxes and accessories as shown on the Plans and specifications.

1.2 SUMMARY

- A. This Section includes the following general-duty valves:
 - 1. Ball Valves, Stainless Steel, 12-inches and smaller.
 - 2. Plug Valves, Ductile Iron, 3-inches and larger.
 - 3. AWWA Swing Check Valves
 - 4. Backflow Preventer, Reduce Pressure.
- B. Related Sections:
 - 1. Section 01 33 10 – Supplier’s Submittals
 - 2. Section 01 75 25 – Equipment Testing and Startup
 - 3. Section 01 78 23 – Operations and Maintenance Data
 - 4. Section 40 05 78.13 – Air Release and Air/Vacuum Valves
 - a. For air release valves and combination air/vacuum release valves for water and sewerage service.

1.3 QUALITY ASSURANCE

- A. Referenced Standards: As specified for individual valves in Part 2.
- B. Each valve shall have manufacturer's nameplate in stainless steel showing the pressure ratings, serial and model numbers, year manufactured and other pertinent data.
- C. Valve supplier shall maintain a complete stock of spare parts in the State of Oklahoma or shall indicate that parts will be delivered upon 48 hours of receipt of request.
- D. Obtain all valves of the same style and type, along with the associated manual operators, from a single manufacturer.
- E. NSF Compliance: NSF 61, “Drinking Water Systems Components – Health Effects” for valve materials for potable-water service.
- F. Valve manufacturer shall demonstrate a minimum of five years of experience is similar applications for size of valves furnished. References shall be provided upon request.
- G. Provide Manufacturer’s standard warranty for all products listed.

1.4 SUBMITTALS

- A. Shop Drawings and Product Data:
 - 1. Comply with the general requirements of Section 01 33 10 “Supplier’s Submittals” and the supplemental requirements below.
 - 2. Submit one drawing or illustration showing unit construction for each type and size valve used.

3. Submit the following information for each type of valve furnished:
 - a. Specific application in terms of service and contract drawing number where shown.
 - b. Description including type of valve, type of operator and accessories included.
 - c. Size and type of end connections.
 - d. Maximum non-shock working pressure for which valve is designed.
 - e. Materials of construction and coatings for valves and accessories.
 - f. Manufacturers make and model.
 4. If catalog bulletins are used to communicate above information, mark out inapplicable information.
- B. Affidavits:
1. Submit affidavits of compliance with the reference standards when standards are specified.
- C. Operation and Maintenance Data:
1. Comply with the requirements of Section 01 75 25 "Equipment Testing and Startup", 01 78 23 "Operation and Maintenance Data", and 01 33 10 "Supplier's Submittals".

1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of the General Conditions and manufacturers' recommendations.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Obtain all valves, extensions, and associated manual operators of a given type from a single manufacturer.
- B. Furnish valves in the sizes specified on the Drawings.
- C. Valves shall be capable of withstanding the maximum system pressures.
- D. Valve operators to turn to left, counterclockwise, to open and to right, clockwise, to close.
- E. End connections shall be compatible with those specified for pipe.
- F. Paint valves and operators as shown on the plans and specified in Section 09 91 00, Painting, colors to be selected by OWNER.
- G. All hardware shall be 316 stainless steel.
- H. Contractor shall provide insulation kits where necessary for dissimilar metals.

2.2 BALL VALVE

- A. Stainless Steel Ball Valve, ½-inch to 2-inches:
 1. Three-piece body, full port, vented ball, block-out proof stem, Type 316 stainless steel trim, reinforced TFE seat and seal, threaded ends, lever operator, rated 1000-psi CWP. Conforms to MSS SP-110.
 2. End Connection shall be as noted on the plans
 3. Manufactures:

- a. Contromatics.
 - b. Crane Valve Group
 - c. NIBCO
- B. Stainless Steel Ball Valve, 2-inches to 12-inches:
- 1. Unibody design, blowout-proof stem, Type 316 stainless steel trim, mounting pad, fire safe, vented ball, flanged ends, rated 275-psi CWP. Conforms to MSS SP-72 and MSS SP-25.
 - 2. Manufactures:
 - a. NIBCO

2.3 PLUG VALVE

- A. Valve type: Eccentric Plug non-lubricated, resilient seated with port area not less than 100 percent of pipe area.
- B. Nonshock working pressure at 100°F:
- 1. 175 psig, 1-inch to 12-inch.
 - 2. 150 psig, 14-inch to 36-inch.
- C. Valve Construction:
- 1. Body: Cast iron.
 - 2. Plug: Ductile iron, Buna faced.
 - 3. Bearings: Oil impregnated stainless steel and teflon.
 - 4. Shaft seal: Nitrile butadiene chevron packing, bronze cartridge with O-rings or V-type.
 - 5. Body seat: Nickel steel machined.
 - 6. Furnish grit seats in upper and lower journals.
 - 7. Interior coating: 4 - 6 mil of 2-part hi-build epoxy.
 - 8. Exterior Coating: Epoxy coating in accordance with AWWA C550.
 - 9. End Connections: Flanged for lift station discharge piping
- D. Manufacturers:
- 1. DeZurik
 - 2. Valmatic
 - 3. Keystone

2.4 AWWA SWING CHECK VALVES

- A. AWWA Swing Check Valve, 2-inches through 30-inches Rubber Seated Swing Check Valve
- 1. Referenced Standard: AWWA C508.
 - 2. Non-shock working pressure at 100 °F: 150, unless shown otherwise on the Plans.
 - 3. End connections: Flanged.
 - 4. Body: Full ported ductile iron (ASTM A126-B).
 - 5. Cover: Bolted, ductile iron (ASTM A126-B).
 - 6. Disc: Ductile iron (ASTM A126-B).
 - 7. Seat Ring: Rubber.
 - 8. Shaft: Stainless steel, Type 18-8.

9. Body seat: Stainless steel, Type 316.
10. Cover bolts and trim to be stainless steel, Type 316.
11. Stuffing box: Composition packing.
12. Interior coating: Two part hi-build epoxy.
13. Exterior Coating: Epoxy coating in accordance with AWWA C550.
14. Operator: Adjustable lever arm with weight and hydraulic cushion dashpot with adjustable closing speed. Hydraulic cushion dashpot shall be side mounted.
15. Valves in exposed exterior applications and where indicated to be insulated shall have extended shaft to allow for valve insulation.

B. Acceptable manufacturers:

1. GA Industries, Swing Check Valve
2. DeZurik/APCO Series 6000.
3. Equal by Crispin Valve.

2.5 MISCELLANEOUS VALVES AND RELATED ITEMS

A. Reduced Pressure Backflow Preventer:

1. Description: Two check valves, independent relief between the valves; NRS isolation gate valves or ball valves, testing cock in accordance with AWWA C511, rated 175-psi CWP, meet requirements of USC Cross connection Control Laboratory.
2. Manufacturers:
 - a. Cla-Val Company, Model RP Series
 - b. FEBCO; Model 825Y, 825YD.
 - c. Watts 909

2.6 ACCESSORIES

- A. Furnish accessories specified in valve specifications and as required for a complete system.
- B. Floor boxes to have cast iron bodies and bronze bushings.
- C. Valve boxes for buried service:
 1. Three-piece screw type 5-1/2-inch diameter, cast iron construction.
 2. Concrete pad 2'-0" diameter x 6" thick around valve box at ground surface.
 3. Other features as shown on drawings.
- D. Stem guides to be made of cast iron with bronze bushings and to have adjustable offset.
- E. All components of shaft extensions shall be stainless steel including nut shaft, shaft housing and guides. Minimum shaft diameter shall be 1-inch or diameter of valve shaft, whichever is larger. All components shall have continuous welded joints. Provide stem guides or rock shields at 5-foot intervals.
- F. Valve Operator:
 1. Handwheel: For valves other than quarter-turn types.
 2. Lever Handle: For quarter-turn valves 6-inch and smaller.
- G. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves and ASME B16.24 for bronze valves.

- H. Threaded: With threads according to ASME B1.20.1.
- I. Manufacturers:
 - 1. Floor boxes: Clow, Model F-5695.
 - 2. Valve boxes for buried service: Clow, Model F-2454.
 - 3. Stem guides: Trumbull, Model 367.
 - 4. Chain wheels: Clow, Model F-5680.
 - 5. Floor stands: Clow, Model F-5515.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all valves, floorstands, and appurtenances in complete accordance with manufacturer's instructions and recommendations.
- B. Installation shall be in accordance with the plans, approved shop drawings and the manufacturer's instructions.
- C. Install valves and valve operators to provide for ease of access and operation.

3.2 FIELD QUALITY CONTROL

- A. Retain a qualified representative of the manufacturer to perform the following services:
 - 1. Inspect the completed installation and note deficiencies.
 - 2. Assist the CONTRACTOR during start-up, adjusting, and site testing of completed installation as required.
 - 3. Instruct OWNER personnel in the operations and maintenance of the equipment.

3.3 FIELD TESTING:

- A. Testing and startup will be in accordance with Section 01 75 25 "Equipment Testing and Startup".

END OF SECTION

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