City of Denton

DENTON ENTERPRISE AIRPORT
SCHWEIZER RD./TAXIWAY P
SANITARY SEWER EXTENSION

KSA Project No.: DENT-036

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2-23-18

Prepared by:

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TECHNICAL SPECIFICATIONS

All applicable sections of the City of Denton's Standard Specifications shall be utilized for this project. The City of Denton's Standard Specifications are available for download at the following location:

https://www.cityofdenton.com/en-us/business/solicitations-contracting

In the event of conflict between specifications included herein and the city of Denton's Standard Specifications, the City of Denton's Standard Specifications shall govern.

SECTION 01 11 00 SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract Description

B. Work Sequence

C. Contractor Use of Site and Premises

1.2 CONTRACT DESCRIPTION

A. Work under this contract includes:

1. Installation of approximately 950 linear feet of 8” gravity sewer line along Schweizer Road, as well as approximately 400 linear feet of 2” diameter force main sewer line and associated appurtenances along Taxiway M.

1.3 WORK SEQUENCE

A. Construct Work in phases to accommodate Owner's operations and project integration requirements. During the construction period, coordinate construction schedule and operations with Engineer.

1.4 CONTRACTOR USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:

1. Owner occupancy; and

2. Work by others and work by Owner.

B. The Owner has acquired permits and/or easements as necessary to construct the project. Permits and easements acquired are as shown on the drawings.

C. All Work shall be completed within the designated right-of-ways, Owner property, and Owner acquired easements. The Contractor shall be responsible for any and all additional areas or easements required for construction activities beyond those areas provided.

D. The Contractor shall be responsible for any and all damages caused by the Contractor’s activities whether within the designated right-of-ways, Owner property, Owner acquired easements, and/or Contractor acquired construction areas.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01 22 00 UNIT BID PRICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section of the Specifications covers the components considered to be a portion of each pay item as may or may not be listed in the Unit Price Schedule and is furnished to aid the Contractor in preparing his bid.

1. Of necessity, the items described as components of the various items are discussed in a general manner only, describing the major pieces of equipment and/or materials.

2. Any items and/or appurtenances not specifically mentioned shall be considered a portion of the bid item to which, in the opinion of the Engineer, its function is most directly related.

3. Failure to list all items and/or appurtenances does not relieve the Contractor from furnishing all apparatuses, devices, labor, or materials of whatever nature required for a complete and operating installation in accordance with the intent of the Drawings, approved Shop Drawings, and the Specifications.

B. The successful Contractor shall, as soon as possible after award of the Contract, submit a list itemizing the components of each Lump Sum Bid Item and their respective costs to be used as an aid in the preparation of partial payments.

C. The work called for by these Contract Documents shall be paid for under a single contract on a unit price basis. The total price bid shall constitute full compensation for all work indicated on the bid proposal.

D. Partial payments shall be made to the Contractor based on monthly estimates submitted to the Engineer for approval in accordance with the General and Supplemental Conditions. All estimates for partial payment shall be based on completed work and corresponding dollar amounts as provided in the bid proposal and in accordance with the following schedule.

E. Unique or sole sourced items - “Tying or packaging” of equipment for the purpose of thwarting competition shall be considered to be in non-compliance with these specifications. Manufacturers shall price items under each subsections or sections separately.

1.2 BID ITEM DESCRIPTION

A. Mobilization~~, Insurance, and Bonds:~~

1. Item shall consist of all preparatory work and operations, ~~including but not limited to insurance and bonds~~; those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for the establishment of all offices, buildings, and other facilities necessary for work on the project; and for all work and operations which must be performed or costs incurred prior to beginning work on the various items on the project site.

2. All work covered by this section will be paid for at the contract lump sum price for “Mobilization.”

3. Provided the amount bid for “Mobilization” does not exceed five percent (5%) of the total amount bid for the contract. Partial payments for this item will be made with the first and second partial pay estimates paid on the contract, and will be made at the rate of fifty percent (50%) of the lump sum price for “Mobilization” on each of these partial pay estimates.

4. In the event the amount bid for mobilization exceeds five percent (5%) of the total amount bid for the contract, 2½ percent of the total amount bid will be paid on each of the first two partial pay estimates, and that portion exceeding five percent (5%) of the total bid for the contract will be paid on the last partial pay estimate.

B. Barricades, Signs, and Traffic Handling:

1. Barricades, Signs, and Traffic Handling will be measured by "lump sum."

2. The work and materials as prescribed by this item will be paid for as lump sum for "Barricades, Signs, and Traffic Handling".

3. A portion of the total lump sum will be paid monthly.

4. The monthly payment will be calculated by dividing the total lump sum by the contract time in months.

5. This price shall be compensation for furnishing all labor, materials, supplies, equipment and incidentals necessary to prepare, implement, install, maintain, remove, and generally complete the work in accordance with TxDOT specifications and the Contract Documents.

C. Comply with TPDES Construction General Permit TXR150000 for Storm Water Pollution Prevention:

1. Item shall consist of furnishing all plans, permits, fees, forms, documents, tools, equipment, materials, and labor and appurtenances necessary to meet the Texas Commission on Environmental Quality (TCEQ) Texas Pollution Discharge Elimination System (TPDES) Construction General Permit No. TXR150000 as shown and specified.

2. Payment for this item shall be lump sum for complete compliance with TCEQ, TPDES, and specified requirements. The Contractor assumes sole responsibility for developing, implementing, and maintaining the storm water pollution prevention plan, the TPDES Permit, all best management practices, all storm water control facilities, and all necessary provisions thereto for the duration of the construction activities. No additional payment shall be made for maintaining, modifying, updating, renewing, and/or changing the storm water pollution prevention plan, the permit, control facilities, fees, fines, or other cost incurred the Contractor for this Project.

D. Testing of Sanitary Sewer Mains and Manholes, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor necessary to perform testing of sanitary mains and manholes in accordance with the Contract Documents.

2. Measurement and payment shall be paid per linear foot price for complete testing once approvals and acceptance have been granted.

E. Furnish and Install 8” Dia. SDR 26 ASTM D3034 PVC Sanitary Sewer Pipe, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor including pipe, fittings, excavation, bedding, backfill, jointing of pipe, thrust blocks, concrete encasement and other appurtenances necessary to construct the sewer line, as detailed on the plans and in these specifications.

2. Measurement and payment for this item shall be on a per linear foot basis and as shown in the Proposal.

3. This item shall include pipe installed per linear foot based on horizontal ground surface measurements, and as shown on the Proposal.

F. Install 8” Dia. SDR 26 ASTM D3034 PVC Sanitary Sewer Pipe by Bore, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor including excavation, backfill, and other appurtenances necessary to install 8” diameter PVC pipe by bore as detailed on the plans and in these specifications.

2. Measurement and payment of this item shall be per linear foot based on horizontal ground surface field measurements and as shown on the Proposal.

3. This item includes all costs for the installation of the sewer line by bore and all related items of work as required, in all soil conditions.

G. Furnish & Install 4' Dia. Standard Sanitary Sewer Manhole, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials and labor including excavation, foundation material, backfill, compaction, manhole ring and cover, pipe connectors, gaskets, fittings and other appurtenances necessary to install a 4' Standard Sanitary Sewer Manhole as detailed in the plans and specifications.

2. Measurement and payment for this item shall be on a per each basis and as shown in the Proposal.

H. Furnish & Install 4' Dia. Standard Vented Sanitary Sewer Manhole, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials and labor including excavation, foundation material, backfill, compaction, vent pipe, manhole ring and cover, pipe connectors, gaskets, fittings and other appurtenances necessary to install a 4' Standard Vented Sanitary Sewer Manhole as detailed in the plans and specifications.

2. Measurement and payment for this item shall be on a per each basis and as shown in the Proposal.

I. Connect Existing Force Main to Proposed Manhole, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, labor and incidentals including pipe, fittings, gaskets, cutting and plugging of existing pipe, and any appurtenances necessary to connect the existing sewer line to proposed sewer lines or manholes as detailed on the plans and in these specifications.

2. Measurement and payment for this item shall be on a per each basis and as shown in the Proposal.

3. The unit price for the sewer line connection shall be applicable to all depths of cut shown on the plans.

J. Connect Proposed Sanitary Sewer to Existing Sanitary Sewer, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, labor and incidentals including pipe, fittings, gaskets, cutting and plugging of existing pipe, and any appurtenances necessary to connect the proposed sewer line to existing sewer lines or manholes as detailed on the plans and in these specifications.

2. Measurement and payment for this item shall be on a per each basis and as shown in the Proposal.

3. The unit price for the sewer line connection shall be applicable to all depths of cut shown on the plans.

K. Furnish & Install Seed and Fertilizer, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor for placing topsoil, final grading, tamping, as well as seeding and fertilizing all disturbed areas. All areas disturbed by the Contractor shall be re-vegetated prior to final completion.

2. Measurement and payment of this item shall be per acre upon completion as determined by the Engineer.

3. Seeding and fertilizing of areas along the pipeline route shall cover the area of the pipeline installation as well as both sides of disturbed areas adjacent to the pipeline. No separate payment shall be made for seeding and fertilizing areas disturbed off the pipeline route. Seeding and fertilizing of areas off the pipeline route shall be completed as specified and payment for these areas shall be considered subsidiary to the construction in those areas. The contractor shall seed and fertilize all areas used for stockpiling, storage, or staging at his expense prior to final completion.

L. Clearing and Grubbing, as shown and specified:

1. This bid item consists of furnishing all tools, equipment, materials, and labor to remove existing trees, roots, brush, debris, sod, fences, fence fabric, concrete, asphalt, and any other unspecified obstructions as required for construction of proposed improvements, whether shown or noted in the Plans or not.

2. This bid item also includes loading, transporting, and properly disposing of removed items at an off-site permitted disposal site**.**

3. Measurement and payment for this item shall be per lump sum for the area cleared as approved by the Engineer.

M. Furnish & Install Gravel Foundation Material for Unstable Trench Bottom, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor to install gravel pipe foundation material as shown on the Detail Sheets of the Plans or as directed by the Engineer.

2. Measurement and Payment for this item shall be based on a cubic yard basis as shown in the Proposal.

3. Payment will not be made unless the foundation material is specifically specified in the Plans or as directed by the Engineer.

4. This item is distinct and separate from other classes of embedment, which is not a pay item, but considered subsidiary to the price for the sewer line installation.

N. Trench & Excavation Safety, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor necessary to develop and implement a trench safety plan in accordance with the requirements of the Specifications.

2. Payments for trench and excavation safety shall be at the contract price per linear foot as shown in the proposal. No separate payment will be made for excavations safety, all safety systems used for any excavation shall be subsidiary to this item.

3. No evaluation of the adequacy of the trench and excavation safety systems used by the Contractor will be made by the Engineer since the means, methods and responsibility for trench safety rests solely with the Contractor.

4. By approving the Contractor's request for payment of trench and excavation safety, the Engineer makes no representation that the Contractor's work for this pay item has been performed in a manner consistent with the Contract Documents.

Additive Alternates

O. Force Main Testing, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor necessary to perform testing of sanitary sewer force mains in accordance with the Contract Documents.

2. Measurement and payment shall be paid at a lump sum price for complete testing once approvals and acceptance have been granted.

P. Furnish and Install 2" Dia. SDR 21 ASTM D2241 PVC Force Main Pipe, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor including pipe, fittings, excavation, bedding, backfill, jointing of pipe, thrust blocks, concrete encasement and other appurtenances necessary to construct the force main, as detailed on the plans and in these specifications.

2. Measurement and payment for this item shall be on a per linear foot basis and as shown in the Proposal.

3. This item shall include pipe installed per linear foot based on horizontal ground surface measurements, and as shown on the Proposal.

Q. Furnish and Install 2" Dia. SDR 21 ASTM D2241/RJ PVC Force Main Pipe, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor including pipe, fittings, excavation, bedding, backfill, jointing of pipe, thrust blocks, concrete encasement and other appurtenances necessary to construct the force main, as detailed on the plans and in these specifications.

2. Measurement and payment for this item shall be on a per linear foot basis and as shown in the Proposal.

3. This item shall include pipe installed per linear foot based on horizontal ground surface measurements, and as shown on the Proposal.

R. Install 2" Dia. SDR 21 ASTM D2241/RJ PVC Force Main Pipe by Bore, as shown and specified:

1. Item shall consist of furnishing all tools, equipment, materials, and labor including excavation, backfill, and other appurtenances necessary to install 2" diameter PVC pipe by bore as detailed on the plans and in these specifications.

2. Measurement and payment of this item shall be per linear foot based on horizontal ground surface field measurements and as shown on the Proposal.

3. This item includes all costs for the installation of the sewer line by bore and all related items of work as required, in all soil conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 31 00 COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and Project Conditions

B. Field Engineering

C. Preconstruction Meeting

D. Progress Meetings

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation.

B. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

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

1.3 FIELD ENGINEERING

A. Control datum for survey is that shown on Drawings.

B. Verify set-backs and easements; confirm drawing dimensions and elevations.

C. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.4 PRECONSTRUCTION MEETING

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

B. Attendance Required: Owner, Engineer, Contractor and major Subcontractors.

C. Agenda:

1. Distribution of Contract Documents.

2. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.

3. Designation of personnel representing the parties in Contract and the Engineer.

4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

5. Scheduling.

6. Contractor's access to the site

7. Use of premises by Owner and Contractor.

8. Coordination of tie-ins.

9. Owner's requirements.

10. Application for Payment procedures.

11. Procedures for testing.

12. Procedures for maintaining record documents.

D. Engineer to record minutes and distribute copies within five (5) days after meeting to participants.

1.5 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work as deemed necessary by the Owner, Engineer, or the Contractor.

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

C. Attendance Required: Job Superintendent, major subcontractors and suppliers, Owner, Engineer as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.

2. Review of Work progress.

3. Field observations, problems, and decisions.

4. Identification of problems, which impede planned progress.

5. Review of submittals schedule and status of submittals.

6. Review of off-site fabrication and delivery schedules.

7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.

9. Planned progress during succeeding work period.

10. Coordination of projected progress.

11. Maintenance of quality and work standards.

12. Effect of proposed changes on progress schedule and coordination.

13. Other business relating to work.

E. Engineer will record minutes and distribute copies within five (5) days after meeting to participants.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 31 13 PROJECT COORDINATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Construction Mobilization

B. Schedules

C. Submittals

D. Closeout Procedures.

1.2 CONSTRUCTION MOBILIZATION

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

B. During construction, coordinate use of site and facilities through the Resident Project Representative.

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

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

E. Coordinate field engineering and layout work under instructions of the Resident Project Representative.

1.3 SCHEDULES

A. Submit preliminary progress schedule in accordance with Section 01 32 16 coordinated with Project construction schedule.

B. After review, revise and resubmit schedule to comply with revised Project schedule.

C. During progress of work revise and resubmit with Applications for Payment.

1.4 SUBMITTALS

A. Provide submittals to Project Coordinator for review and transmittal to Engineer.

B. Submit preliminary shop drawings, product data and samples in accordance with Section 01 33 00 for review and compliance with Contract Documents, for field dimensions and clearances, for relation to available space, and for relation to work of separate contracts. Revise and resubmit as required.

C. Submit applications for payment on AIA G702, EJCDC 1910-8-E, AIA G722 and G723, or Engineer approved forms for review and for transmittal to Engineer.

D. Submit requests for interpretation of Contract Documents, and obtain instructions through the Resident Project Representative.

E. Process requests for substitutions, and change orders, through the Project Coordinator.

F. Deliver closeout submittals for review and preliminary inspection reports, for transmittal to Engineer.

1.5 CLOSEOUT PROCEDURES

A. Notify Resident Project Representative when Work is considered ready for Substantial Completion. Accompany Resident Project Representative on preliminary inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.

B. Comply with Resident Project Representative's instructions to correct items of work listed in executed Certificates of Substantial Completion.

C. Notify Resident Project Representative when Work is considered finally complete. Accompany Resident Project Representative on preliminary final inspection.

D. Comply with Resident Project Representative's instructions for completion of items of Work determined by Engineer's final inspection.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal Procedures

B. Construction Progress Schedules

C. Product Data

D. Shop Drawings

E. Design Data

F. Test Reports

G. Certificates

H. Manufacturer's Instructions

I. Manufacturer's Field Reports

J. Erection Drawings

1.2 RELATED SECTIONS

A. Section 01 45 00 – Quality Control.

B. Section 01 77 00 - Contract Closeout.

1.3 SUBMITTAL PROCEDURES

A. All items shall be transmitted electronically and include a Contractor's review stamp.

B. All items shall be submitted electronically. The preferred method of submission is utilizing the Newforma Info Exchange project page provided by KSA. KSA will provide a link to the project page for the Contractor to make submittals, to submit RFI's, and upload large files as necessary. There is no cost for using this service. If for some reason the Contractor cannot utilize the Newforma Info Exchange project page for submission, the Contractor shall submit one scanned copy of the submittal via email to the Project Manager, David Perkins, at dperkins@ksaeng.com.

C. Transmittals

1. An item that is resubmitted will retain the original number but with an added suffix starting with A.

2. Only one specification division should be covered by one letter of transmission and Newforma file transfer.

3. Sufficient catalog information together with catalog cuts and technical data must be submitted to allow an evaluation to be made to determine whether or not the item in question is acceptable.

D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

E. Schedule submittals to expedite the Project and coordinate submission of related items. For each submittal for review, allow fifteen (15) working days, excluding delivery time to and from the Contractor.

F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

G. Provide 3" x 5" space for Contractor and Engineer review stamps.

H. When revised for resubmission, identify all changes made since previous submission.

I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within fifteen (15) days after date of Owner-Contractor Agreement.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a computer generated horizontal bar chart with separate line for each major portion of Work or operation, identifying first work day of each week.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

1.5 PRODUCT DATA

A. Product Data for Review:

1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

2. After review, provide copies and distribute in accordance with Submittal Procedures article above and for record documents purposes described in Section 01 77 00 – Contract Closeout.

B. Product Data for Information:

1. Submitted for the Engineer’s knowledge as contract administrator or for the Owner.

C. Product Data for Project Closeout:

1. Submitted for the Owner’s benefit during and after project completion.

D. Submit the number of copies which the Contractor requires, plus three (3) copies which will be retained by the Engineer.

E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

F. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

G. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01 77 00 - Contract Closeout.

1.6 SHOP DRAWINGS

A. Shop Drawings for Review:

1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

2. After review, produce copies and distribute in accordance with Submittal Procedures article above and for record documents purposes described in Section 01 77 00 – Contract Closeout.

B. Shop Drawings for Information:

1. Submitted for the Engineer’s knowledge as contract administrator or for the Owner.

C. Shop Drawings for Project Closeout:

1. Submitted for the Owner’s benefit during and after project completion.

D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.7 SAMPLES

A. Samples for Review:

1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

2. After review, produce duplicates and distribute in accordance with Submittal Procedures article above and for record documents purposes described in Section 01 77 00 - Contract Closeout.

B. Samples for Information:

1. Submitted for the Engineer’s knowledge as contract administrator or for the Owner.

C. Samples for Selection:

1. Submitted to Engineer for aesthetic, color, or finish selection.

2. Submit samples of finishes from the full range of manufacturer’s standard colors, in custom colors selected, textures, and patterns for Engineer selection.

3. After review, produce duplicates and distribute in accordance with Submittal Procedures article above and for record documents purposes described in Section 01 77 00 - Contract Closeout.

D. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

E. Include identification on each sample, with full Project information.

F. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.

G. Reviewed samples which may be used in the Work are indicated in individual specification sections.

H. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.8 DESIGN DATA

A. Submit for the Engineer’s knowledge as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.9 TEST REPORTS

A. Submit for the Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

C. Refer to Section 01 45 00 - QUALITY CONTROL, Manufacturer’s Field Services article.

1.12 MANUFACTURER’S FIELD REPORTS

A. Submit reports for the Engineer’s benefit as contract administrator or for the Owner.

B. Submit report in duplicate within 30 days of observation to Engineer for information.

C. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.13 ERECTION DRAWINGS

A. Submit drawings for the Engineer's benefit as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by the Engineer or Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01 42 19 REFERENCE STANDARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality Assurance

1.2 QUALITY ASSURANCE

A. For Products or workmanship specified by association, trade or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents.

C. Obtain copies of standards when required by the Contract Documents.

D. Maintain copy at project site during submittals, planning and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from the Engineer before proceeding.

F. Neither the contractual relationship, duties and responsibilities of the parties in Contract nor those of the Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01 45 00 QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality Assurance - Control of Installation

B. Tolerances

C. References and Standards

D. Inspection and Testing Laboratory Services

E. Manufacturers' Field Services

1.2 RELATED SECTIONS

A. Section 01 42 19 - Reference Standards

B. Section 01 33 00 - Submittals: Submission of manufacturer’s instructions and certificates.

C. Section 01 60 00 – Product Requirements: Requirements for material and product quality.

1.3 QUALITY ASSURANCE - CONTROL OF INSTALLATION

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

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

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

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

E. Perform Work by persons qualified to produce required and specified quality.

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

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

1.4 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.5 REFERENCES AND STANDARDS

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

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

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

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

1.6 INSPECTION AND TESTING LABORATORY SERVICES

A. Contractor will appoint, employ and pay for specified services of an independent firm to perform testing.

B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Engineer.

C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Engineer or the Owner.

D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Engineer and independent firm 24 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing does not relieve Contractor to perform Work to contract requirements.

G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.

1.7 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer thirty (30) days in advance of required observations. Observer subject to approval of Engineer.

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

D. Refer to Section 01 33 00 - SUBMITTALS, MANUFACTURER'S FIELD REPORTS article.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specifications sections.

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

3.2 PREPARATION

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

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

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

END OF SECTION

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SECTION 01 45 23

TESTING SERVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Selection and Payment.

B. Quality Assurance.

C. Agency Responsibilities.

D. Agency Reports.

E. Limits on Testing Authority.

F. Contractor Responsibilities.

G. Schedule of Tests.

1.2 RELATED SECTIONS

A. Section 01 33 00 - Submittals.

B. Section 01 77 00 - Contract Closeout.

1.3 REFERENCES

A. ASTM C802 - Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction.

B. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

C. ASTM E329 - Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.

D. ASTM E543 - Practice for Determining the Qualification of Nondestructive Testing Agencies.

E. ASTM E548 - Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies.

F. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.4 SELECTION AND PAYMENT

A. Contractor will employ services of an independent testing agency or laboratory to perform specified testing.

B. Employment of testing agency or laboratory by the Owner in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1.5 QUALITY ASSURANCE

A. Laboratory: Authorized to operate in State in which Project is located.

B. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

C. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.6 AGENCY RESPONSIBILITIES

A. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

B. Perform specified sampling and testing of Products in accordance with specified standards.

C. Ascertain compliance of materials with requirements of Contract Documents.

D. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or Products.

E. Perform additional tests required by Engineer.

1.7 AGENCY REPORTS

A. After each test, promptly submit two (2) copies of report to Engineer and to Contractor.

B. Include:

1. Date Issued.
2. Project Title and Number.
3. Name of Inspector.
4. Date and Time of Sampling or Inspection.
5. Identification of Product and Specifications Section.
6. Location in the Project.
7. Type of Inspection or Test.
8. Date of Test.
9. Results of Tests.
10. Conformance with Contract Documents.

C. When requested by Engineer, provide interpretation of test results.

1.8 LIMITS ON TESTING AUTHORITY

A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency or laboratory may not approve or accept any portion of the Work.

C. Agency or laboratory may not assume any duties of Contractor.

D. Agency or laboratory has no authority to stop the Work.

1.9 CONTRACTOR RESPONSIBILITIES

A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used which require testing.

B. Cooperate with laboratory personnel, and provide access to the Work.

C. Provide incidental labor and facilities:

1. To provide access to work to be tested.
2. To obtain and handle samples at the site or at source of Products to be tested.
3. To facilitate tests.
4. To provide storage and curing of test samples.

D. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing services.

1.10 SCHEDULE OF TESTS

A. Individual Specification Sections: Tests required and standards for testing.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01 50 00 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, telephone service, water, and sanitary facilities.

B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.

C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.

1.2 TEMPORARY SANITARY FACILITIES

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

1.3 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.

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

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

1.4 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

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

1.5 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

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

C. Prohibit traffic from landscaped areas.

1.6 SECURITY

A. Provide security and facilities to protect Work from unauthorized entry, vandalism or theft.

B. Coordinate with Owner’s security program.

1.7 ACCESS ROADS

A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.

B. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.

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

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

E. Designated existing on-site roads may be used for construction traffic.

1.8 PARKING

A. When site space is not adequate, provide additional off-site parking.

1.9 PROGRESS CLEANING AND WASTE REMOVAL

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

B. Collect and remove waste materials, debris and rubbish from site periodically and dispose off-site.

1.10 PROJECT IDENTIFICATION

A. Provide two (2) four feet wide by four feet high project sign of exterior grade plywood and wood frame construction, painted, with exhibit lettering by professional sign painter to Engineer's design and colors.

B. List title of Project, names of Owner, Engineer, and Contractor.

C. Erect on site at location established by Engineer.

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

E. Refer to sign detail in these specifications.

F. Project funding agency signage requirements shall supersede other requirements of this section if applicable.

1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials prior to Substantial Completion inspection.

B. Remove underground installations to a minimum depth of two (2) feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 55 26 BARRICADES, SIGNS, AND TRAFFIC HANDLING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This item shall consist of providing, installing, moving, replacing, maintaining, cleaning, and removing upon completion of work all barricades, signs, barriers, cones, lights, signals, and such type devices of handling traffic as indicated in the plans or as directed by the Engineer.

1.2 REFERENCES

A. Texas Manual on Uniform Traffic Control Devices (TMUTCD).

1.3 QUALITY ASSURANCE

A. All barricades, signs, and other types of devices listed above shall conform to details shown in the plans or those indicated in the TMUTCD.

B. Prior to beginning work, the Contractor shall designate a competent person who will be responsible and available on the project site or in the immediate area to insure compliance with traffic control requirements.

C. The Engineer will designate a qualified person to observe implementation, and who will have authority to assure compliance with TMUTCD.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

A. Barricades, signs, and traffic handling devices shall be installed and maintained in accordance with the approved traffic control plan. These devices shall be maintained throughout the duration of the project unless otherwise approved by the Engineer.

B. Contractor shall be responsible for coordinating any traffic flow modification with City or State officials.

END OF SECTION

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SECTION 01 56 23 STORM WATER POLLUTION PREVENTION PLAN

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The work to be performed under this Section shall consist of furnishing all permits, preparation and implementation of a site specific Storm Water Pollution Prevention Plan, notice of intent, notice of termination, labor, equipment, materials, and pay all permit fees as necessary to meet the requirements of the Texas Pollution Discharge Elimination System (TPDES) associated with construction activities under TPDES Construction General Permit TXR150000 for storm water pollution prevention as required by current Federal, State, and Local rules and regulations as shown and specified.

1.2 SUBMITTALS FOR INFORMATION

A. Section 01 33 00 - Submittals: Procedures for submittals.

B. The following items shall be submitted for record purposes only. These documents will not be reviewed for compliance with permit requirements.

1. Storm water pollution prevention plan,

2. Notice of Intent (NOI),

3. Photocopies of permit application fee payment(s), and

4. Notice of Termination (NOT).

1.3 GENERAL PERMIT, APPLICATION, AND FEES

A. The Contractor shall bear sole responsibility for the storm water pollution prevention provisions of this Contact as well as bear sole responsibility for development, implementation, and maintenance of the storm water pollution prevention plan, the best management practices, and the facilities utilized to meet the TPDES General Permit requirements. The storm water pollution prevention plan and Notice of Intent shall be completed prior to beginning any work or stockpiling of materials.

B. Prior to filing the Notice of Intent, the Contractor shall develop and submit a project specific storm water pollution prevention plan based on best management practices that includes all aspects as required by current Texas Commission on Environmental Quality (TCEQ) and US Environmental Protection Agency (USEPA) rules.

C. After submittal of a Project specific storm water pollution prevention plan as required by TXR150000, the Contractor shall file the Notice of Intent (NOI). A copy of the NOI shall be submitted to the Engineer for record purposes.

D. The Contractor shall pay all fees, including initial application and renewal fees, associated the TPDES permit application. A photocopy of the payment shall be submitted to the Engineer.

E. The Contractor shall pay all costs associated with the development of the storm water pollution prevention plan as well as the implementation, maintenance, monitoring, and inspection of the storm water pollution prevention plan facilities during the construction period.

F. Upon closeout of the Project, the Contractor shall submit at Notice of Termination (NOT) to the TCEQ using the proper form and provide a copy to the Engineer or record purposes

1.4 SWPPP

A. The Storm Water Pollution Prevention Plan shall comply with the requirements of TPDES Construction General Permit TXR150000. For additional information contact the Texas Commission on Environmental Quality at P. O. Box 13087, Austin, TX 78711-3087 or on the web at

http://www.tnrcc.state.tx.us/permitting/waterperm/wwperm/construct.html#approved

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 60 00 MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Transportation and Handling

B. Storage and Protection

C. Product Options

D. Substitutions

1.2 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.3 STORAGE AND PROTECTION

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

B. Store with seals and labels intact and legible.

C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.

D. For exterior storage of fabricated Products, place on sloped supports above ground.

E. Provide off-site storage and protection when site does not permit on-site storage or protection.

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

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.4 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

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

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

1.5 SUBSTITUTIONS

A. Engineer will consider requests for Substitutions only within thirty (30) days after date established in Notice to Proceed.

B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

2. Will provide the same warranty for the Substitution as for the specified Product.

3. Will coordinate installation and make changes to other Work, which may be required for the Work to be complete with no additional cost to Owner.

4. Waives claims for additional costs or time extension, which may subsequently become apparent.

5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.

2. Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on the Contractor.

3. The Engineer will notify Contractor of decision to accept or reject request.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 77 00 CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout Procedures

B. Final Cleaning

C. Project Record Documents

D. Operation and Maintenance Data

E. Spare Parts and Maintenance Products

F. Warranties

G. Maintenance Service

1.2 RELATED SECTIONS

A. Section 01 50 00 - Construction Facilities and Temporary Controls

1.3 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean debris from drainage systems.

C. Clean site; sweep paved areas, rake clean landscaped surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from the site.

E. Remove all temporary facilities and structures.

1.5 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings

2. Specifications

3. Addenda

4. Change Orders and other modifications to the Contract

5. Reviewed Shop Drawings, Product Data, and Samples

6. Manufacturer's instruction for assembly, installation, and adjusting

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

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

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

2. Field changes of dimension and detail.

3. Details not on original Contract drawings.

G. Submit documents to Engineer prior to final Application for Payment.

1.6 WARRANTIES

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers and manufacturers.

C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

1.7 MAINTENANCE SERVICE

A. Furnish service and maintenance of components indicated in specification sections for one (1) year from date of Substantial Completion during the warranty period.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust and lubricate as required.

C. Include systematic examination, adjustment and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 31 05 13 EARTH FILL CLASSIFICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Subsoil materials.

B. Topsoil materials.

1.2 RELATED SECTIONS

A. Section 31 05 16 – Aggregate Fill Earthwork.

B. Section 31 23 33 – Excavation, Backfilling, and Compacting for Utilities.

C. Section 31 22 19 – Finish Grading.

D. Section 32 92 19 – Seeding.

1.3 REFERENCES

A. ASTM D698 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures.

B. ASTM D2487 – Classification of Soils for Engineering Purposes.

C. ASTM D2922 – Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

D. ASTM D3017 – Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

E. Association of Official Agriculture Chemists.

F. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

https://www.cityofdenton.com/en-us/business/solicitations-contracting

1.4 SUBMITTALS FOR REVIEW

A. Section 01 33 00 – Submittals: Procedures for submittals.

B. Samples:

1. Submit, in air–tight containers, 10 lb. sample of each type of fill to testing laboratory.

2. All off-site materials must be approved by the Engineer prior to installation.

1.5 SUBMITTALS FOR INFORMATION

A. Section 01 33 00 – Submittals: Procedures for submittals.

B. Materials Source: Submit name of imported materials source.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with plans and specification requirements, TxDOT standards, and Owner standards.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Soil Type S1 – Subgrade material:

1. Material remaining in place after excavation.

2. Suitable for slab/foundation subgrade, undisturbed nor over excavated.

3. Where subgrade soils are soft, loose, or otherwise unsatisfactory, the soil shall be removed and replaced with select fill or soil cement as determined by the Engineer.

B. Soil Type S2 – Common Fill:

1. Excavated and re-used material or from borrow approved by the Engineer.

2. Graded free of lumps larger than 3 inches, rocks larger than 2 inches, excessive silts and debris.

3. Do not use soil containing brush, roots, or similar organic matter.

4. Conforming to ASTM D2487 Class II or Class III soils with a liquid limit less than 40, and a plasticity index less than 20, but greater than 4.

C. Soil Type S3 – Select Fill:

1. Imported borrow material from borrow area approved by the Engineer. Material shall be tested for compliance by the Contractor and test results submitted to the Engineer for approval.

2. Clayey sand soils free from organic matter with no lumps larger than 1 inch, no rocks larger than ½ inch, nor excessive silts.

3. Do not use soils containing brush, roots, sod or other organic materials.

4. Select fill shall conform to ASTM D2487 Class II or Class III and shall have a liquid limit less than 30 with a plasticity index less than 15 but greater than 4.

D. Soil Type S4 – Top Soil:

1. Soil suitable for growth of surface cover. Material stripped and stockpiled from site or borrowed from off site.

2. Free from roots, brush, rocks, weeds and other extraneous matter exceeding 1 inch in any direction.

3. Minimum 60% sand, Maximum 30% silts, Maximum 10% clay, no less than 6% and no more than 20% organic matter.

4. Submit test data showing compliance with these specifications. Include percent weight of constituent material, material particle size, and pH.

   a. Topsoil shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches or more in diameter), clay lumps or similar objects.

   b. There shall be not less than twenty percent (20%) nor more than eighty percent (80%) of the material passing the 200-mesh sieve as determined by the wash test in accordance with ASTM C 117.

   c. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the Association of Official Agriculture Chemists in effect on the date of the invitation of bids.

   d. The organic content shall be not less than three percent (3%) nor more than twenty percent (20%) as determined by the wet-combustion method (chromic acid reduction).

2.2 SOURCE QUALITY CONTROL

A. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698.

B. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work. A change in source requires sampling, testing, and approval by the Engineer.

PART 3 EXECUTION

3.1 SOIL REMOVAL

A. Excavate soils from areas designated.

B. Remove lumped soil, boulders, and rock.

C. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.2 STOCKPILING

A. Stockpile materials on site at locations designated by Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition

B. If a borrow area is indicated, leave area in a clean and neat condition.

C. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 05 16 AGGREGATE FILL EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate materials.

1.2 RELATED SECTIONS

A. Section 31 05 13 - Earth Fill Classifications.

B. Section 31 23 33 - Trenching & Backfill.

C. Section 33 31 19 – Small Diameter Sanitary Sewer.

D. Section 31 22 19 – Finish Grading.

1.3 REFERENCES

A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures.

C. ASTM D2487 - Classification of Soils for Engineering Purposes.

D. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

E. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

F. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

https://www.cityofdenton.com/en-us/business/solicitations-contracting

1.4 SUBMITTALS FOR REVIEW

A. Section 01 33 00 - Submittals: Procedures for submittals.

B. Samples: Submit, in air-tight containers, 10 lb. sample of each type of material to testing laboratory.

1.5 SUBMITTALS FOR INFORMATION

A. Section 01 33 00 - Submittals: Procedures for submittals.

B. Materials Source: Submit name of imported materials suppliers.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with plans and specification requirements, TxDOT standards, and Owner requirements.

PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1 - Drain Rock:

1. As shown on the Drawings, under structures and behind walls shall be clean, washed, sound durable, well-graded crushed rock, crushed gravel or natural stone gravel.

2. Conforming to ASTM C-33 Size No. 57 coarse aggregate between 1 inch and 1/4 inch.

B. Coarse Aggregate Type A2 - Pipe Embedment:

1. Angular 1 inch crushed rock or natural stone meeting the requirements of ASTM C-33 No. 57.

2. Embedment material shall be clean, washed, sound, durable and well graded.

C. Coarse Aggregate Type A3 - Foundation Material:

1. Coarse stone or crushed gravel.

2. Foundation material shall be pit run angular crushed, natural washed stone free of shale, clay, friable material and debris; well graded between 1 and 3 inches in size, with a minimum of 90% retained on a 1-inch sieve.

D. Aggregate Type A4 - Pea Gravel:

1. Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ASTM C136 to the following limits:

2. Minimum Size: ¼ inch

3. Maximum Size: ⅝ inch

2.2 FINE AGGREGATE MATERIALS

A. Fine Aggregate Type A5 - Sand:

1. Natural river or bank sand; washed, free of silt, clay, loam, friable or soluble materials and organic matter; graded in accordance with ASTM C136; within the following limits:

Sieve Size	Percent Passing
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0 to 10

2.3 SOURCE QUALITY CONTROL

A. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698, and ASTM C33.

B. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698, and ASTM C33.

C. If tests indicate materials do not meet specified requirements, change material or material source and retest.

D. Provide materials of each type from same source throughout the Work. A change in source requires sampling, testing, and approval by the Engineer.

PART 3 EXECUTION

3.1 STOCKPILING

A. Stockpile materials on site at locations designated by the Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

A. Remove stockpile; leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

B. Leave unused materials in a neat, compact stockpile.

C. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

END OF SECTION

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SECTION 31 10 13 CARE OF WATER DURING CONSTRUCTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish labor, materials, equipment and incidentals, including pumps, piping and other facilities necessary to remove surface and groundwater as needed to perform the required project construction.

B. Build and maintain the necessary temporary impounding works, channels, and diversions. Remove the temporary works, equipment, and materials after they have served their purpose in strict accordance with this section of the specifications and the applicable drawings.

1.2 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 – Submittals and shall include plans and procedures for handling flood flows and dewatering excavations. Submit plans and procedures to Engineer for approval.

B. Any construction modifications to the system shall also be submitted.

1.3 JOB CONDITIONS

A. Approval of plans and procedures for handling flood flows and dewatering does not relieve the Contractor of full responsibility and liability for care of water during construction.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 FLOOD FLOWS AND OTHER WATER

A. The Contractor shall be responsible for handling and diverting any flood flows, stream flows, or any other water, including groundwater encountered during the progress of the work. Build, maintain, and operate cofferdams, channels, flumes, sumps, and other temporary works needed to pass floodwater, divert stream flow, or pass other surface water through or around the construction site and away from construction in progress. Unless otherwise approved by the Engineer, a diversion must discharge into the same natural watercourse in which its headworks are located.

B. Construct permanent work in areas free from water. The removal of protective works, after having served their purpose, shall be in a manner satisfactory to the Engineer.

3.2 SURFACE RUNOFF

A. Surface runoff water shall be diverted away from the trenches. Such diversion shall be into existing drainage structures such as storm sewers, ditches or streams. Diversion of surface runoff shall be in such a manner to prevent flooding of or damage to public or private property.

3.3 DEWATERING EXCAVATED AREAS

A. The Contractor shall be responsible for dewatering all excavations during construction. Lower the water table as needed to keep those areas free of standing water or excessive muddy conditions.

B. Furnish the drains, sumps, casings, well points, and other equipment necessary to dewater areas for required construction work. Any dewatering method that causes a loss of fines from foundation areas will not be permitted. Keep available standby equipment to provide proper and continuous operation of the dewatering system. Provide continuous monitoring (24 hours per day) of the dewatering system to provide continuous operation.

3.4 DEWATERING TRENCHES

A. Dewatering of trenches shall be accomplished by whatever means elected by the contractor. However, bedding material or pipe may not be placed in wet or unstable trenches. Soil that cannot be properly dewatered shall be excavated and dry material tamped in place to such a depth as may be required to provide a firm trench bottom.

END OF SECTION

SECTION 31 22 19 FINISH GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Final grade topsoil for finish landscaping.

1.2 RELATED SECTIONS

A. Section 31 05 13 - Earth Fill Classification.

B. Section 31 23 33 - Trenching & Backfilling

C. Section 32 92 19 – Seeding.

PART 2 PRODUCTS

2.1 MATERIAL

A. Topsoil: Fill Type S4 as specified in Section 31 05 13, EARTH FILL CLASSIFICATIONS.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate base has been contoured and compacted.

3.2 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove subsoil contaminated with petroleum products.

C. Scarify surface 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, and planting is required, to thickness as scheduled. Place topsoil during dry weather.

B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of sub-grade.

C. Remove roots, weeds, rocks, and foreign material while spreading.

D. Manually spread topsoil close to plant life, buildings, and structures to prevent damage.

E. Lightly compact placed topsoil.

F. Remove surplus subsoil and topsoil from site.

G. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 TOLERANCES

A. Top of Topsoil: Plus or minus ½ inch.

3.5 PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, utilities, paving, and curbs.

END OF SECTION

SECTION 31 23 16.16 EXCAVATION, BACKFILLING AND COMPACTING FOR STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating, backfilling and compacting for structures and soil borings.

1.2 REFERENCES

A. ASTM C33 - Concrete Aggregates.

B. ASTM D698 - Standard Methods of Test for Moisture-Density Relations of Soil (Standard).

C. ASTM D1557 - Test for Moisture-Density Relations of Soil (Modified).

D. ASTM D2922 - Density of Soil and Soil Aggregate In-Place by Nuclear Methods.

E. ASTM D2487-98 - Classification of Soils for Engineering Purposes.

F. ASTM D3017 - Moisture Content of Soil and Soil Aggregate In-Place by Nuclear Methods.

G. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

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1.3 SUBMITTALS

A. See Section 01 33 00, SUBMITTALS.

B. Samples: Aggregate samples of material as required by the testing laboratory.

C. Quality Control Submittals: For information only.

1.4 PROJECT CONDITIONS

A. Protection:

1. Erect sheeting, shoring and bracing as necessary for protection of persons, improvements and excavations.

2. Provide dewatering and drainage necessary to keep excavations free of water. Dewatering System shall maintain the water level a minimum of 3 feet below the excavation. Contractor shall provide and maintain all dewatering equipment during excavation, construction, backfill, and until structure is placed in service. Contractor shall operate dewatering system continuously without interruption during weekends and/or holidays.

B. Coordination: Coordinate backfill operations with installation of utilities.

PART 2 PRODUCTS

2.1 SELECT FILL

A. Source: Select fill shall be imported borrow material from borrow areas approved by the Engineer. Site excavated materials meeting the conditions of select fill shall be acceptable. Material from source shall be tested for compliance with project requirements and approved by the Engineer.

B. Suitability: Use the best material available, suitability of select fill is subject to the Engineer's approval.

C. Quality: Select fill material must be free of clay lumps larger than 1 inch, rocks larger than ½ inch, and/or excessive slits. Do not use soil containing brush, roots, sod or similar organic materials.

D. Characteristics: Materials shall conform to ASTM D2487 Class II or Class III and shall have a liquid limit less than 30 with a plasticity index less than 12 but greater than 4.

2.2 GENERAL SITE FILL

A. Source: Obtain general site fill from required excavation or, if excavated material is not sufficient, from borrow areas approved by the Engineer.

B. Suitability: Use the best material available from excavation or borrow. Suitability of general site fill material is subject to the Engineer's approval.

C. Quality: Fill material shall be free of lumps larger than 3 inches, rock larger than 2 inches and excessive silts. Do not use soil containing brush, roots, sod or similar organic materials.

D. Characteristics: General site fill material shall conform to ASTM D2487 Class II or Class III soils.

2.3 AGGREGATE

A. Free-draining, well-grade crushed rock, gravel, or sand per ASTM C33, Coarse Aggregate Section.

2.4 TOP SOIL

A. Source: Obtain top soil from the required excavation, or if sufficient material is not available, obtain from borrow areas approved by the Engineer.

B. Suitability: Use the best material available. Suitability of material is subject to the Engineer's approval.

C. Quality: Material shall be free of large roots or branches, stumps, brush, rubbish, or other objectionable matter.

D. Characteristics: Soils possessing the characteristics that produce growth of grasses or other vegetation.

2.5 SOURCE QUALITY CONTROL

A. Provide materials of each type from same source throughout the Project.

B. A change in source requires sampling, testing, and approval by Engineer.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine project site and investigate existing subsurface conditions to determine nature, kind and character of materials and conditions to be encountered.

B. Prior to commencing excavation operations, disconnect and cap or protect existing utility services, if any, in accordance with the requirements of the owning companies and applicable ordinances and regulations.

C. Provide for surface drainage.

D. Keep excavations free of water during entire progress of the work.

E. Prior to backfilling grade beams and below grade walls, verify that beams, walls and footings have properly cured.

F. Verify that forms, trash, debris and applicable temporary shoring have been removed.

G. Verify that walls are supported at top and bottom.

3.2 EXCAVATION AND SUBGRADE PREPARATION

A. Excavate beneath structures to lines, grades, and elevations as shown. Over excavation shall be restored by the Contractor at his own expense. Over excavation shall be corrected by backfilling with select fill in 8 inch lifts. Compact to 95% of maximum density within 2% of optimum moisture per ASTM D698.

B. Scarify exposed surfaces to a depth of 8 inches and recompact to a density of 95 percent of the maximum density when tested by the Standard Proctor Compaction Test (ASTM D698), at a moisture content of ±2 percent of optimum.

C. Remove weak or highly organic soils noted by probing and replace with general site fill. Place fill in 8-inch lifts and compact to 95 percent of maximum density (ASTM D698) at a moisture content of ±2 percent of optimum.

D. Do not extend structure fill beyond structure lines or as shown.

E. Excavation is unclassified. Break rock with hydraulic ram to obtain near neat line excavation. Blasting is not allowed.

3.3 BACKFILL

A. Schedule backfilling to expedite construction progress.

B. Backfill in manner to prevent excessive pressure against previously completed work and to prevent damage or displacement to utility systems.

C. Place backfill materials for grade beams as follows:

1. Exterior Face of Grade Beams: Where required, backfill with select fill. Place backfill in layers of approximately 8 inches loose lifts and compact to 98 percent of maximum density, percent moisture of ±2 percent of optimum. Standard Proctor Density (ASTM D698).

2. Place backfill at grade beams as soon as forms are removed. Keep grade beam excavations dry at all times. If rain occurs before backfill is placed, remove water from excavations immediately.

D. Backfill structure walls with select fill within 8” of the structure, and general site fill for the remaining fill. Compact by vibrating to 95 percent of maximum density within two percent of optimum moisture as measured by ASTM D698. Compaction within five (5) feet of the structure shall be achieved using hand compaction equipment. Do not over compact.

E. Exercise care to prevent over compaction of backfills.

F. Where top of below grade structure backfill is not covered with paving or other impervious barrier, the final 2 feet of backfill shall be select fill. Place fill in 8 inch thick lifts and compact to 95 percent of maximum density at ±2 percent of optimum moisture content. Allow for 4 inches of topsoil placement.

3.4 MATERIAL DISPOSAL

A. Remove waste and excess excavated material from the construction site before final inspection. Legally dispose of material at a licensed site or with written and notarized permission from the property owner for a private disposal site. All costs associated with waste material removal and disposal shall be paid for by the Contractor.

3.5 SOIL BORINGS

A. A copy of the Geotechnical Report for this project is attached in the appendix of the specification.

3.6 TESTING SERVICES:

A. Contractor will employ and pay for services of an independent testing agency or laboratory to perform specified testing.

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

C. The Contractor shall be responsible for all costs associated with performing the required testing. Prior to construction the Contractor shall select a testing agency or laboratory to perform the required testing and shall notify the Owner in writing which testing agency or laboratory will be used for the required tests. The Contractor shall use one testing agency or laboratory for all materials testing required to complete the project. Test results shall be furnished to the Owner electronically and by hand delivery to the Owner’s Construction Inspector with three (3) working days of completion of the test.

D. Testing Agency shall perform compaction testing of every lift placed around the proposed meter vault. A minimum of three (3) separate tests of each lift shall be performed (one test on each side of the new meter vault) for each lift of backfill placed.

END OF SECTION

SECTION 31 23 23 EXCAVATION, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Excavating, trenching, backfilling and compacting for water distribution mains, sanitary sewers, manholes and other utility systems and appurtenances, and the disposal of excess excavated material.

1.2 REFERENCES:

A. ASTM C33 - Coarse Aggregates.

B. ASTM D698 - Moisture-Density Relations of Soils (Standard.)

C. ASTM D2487 - Classification of Soils for Engineering Purposes.

D. ASTM D4254 - Minimum Index Density and Unit Weight of Soils and Calculations of Relative Density.

E. ASTM D4318 - Test for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

F. OSHA - Occupational Safety and Health Administration and Related Regulations.

G. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

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1.3 PROTECTION OR REMOVAL OF UTILITY LINES:

A. The Contractor shall anticipate all underground obstructions such as, but not limited to, water mains, gas lines, storm and sanitary sewers, telephone or electric light or power ducts, concrete, and debris.

1. Any such lines or obstructions indicated on the Drawings show only the approximate locations and shall be verified in the field by the Contractor.

2. The Owner and Engineer will endeavor to familiarize the Contractor with all known utilities and obstructions, but this shall not relieve the Contractor from full responsibility in anticipating all underground obstructions whether or not shown on the Drawings.

B. The Contractor shall, at his own expense, maintain in proper working order and without interruption of service all existing utilities and services which may be encountered in the work.

1. With the consent of the Engineer and utility owner such service connections may be temporarily interrupted to permit the Contractor to remove designated lines or to make temporary changes in the locations of services.

2. The cost of making any temporary changes shall be at the Contractor's expense.

C. Notify all utility companies involved to have their utilities located and marked in the field.

1. All underground utilities shall then be uncovered to verify location and elevation before construction begins.

2. The Contractor shall obtain all necessary permits.

D. The Contractor shall obtain necessary permits, except right-of-way permits, required for completion of the project.

E. Utility Spacing: The spacing for utility lines shall meet the installation requirements and the requirements of the TCEQ 30TAC 290.44(e).

1.4 PROJECT CONDITIONS:

A. Protection:

1. Erect sheeting, shoring and bracing as necessary for protection of persons, improvements, existing structures, and excavations.

2. Provide dewatering and drainage necessary to keep excavations free of water.

a. Dewatering System shall maintain the water level a minimum of 3 feet below the excavation.

b. Contractor shall provide and maintain all dewatering equipment during excavation, construction, backfill, and until utility is placed in service.

c. Contractor shall operate dewatering system continuously without interruption during weekends and/or holidays.

PART 2 PRODUCTS

2.1 MATERIALS:

A. Earth Backfill:

1. Earth backfill shall be excavated and reused or borrow material free of lumps larger than 1 inch, stones larger than 1/2 inch, trash, organic, spongy or otherwise objectionable material.

2. Earth backfill materials shall be approved by Engineer.

B. Sand:

1. Sand shall be free from clay lumps, organic and other deleterious material, and have a plasticity index no greater than 12, as determined by ASTM D4318.

C. Crushed Rock:

1. Provide durable crushed rock free of clay lumps, organic or other deleterious material.

2. Crushed rock size shall be Class I per ASTM D1487.

3. ASTM C33, size No. 57 or 67 shall be considered Class I material.

D. Coarse-Grained Soils:

1. Coarse-grained soils for pipe bedding shall be ASTM D2487, Class II or III.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION:

A. Examine utility routes and coordinate excavation work to eliminate installation conflicts.

B. Allow room for stockpiling excavated material and utility construction material during utility construction.

3.2 TRENCH EXCAVATION:

A. Procedure: Excavate to indicated or specified depths.

1. Excavate by open cut method.

2. Dispose of unacceptable backfill material and provide suitable material for backfill without additional expense.

3. During excavation, stockpile material suitable for backfilling in an orderly manner far enough from the bank of the trench to avoid overloading, slides, or cave-ins.

4. Grade as necessary to prevent surface water from flowing into trenches or other excavations.

5. Cut banks of trench as nearly vertical as practical.

a. Remove stones as necessary to avoid point-bearing.

b. Over-excavate wet or unstable soil from the trench bottom to permit construction of a more stable bed for pipe.

c. Over excavation shall be filled and tamped with clean dry sand or other approved material to the required grade.

6. Excavate the trench to the proper width as shown.

a. If the trench width below the top of pipe is wider than specified in this Section or shown, install additional backfill.

b. No additional payment will be made for additional material or work required for installation.

7. Accurately grade the trench bottom to provide proper bedding as required for pipe installation.

8. If any excavation is carried beyond the lines and grades required or authorized, the Contractor shall, at his own expense, fill such space with concrete or other suitable material as directed by the Engineer. No additional payment will be made.

B. Sheeting and Bracing:

1. Install sheeting and bracing necessary to support the sides of trenches and other excavations with vertical sides, as required by current OSHA regulations.

C. Water in Excavation:

1. Keep work free from ground or surface water at all times.

2. Provide pumps of adequate capacity or other approved method to remove water from the excavation in such a manner that it will not interfere with the progress of the work or the proper placing of other work.

D. Trenching Progress:

1. Trenching operations shall not be in excess of 100 feet ahead of pipe laying operations in city streets or 1,000 feet in open country.

2. Not more than two (2) consecutive cross-streets may be closed to traffic at any given time.

E. Existing Lawns and Shrubbery:

1. The Contractor shall take particular care to preserve existing lawns and shrubbery.

2. Make minor pipe alignment changes as may be necessary with approval from the Engineer.

F. Existing Pavement:

1. Existing pavement over trenches shall be removed to a width of 6 inches outside of the trench on each side.

2. Remove to a neat line by sawing method.

3. Remove brick pavement by hand, deliver and stack as directed by the Owner.

3.3 Pipe Bedding:

A. Pipe Zone:

1. The pipe zone is defined as including the pipe bedding, backfill to one-half the pipe diameter (the springline) and the initial backfill to 12 inches above the top of the pipe.

B. Class A Bedding:

1. Where shown, the Contractor shall install the pipe in concrete encasement.

2. Concrete for encasement shall be 3000-psi compressive strength as specified in Section 03300.

3. Precautions shall be used to prevent pipe movement or deflection during construction.

4. Concrete for encasement, shall be included in the unit price bid per linear foot in place.

C. Class B Bedding:

1. Where shown, the Contractor shall install the pipe with sand bedding.

2. Accurately grade the bottom of the trench 4 inches below the bottom of the pipe and limits of clear space on either side of the pipe.

3. Place a minimum of 4 inches of compacted sand backfill up to the flow line of the pipe or above before pipe is laid.

4. Install pipe, place additional sand backfill to springline and compact.

5. Complete bedding with compacted sand to 12 inches above the top of the pipe.

6. Compact the bedding and backfill to a minimum of 95 percent of maximum dry density per ASTM D698, maintaining moisture within ±2 percent of optimum or 70 percent of relative density per ASTM D4254.

D. Class C Bedding:

1. Pipe bedding for pipes 10 inch diameter and larger shall be Class C unless otherwise stated.

2. Accurately grade the bottom of the trench 4 inches below the bottom of the pipe and to the limits of the clear space on either side of the pipe.

3. Place a minimum of 4 inches of compacted granular embedment material (Type A2) below the pipe and to the spring line of the pipe.

4. The initial layer of embedment material placed to receive the pipe shall be brought up to a grade slightly higher than that required for the bottom of the pipe and the pipe shall be placed thereon and brought to grade by tamping, or by removal of the slight excess amount of embedment under the pipe.

5. Adjustment to grade line shall be made by scraping away or filling with embedment materials. Wedging or blocking up of pipe will not be permitted.

6. Each pipe section shall have a uniform bearing on the embedment for the full length of the pipe, except immediately at the joint.

7. After each pipe has been graded, aligned, placed in final position on the bedding material and joint made, sufficient embedment material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and alignment during subsequent pipe jointing and embedment operations.

8. Embedment material shall be deposited simultaneously on each side of pipe and compacted uniformly to the spring line or the elevation shown on the plans, whichever is higher.

9. Sheeting and shoring will not be allowed in the pipe zone during or after installation of the pipe or embedment material, unless special provisions are made to ensure the specified compaction of bedding and pipe alignment is maintained after removal of sheeting and shoring.

E. Class D Bedding:

1. Class D Bedding shall be used only when directed by the Engineer or the Engineer's Representative.

2. Accurately grade the bottom of the trench as required for a stable foundation below the bottom of the pipe and to limits of clear space on either side of the pipe.

3. Place and compact Type A3 Foundation Material to a level of 4 inches below the bottom of the pipe and to limits of clear space on either side of the pipe.

4. Place and compact a minimum of 4 inches of sand backfill up to the flow line of the pipe or above before pipe is laid.

5. Install the pipe and place additional sand backfill to the spring line of the pipe and compact.

6. Complete bedding with compacted sand backfill to 12 inches above the top of the pipe.

7. Compact the bedding and backfill to minimum of 95 percent of maximum density per ASTM D698. Maintain moisture within ±2 percent of optimum.

F. Class E Bedding

1. Pipe bedding for pipes 8 inches diameter or smaller shall be Class E unless otherwise stated.

2. Accurately grade the bottom of the trench 4 inches below the bottom of the pipe and limits of clear space on either side of the pipe.

3. Place a minimum of 4 inches of compacted select spoil backfill up to the flow line of the pipe or above before pipe is laid.

4. Install pipe, place additional select spoil backfill to springline and compact.

5. Complete bedding with compacted select spoil to 12 inches above the top of the pipe.

6. Compact the bedding and backfill to a minimum of 95 percent of maximum dry density per ASTM D698, maintaining moisture within ± 2 percent of optimum of 70 percent of relative density per ASTM D4254.

7. Remainder of trench shall be spoil backfill compacted to density of adjacent in situ soil.

3.4 UTILITY INSTALLATION:

A. Sanitary Sewers, Water Supply and Distribution Lines:

1. Limit clear space on either side of the pipe to 12 inches.

2. Above the pipe, cut as wide as necessary to sheet and brace and properly perform the work.

3. Provide class of bedding as shown.

4. Avoid interference with other utilities.

5. Install piping and appurtenances as specified.

B. Electrical System:

1. Trench banks for conduit lines need not be kept vertical but may be sloped or widened to such general limits as may be set, provided there is no interference with other utilities.

2. Over-excavating and backfilling with suitable selected material where rock is encountered will not be required except for a gradual cushioning toward points of abrupt drop-off in the rock to levels considerably below the grade of the conduit.

3. Special trenching requirements for conduits, direct-buried electrical cables and duct lines are specified in Division 16 - Electrical.

C. Storm Sewer Culverts:

1. Grade trenches to the line and grade required for proper installation of pipe.

2. Provide Class C bedding for concrete pipe for culvert installation.

3. Install piping and appurtenances as specified.

D. Excavation for Appurtenances:

1. Excavate sufficiently for manholes, utility pull boxes and similar structures to leave at least 2 feet clear between the outer surfaces and the embankment or timber that may be used to hold and protect the banks.

2. Any over-depth excavation below such appurtenances not directed will be considered unauthorized and will be refilled with concrete, as directed by the Engineer, at no additional cost to the Owner.

3.5 BACKFILLING:

A. Criteria:

1. Backfill trenches to ground surface with material as specified.

2. Reopen trenches improperly backfilled to depth required for proper compaction.

3. Refill and compact as specified, or otherwise correct the condition in an approved manner.

B. Open Areas:

1. Above the pipe zone, deposit earth backfill in 8-inch lifts.

2. Mound excess material over trench as shown.

3. Excavated material placed shall be free of rock greater than 6 inches in any direction.

4. All forms, lumber, trash and debris shall be removed from trenches, manholes and other utility structures.

5. Backfill for manholes, utility pull boxes and other utility structures shall be placed in accordance with applicable Specification Sections.

C. Pavement Section:

1. Above pipe zone, place compacted ASTM D2487 Class II material in 6-inch lifts. Compact to 95% of maximum density within 2% of optimum moisture per ASTM D698. Complete the backfill with aggregate base course and paving as specified and detailed.

3.6 DISPOSAL OF EXCESS MATERIAL:

A. Remove waste and excess excavated material from the construction site before final inspection.

B. Legally dispose of material at a licensed site or with written and notarized permission from the property owner for a private disposal site.

C. All cost associated with waste material removal and disposal shall be paid for by the Contractor.

END OF SECTION

SECTION 31 23 33.13 TRENCH SAFETY

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Requirements for a Trench and Excavation Safety System to be designed and furnished by the Contractor for the safety and health of personnel.

B. Submission of a written Plan describing the System in detail.

1.2 REFERENCES:

A. 29 CFR 1926 - Occupational Safety and Health Standards - Excavations, United States Department of Labor, latest edition.

B. Others - Other applicable Federal, State, and local rules for Trench Construction or excavations.

C. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

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1.3 REQUIREMENTS:

A. The Contractor shall develop, design, and implement a System. The Contractor shall bear the sole responsibility for the adequacy of the System.

B. The requirements of 29 CFR 1926 shall be the minimum requirements for this specification and are adopted as a part of this specification. Other regulations relating to trench and excavation safety shall also be considered a part of this specification as if referenced directly.

C. Should the System require wider trenches than shown, the Contractor shall be responsible for the costs associated with determining adequacy of pipe bedding and class, as well as, purchase and installation of alternate materials.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 GENERAL:

A. Implement the system in accordance with the written System Plan and conduct affected work in accordance with the same.

B. The system shall be in use during all phases of construction.

C. Neither the Engineer nor the Owner will be responsible for ensuring the trench safety system is constructed and utilized in accordance with the safety plan. This shall be the sole responsibility of the contractor.

PART 4 MEASUREMENT & PAYMENT

4.1 MEASUREMENT:

A. Trench safety shall be measured on a per linear foot basis.

B. No evaluation of the adequacy of the trench safety precautions will be made by the Engineer since the means, methods & responsibility for safety rest solely with the Contractor.

4.2 PAYMENT:

A. Payment for trench safety will be made in accordance with the contract documents.

B. No evaluation of the adequacy of the trench safety systems used by the Contractor will be made by the Engineer since the means, methods and responsibility for trench safety rest solely with the Contractor.

C. By approving the Contractor's request for payment of trench safety, the Engineer makes no representation that the Contractor's work for this pay item has been performed in a manner consistent with the contract documents.

END OF SECTION

SECTION 32 11 13 FOUNDATION MATERIAL FOR UNSUITABLE SUBGRADE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This item shall govern for the removal of subgrade material deemed unsuitable or deficient as a result of proof rolling and the subsequent replacement and compaction of approved subgrade material.

1.2 RELATED SECTIONS

A. Section 31 05 16 – Aggregate Fill Earthwork.

1.3 REFERENCES

A. Texas Department of Transportation Standard Specifications for Construction of Highways, Streets and Bridges, 1993 Edition (Blue Book).

B. ASTM C33 - Coarse Aggregates.

C. ASTM D698 - Moisture-Density Relations of Soils (Standard.)

D. ASTM D2487 - Classification of Soils for Engineering Purposes.

E. ASTM D4254 - Minimum Index Density and Unit Weight of Soils and Calculations of Relative Density.

F. ASTM D4318 - Test for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

G. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

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PART 2 PRODUCTS

2.1 MATERIALS

A. See Section 31 05 16 – Aggregate Fill Earthwork.

PART 3 EXECUTION

3.1 CONSTRUCTION METHODS

A. The Contractor shall excavate all soils, which are soft or otherwise unusable for subgrade material.

B. Excavation of unusable soils shall be conducted so that acceptable material directly adjacent to the construction limits will not be disturbed.

C. The depth of excavation shall be determined by the Project Engineer, but shall not be less than six (6) inches.

3.2 COMPACTION

A. The approved foundation material shall be placed and compacted to 95 percent of maximum density within two percent of optimum moisture as measured by ASTM D698, in six (6) inch lifts.

B. In place moisture-density test may be ordered by Engineer to insure that all trench backfill complies with the requirements of the specification,

3.3 DISPOSAL OF EXCESS MATERIAL

A. Excavated materials shall be handled at all times in such a manner as to cause a minimum inconvenience to public travel and to permit safe and convenient access to private and public property adjacent to or along the line of the work.

B. In parkways and easements where it is necessary to deposit excavated materials on lawns during the work, burlap or similar materials shall be placed on the lawn to prevent contact between excavated materials and the lawn.

C. Remove waste and excess excavated material from the construction site before final inspection.

D. Legally dispose of material at a licensed site or with written and notarized permission from the property owner for a private disposal site.

E. All cost associated with waste material removal and disposal shall be paid for by the Contractor.

END OF SECTION

SECTION 32 92 19 SEEDING

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Preparation of subsoil.

B. Placing topsoil.

C. Seeding, Hydroseeding, mulching, and fertilizer.

D. Maintenance.

1.2 REFERENCES:

A. FS O-F-241 - Fertilizers, Mixed, Commercial.

B. Texas Seed Law.

C. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

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1.3 DEFINITIONS:

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.4 MAINTENANCE DATA:

A. Submit under provisions of Section 01 33 00, SUBMITTALS.

B. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.5 QUALITY ASSURANCE:

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. All seed shall be labeled in accordance with the current rules and regulations of the Texas Seed Law and shall be free of noxious weeds as listed by the Board.

C. All legumes must be inoculated with an approved culture as per the manufacturer's recommendations.

1.6 REGULATORY REQUIREMENTS: Comply with all regulatory agencies for fertilizer and herbicide composition.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01 31 00, PROJECT MANAGMENT AND COORDINATION.

B. Deliver grass seed mixture in sealed containers unless otherwise authorized by the Engineer in writing. Seed in damaged packaging is not acceptable.

C. Seed, which has become wet, moldy, or otherwise damaged in transit or storage will not be acceptable.

D. Deliver fertilized in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.8 COORDINATION: Coordinate work under provisions of Section 01 31 00, PROJECT MANAGEMENT AND COORDINATION

1.9 MAINTENANCE SERVICE: Furnish maintenance of seeded areas for two (2) months from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 SEED MIXTURE

A. Normal Application Seed Mixture (For Installation Between 5:1 and 6:1 inclusive, unless otherwise approved by the Engineer)

Seed	Minimum Seed Purity (Percent)	Minimum Germination (Percent)	Rate of Application (lb./acre)
Common Bermuda, hulled	95.0%	85.0%	90

B. Hydromulch, Seed, Lime, and Fertilizer (Slopes 0% to 5%)

1. In the areas shown on the plans, or as directed by the Engineer, apply the normal seed mixture using a hydroseeder along with the following components:

a. Seed, as noted above for normal seed mixture.

b. Fertilizer, as described below

c. Liquid Lime, as described below

d. Enviro-Tak fiber mulch binder, as distributed by Southwest Environment Services, Inc. (Tyler, Texas) at a rate of 60 lbs. Per acre.

e. Fiber mulch at a rate of 2,000 lbs. per acre.

2. The contractor shall install a micronutrient such as Turfblend, or equal, at the rate suggested by the supplier.

3. In addition to slopes between 0% and 5%, this mixture shall be applied to all areas receiving bonded fiber matrix mulch.

C. Plaster/cellulose fiber much, Seed, Lime, and Fertilizer (Slopes >5%)

1. In the areas shown on the plans, or as directed by the Engineer, apply the normal seed mixture using a hydroseeder along with the following components:

    a. Seed, as noted above for normal seed mixture.

    b. Fertilizer, as described below.

    c. Liquid Lime, as described below.

    d. Plaster/cellulose fiber mulch, as describe below.

2. The contractor shall install a micronutrient such as Turfblend, or equal, at the rate suggested by the supplier.

D. Creeping Red Fescue or perennial rye: 50 percent.

2.2 SOIL MATERIALS: Topsoil: As specified in Section 31 05 13, EARTH FILL CLASSIFICATIONS.

2.3 ACCESSORIES

A. Liquid Lime:

1. Liming will be required for all area when the normal seed mixture is applied.

2. The lime to be used shall be liquid lime and shall be applied at a rate of 5 gallons per acre.

3. The liquid lime shall be flowable dolomitic limestone ground to a fineness whereby 100% will pass through a 300-mesh screen.

4. The liquid lime shall be as distributed by Southwest Environment Services, Inc. of Tyler, Texas or approved equal.

5. The liquid lime shall be applied at the same time as the seed and fertilizer with the use of a hydroseeder.

B. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are acceptable.

C. Plaster/cellulose Fiber Mulch:

1. Plaster/cellulose fiber mulch shall be a mixture of plaster and natural cellulose fiber mulch.

2. The plaster shall consist of naturally-occurring high purity processed gypsum and necessary additives, such as retarders and accelerators and water to form a cemetitious binder that will produce a protective crust-like barrier within 4 to 8 hours after application.

3. The gypsum shall be produced from a quarried or mined source.

4. In addition, the gypsum shall be processed to be composed of a crushed, dry calcium sulfate hemihydrate (CA SO4.1/2 H20) having a purity of not less than 88%.

5. The processed gypsum plus the necessary additives shall be furnished in bags or bulk and be accompanied by bills of landing and shipping invoices stating the gypsum purity content, dry weight, and source of manufacture.

6. Processed gypsum, which has become partially air set, lumpy, or caked prior to use will be rejected.

7. The cellulose fiber mulch shall be produced from grinding clean, whole wood chips, or fiber produced from ground newsprint with a labeled ash content not to exceed 7%.

D. Fertilizer:

1. FS O-F-241, Type I, Grade A; recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the following proportions:

2. The contractor shall have a turf analysis performed for the topsoil (4 maximum).

3. Based upon the results of the turf analysis, the following fertilizer requirement may be adjusted to suit the existing topsoil.

a. Fertilizer shall be thirty percent (30%) nitrogen, thirty percent (30%) phosphorous, and thirty percent (30%) potash commercial fertilizer and shall be spread at the minimum rate of 650 lbs. per acre.

b. In addition, trace elements such a K-Mag may be required if the need is shown by the turn analysis.

E. Water:

1. Clean, fresh and free of substances or matter, which could inhibit vigorous growth of grass.

2. The Contractor shall water the seed and fertilizer as he deems necessary to establish the grass, at no expense to the Owner.

3. No water is available at the Landfill for construction purposes.

F. Prevent contamination.

PART 3 EXECUTION

3.1 EXAMINATION: Verify that prepared soil base is ready to receive the work of this Section.

3.2 PREPARATION OF SUBSOIL

A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.

C. Scarify subsoil to a depth of 4 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.3 PLACING TOPSOIL

A. Spread topsoil to a minimum depth of 4 inches over area to be seeded. Rake until smooth.

B. Place topsoil during dry weather and on dry unfrozen subgrade.

C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.

D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

E. Install edging at periphery of seeded areas in straight lines to consistent depth.

3.4 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. For dry placing do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Lightly water to aid the dissipation of fertilizer.

3.5 SEEDING

A. Apply seed at a rate of 5 pounds per 1000 square foot evenly in two intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Planting Season: March through September for Bermuda, September through March, fescue/rye only.

D. Do not sow immediately following rain, when ground is too dry, or during windy periods.

E. Roll seeded area with roller not exceeding 112 pounds.

F. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inch. Maintain clear of shrubs and trees.

G. Apply water with a fine spray immediately after each area has been mulched. Saturate to 3 inches of soil.

3.6 HYDROSEEDING

A. Apply seeded slurry with a hydraulic seeder at a rate of 5 pounds per 1000 square feet evenly in two intersecting directions.

B. Do not hydroseed area in excess of that which can be mulched on same day.

C. Immediately following seeding, apply mulch to a thickness of 1/8 inch. Maintain clear of shrubs and trees.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 3 inches of soil.

E. Contractor shall establish 95% ground cover with no bare area larger than one square foot of the established species prior to acceptance and final payment.

3.7 MAINTENANCE

A. Mow grass at regular intervals to maintain a maximum height of 2½ inches. Do not cut more than 1/3 of grass blade at any one mowing.

B. Neatly trim edges and hand clip where necessary.

C. Immediately remove clippings after mowing and trimming.

D. Water to prevent grass and soil from drying out.

E. Immediately reseed areas, which show bare spots.

3.8 GUARANTEE

A. Grass will be guaranteed for a period of two (2) years from acceptance of the project.

B. At the end of the guarantee period any areas determined to not have sufficient ground cover (95% with no bare area larger than one square foot of the established species) shall be re-seeded.

END OF SECTION

SECTION 33 05 13 MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Modular precast concrete manhole sections with tongue-and-groove joints, covers, anchorage, and accessories.

1.2 REFERENCES

A. ASTM A48 - Gray Iron Castings.

B. ASTM C478 - Precast Reinforced Concrete Manhole Sections.

C. ASTM C923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

D. City of Denton's Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

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1.3 SUBMITTALS FOR REVIEW

A. Section 01 33 00 - Submittals: Procedures for submittals.

B. Shop Drawings: Indicate manhole locations, elevations, piping, sizes and elevations of penetrations.

C. Product Data: Provide manhole covers, component construction, features, configuration, and dimensions.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 PRECAST CONCRETE MANHOLE

A. Manholes shall be per City of Denton Standard Details.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.2 PREPARATION: Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.3 PLACING MANHOLE SECTIONS

A. Excavate to a uniform depth to permit the installation of a minimum of 12 inches of gravel material for base pad subgrade.

B. Adjust elevation of gravel material as required to attain proper grade and alignment of the base section.

C. Place base pad, set top surface level. Place manhole in accordance with manufacturer's recommendations.

D. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.

E. Cutouts in the bottom sections shall be appropriate for the pipe being laid and shall have identifying markings to facilitate their being used in the correct locations.

F. The connecting pipe for concrete manhole installation with resilient connectors shall be plain end, square cut, spigots, which shall not protrude more than one inch inside the manhole.

G. Stubs for future connections shall be provided at locations shown. Stubs shall be a minimum of one pipe joint long (13 feet) and terminate in a bell with a plug at the distal end.

H. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.

I. Set cover frames and covers level without tipping, to correct elevations.

J. Coordinate with other sections of work to provide correct size, shape, and location.

K. Manhole height shall be adjusted by using variable height risers set at the lowest section below natural grade.

3.4 INVERTS

A. The bottom of each manhole shall be provided with a "U" shaped channel that is a smooth continuation of the inlet and outlet pipes. In manholes with pipes of different sizes, the tops of the pipes shall be placed at the same elevation, unless otherwise shown on the drawings, and flow channels in the invert sloped on an even slope from pipe to pipe.

B. The surface of the concrete slab shaped to form the invert shall be sloped upward from the edge of the invert to the manhole wall.

1. The upper half of any pipe extending inside the manhole shall be cut substantially flush with the wall.

2. Any rough edge shall be smoothed with mortar.

C. Mortar used in manholes shall be mixed in the proportions by volume of 1 part cement to 4 parts sand. Mortar shall have a workable consistency, but shall be as dry as feasible.

D. The centerline projection of all pipes shall pass through the centerline of the manhole.

3.5 CONNECTION TO EXISTING MANHOLES:

A. Connection to existing manholes shall not be made until all downstream manholes and sewer lines have been completed, cleaned, tested, and inspected in accordance with the specification. The Engineer must grant approval prior to connection to existing manholes.

B. Connections to existing manholes shall be made by cutting a hole in the wall of the existing manhole, shaping the bottom of the manhole to fit the invert of the connections, inserting a length of sewer pipe through the opening and filling around the pipe with cement mortar and troweling the cement mortar inside and outside the manhole to a neat finish.

1. When necessary to satisfactorily perform the work, the flow of sewage shall be blocked at a time of minimum flow.

2. If necessary to prevent flow back up in the line to the extent that the damage would occur, the Contractor shall maintain the flow level with a trench pump section inserted in the line or in the next upstream manhole.

3. Discharge shall be made into an appropriate manhole downstream of the construction.

4. Connections to manholes, mains, and house services shall be made in a thoroughly workmanlike manner to the satisfaction of the Engineer.

5. All bypass pumping shall be considered subsidiary to the construction of the connection and shall be provided by the Contractor at no additional expense to the Owner.

3.6 CONNECTION TO EXISTING GRAVITY SEWER MAINS:

A. Connection to existing gravity sewer mains shall not be made until all downstream manhole and sewer lines have been completed, cleaned, tested, and inspected in accordance with the specifications. The Engineer must grant approval prior to connection to existing gravity sewer mains.

B. Contractor shall carefully excavate around existing gravity sewer main and construct manhole base so as not to disrupt service of existing main. Contractor shall take all precautions and actions necessary to protect existing main.

C. Connections to existing main shall be made by excavating around the main constructing the manhole to fit the existing main and the proposed effluent line.

1. Once the manhole has been properly constructed, cut the existing main, plug the existing main effluent and direct the flow through the new main.

2. When necessary to satisfactorily perform the work, the flow of sewage shall be blocked at a time of minimum flow.

3. If necessary to prevent flow backup in the line to the extent that damage would occur, the Contractor shall maintain the flow level with a trench pump inserted in the line or the upstream manhole.

4. Discharge shall be made into an appropriate manhole downstream of construction.

5. All bypass pumping shall be considered subsidiary to the construction of connection to existing sewer mains and shall be provided by the Contractor at no additional expense to the Owner.

3.7 MANHOLES TO BE ABANDONED:

A. Manholes indicated on the Drawings to be abandoned shall be abandoned in accordance with these specifications and the details of the drawings.

B. Manholes shall not be abandoned until the new interceptor has been completed, tested, inspected and approved by the Engineer.

C. The Contractor shall plug existing influent and effluent mains, fill lower section to 3’ below natural ground with sand, then backfill the remainder of the manhole with accepted trench backfill material.

1. Backfill material shall be placed in 8" lifts and compacted to 90% standard proctor or 95% standard proctor when in a pavement section.

2. The manhole cone and riser shall be removed to an elevation of 3' below natural ground and then properly disposed of off-site.

3.8 MAHHOLE ACCESS:

A. Entrance into manholes in excess of four feet deep shall be accomplished by means of a portable ladder.

B. Contractor shall provide such ladder as necessary during construction.

C. Comply with appropriate OSHA requirements.

3.9 TESTING

A. See Section 01 45 23 for testing requirements for Manholes.

END OF SECTION

SECTION 33 31 19 SMALL DIAMETER SANITARY SEWER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sanitary sewer lines including, blocking, joints, fittings, and other appurtenances for sewer lines 18 inches in diameter or less.

1.2 REFERENCES

A. ANSI/AWWA C104/A21.4 - Cement Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water.

B. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings 3 inch through 48 inch, for Water and Other Liquids.

C. ANSI/AWWA C111/A21.11 - Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.

D. ANSI/AWWA C150/A21.50 - Thickness Design of Ductile Iron Pipe.

E. ANSI/AWWA C151/A21.51. - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water and Other Liquids.

F. ANSI/AWWA C153/A21.53 - Ductile Iron Compact Fittings for 3 inch through 16 inch for Water and Other Liquids.

G. ASTM A746 - Ductile Iron Gravity Sewer Pipe.

H. ASTM D-3034 – Pipe Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe

I. ASTM D-3212 – Joints for Drain and Sewer Plastic Pipes Using Elastomeric Seals

J. ASTM F-477 – Elastomeric Seals (Gaskets)_ for Joining Plastic Pipe

K. ASTM D-1784 – Rigid Poly (Vinyl Chloride) (PVC) Compounds

L. ASTM D-2412 – Standard Test Method for Determination of External Loading of Plastic Pipe by Parallel Plate Loading

M. ASTM D-2231 – Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications

N. City of Denton’s Standard Specifications - North Central Texas Council of Governments (NCTCOG) Public Works Construction Standards 2004.

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1.3 SUBMITTALS

A. Section 01 33 00 - Procedures for Submittals.

B. Product Data: Manufacturer's product data sheets on all materials incorporated into work.

C. Quality Control Submittals: For information only.

1. Certificates: Manufacturer's certificates attesting compliance with applicable specifications for grades, types, classes, and other properties.

D. Contract Closeout Submittals: Refer to Section 01 77 00, Contract Closeout.

1. Project Record Documents: Submit documentation according to Section 01 77 00, Contract Closeout. Accurately record installed locations of piping, and service connections, and accessories.

1.4 QUALITY ASSURANCE

A. Pipeline installation shall be in accordance with manufacturer's recommendations.

B. Pipe shall be kept clean of all foreign matter.

1. At termination of pipe laying, provide suitable cover to close open end until burying operations are resumed.

1.5 DELIVERY, STORAGE AND HANDLING

A. Each load of pipe delivered to the job site shall be inspected by the Resident Project Representative.

B. Pipe shall be transported with ends covered to prevent debris accumulation during transport

1.6 PRODUCT CONDITIONS

A. Perform no pipe work in fill areas until embankment or fill has been completed to at least two (2) feet above top of pipe and properly compacted.

PART 2 PRODUCTS

2.1 GRAVITY & PRESSURE SYSTEMS

A. Pipe:

1. Ductile Iron (DI) Pipe:

a. Ductile Iron Pipe shall be in accordance with ANSI/AWWA C151/A21.51 with thickness as determined by ANSI/AWWA C150/A21.50.

b. All Ductile Iron Pipe shall be Protecto 401 Ceramic Epoxy lined interior and have a bituminous coated exterior according to ANSI/AWWA C151/A21.51 or C115/A21.15. Protecto 401 lining shall conform to ASTM E-96-66, ASTM B117, ASTM G-95, and ASTM D-714-87.

c. Pressure Class 150 shall be used unless otherwise noted.

d. Ductile Iron Pipe as manufactured by American Cast Iron Pipe or U.S. Pipe shall be used. No other suppliers shall be accepted.

2. Poly (Vinyl Chloride) (PVC) Pipe

a. PVC pipe shall be in accordance with ASTM D-3034 for gravity sewer pipe or ASTM D-2241 for pressure sewer pipe with integral wall bell and spigot joints.

b. PVC pipe shall be manufactured from clean, virgin, NSF approved PVC compound meeting the requirements of Cell Class 12454-B as defined by ASTM D-1784.

c. Pipes shall be produced with a wall thickness corresponding to dimension ratio SDR-26 (or as shown on the plans), with a pipe stiffness value of 115 psi when tested in accordance with ASTM D-2412.

B. Joints:

1. Joints shall be mechanical joint or push-on joint conforming to AWWA C111. Joint material for Ductile Iron Pipe shall be rubber gasket type conforming to ANSI/AWWA C111/A21.11. The gaskets shall be furnished by the pipe manufacturer.

2. Each mechanical joint shall consist of a bell cast integrally with the pipe or fitting and provided with an exterior flange having bolt holes and a socket with annular recesses for the sealing gasket and the plain end of the pipe or fitting; a pipe or plain end; a sealing gasket; a follower gland with bolt holes; and tee-head bolts and hexagonal nuts. The mechanical joint shall meet the requirements of ANSI/AWWA C111/A21.11-85.

3. Push-on (bell and spigot) joints shall consist of a bell cast integrally with the pipe or fitting and a socket with annular recesses for the sealing gasket and the plain end of the pipe or fitting. The push-on joints shall meet the requirements of ANSI/AWWA C111/A21.11-85. Joints for PVC pipe shall conform to ASTM D-3212 with elastomeric seals conforming to ASTM F-477.

4. All piping shall be push-on as shown on the drawings, unless otherwise specified.

C. Fittings:

1. Standard Fittings: All bends, tees, plugs, adapters, wyes, and other fittings shall meet the requirements of the type and kind of pipe used.

2. Adapters - When joining dissimilar pipe materials or repairing pipe, suitable adapters shall be used. The adapters shall be insert or bonded coupling type and shall meet strength and chemical requirements of ASTM C594.

3. Ductile Iron - Fittings shall be push-on type meeting ANSI/AWWA C110/A21.10. Fittings shall be cement lined in accordance with ANSI/AWWA C104/A21.4 and shall have a bituminous coated exterior per ANSI/AWWA C110/A21.10 or C153/A21.53.

2.2 ACCESSORIES

A. Non-shrink grout:

1. Gifford-Hill - Supreme.

2. L&M – Crystex.

3. Master Builders – Masterflow 713 Grout.

4. Sauereisen Cements – F0100 Level Fill Grout.

5. Others as approved by the Engineer.

B. Waterstops:

1. Waterstops shall be as recommended by pipe manufacturer and approved by the Engineer.

C. Polyethylene Encasement:

1. When ductile iron pipe is installed, the entire length of the D.I.P. with the exception of bore encasement shall be encased with polyethylene. D.I.P. shall be encased with 8-mil thick polyethylene in accordance with ANSI/AWWA C104/A21.5 standard.

PART 3 EXECUTION

3.1 PREPARATION

A. Stake locations of fittings, valves and accessories prior to installation for review by Engineer.

B. Prior to installation, remove foreign matter from within pipes and fittings and verify material is in satisfactory condition.

C. Trench sufficiently ahead of pipe installation to uncover any potential conflicts with grade.

D. Each joint shall be carefully inspected before being placed in the trench. Any joint found to be cracked or otherwise damaged as to impair its usefulness shall be plainly marked then removed from the site as soon as possible.

3.2 PIPE INSTALLATION

A. Pipe shall be installed in accordance with ASTM D2321/ASTM D2231.

B. Preparation:

1. Do not lay pipe in water, or when trench or weather are unsuitable for work. Keep water out of trench until jointing is complete and bedding is placed to top of pipe. When work is not in progress, close ends of pipe and fittings securely so that no trench water, earth or other substances will enter pipes or fittings.

2. Keep inside of pipe free from foreign matter during operations by plugging or other approved method.

3. Place pipe so that full length of each section rests solidly upon pipe bed, with recesses excavated to accommodate bells and joints. Take up and relay pipe when grade or joint is disturbed after laying.

4. Handle pipe and accessories so that pipe placed in trench is sound and undamaged. Take particular care not to injure pipe coating when applicable.

5. Cut neatly, using approved type mechanical cutter without damaging pipe. Use wheel cutters when practicable.

C. Excavation, Compaction and Backfill: In accordance with Section 31 23 23, Excavating, Backfilling and Compacting for Utilities.

D. Bedding: In accordance with Section 31 23 23 and as shown on the Drawings.

E. Placing and Laying:

1. Set and bury lines accurately to grades as shown on the plans.

2. Do not exceed 75 percent of pipe manufacturer's recommendations for deflections from straight line or grade as required by vertical curves, horizontal curves, or offsets. If alignment requires deflections in excess of these limitations, use fittings.

3. Intersecting lines shall be joined by an appropriate fitting.

4. Any adjustment to obtain correct line shall be made by tamping or removing soil and in no case by wedging or blocking pipe.

5. Pipe shall be secured against upheaval or floating during the placement of concrete bedding, encasement, or anchors.

F. Joints:

1. Make push-on joints in accordance with manufacturer's recommendations. Lay spigot ends downstream and push-on to full depth.

2. Spigot and bells shall be cleaned thoroughly before the application of lubricant and attachment of the preformed joint gasket.

G. Connections to Existing Sewers:

1. Connections to existing sewers shall not be made until all of the proposed sewer lines and manholes have been constructed, cleaned and approval granted by the Engineer for making connection. No connection shall be made until all new sewers have passed specified leakage tests.

3.3 REMOVAL AND REPLACEMENT OF PIPE IN ORIGINAL LOCATION

A. Preparation

1. Carefully remove or protect surface features in work area. Excavate to completely expose the existing pipe, taking adequate precautions not be disturb any other existing underground facilities and handling excavated materials as described in other Sections.

2. The section of pipe to be replaced shall be isolated by plugging and/or by-pass pumping or by any other method proposed by the Contractor and approved by the Engineer. All plugging and by pass pumping shall be considered subsidiary to the cost of removal and replacement of pipe.

B. Excavation

1. Remove and dispose of the existing pipe and concrete encasement, if any. This shall be phased and coordinated with its replacement so as to minimize public inconvenience.

2. The trench bottom shall be reshaped to accommodate the new pipe and embedment or encasement as required.

C. Bedding

1. In accordance with Section 31 23 23 and as shown on the drawings.

D. Placing and Laying

1. In accordance with Section 3.2 E above.

2. Make connections to existing or proposed manholes or cleanouts and to existing pipe remaining in place.

3. Install wyes or tees, with branches temporarily plugged, to make reconnections to existing service laterals, if any.

4. Except for testing, service shall be maintained at all times. Where necessary, services shall be temporarily reconnected to the new main.

3.4 TESTING AND INSPECTION

A. Low Pressure Air Tests:

1. A low pressure air test shall be performed after completing a section of sewer line in accordance with the following:

The procedure for the low pressure air test shall conform to the procedures described in ASTM C-828, ASTM C-924, ASTM F-1417 or other appropriate procedures, except for testing times. The test times shall be as outlined below. For sections of pipe less than 36-inch average inside diameter, the following procedure shall apply unless the pipe is to be joint tested. The pipe shall be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure is stabilized, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be computed from the following equation:

$$T \equiv \frac{0.085 \times D \times K}{Q}$$

T = time for pressure to drop 1.0 pound per square inch gauge in seconds
K = 0.000419 x D x L, but not less than 1.0
D = average inside pipe diameter in inches
L = length of line of same pipe size being tested, in feet
Q = rate of loss, 0.0015 cubic feet per minute per square foot internal surface shall be used

Since a K value of less than 1.0 shall not be used, there are minimum testing times for each pipe diameter as follows:

Pipe Diameter (Inches)	Minimum Time (seconds)	Length for Minimum Time (feet)	Time for Longer Length (seconds)
6	340	398	0.855(L)
8	454	298	1.520(L)
10	567	239	2.374(L)
12	680	199	3.419(L)
15	850	159	5.342(L)
18	1020	133	7.693(L)
21	1190	114	10.471(L)
24	1360	100	13.676(L)
27	1530	88	17.309(L)
30	1700	80	21.369(L)
33	1870	72	25.856(L)

The test may be stopped if no pressure loss has occurred during the first 25% of the calculated testing time. If any pressure loss or leakage has occurred during the first 25% of the testing period, then the test shall continue for the entire test duration as outlined above or until failure.

2. The exfiltration test shall conform to 30 TAC 317.2(a)(4) using procedures described in ASTM F1417 (Poly(vinyl chloride)(PVC) except for testing times. Testing time shall be calculated based on 30 TAC 317.2(a)(4)(B).

3. The tests shall be performed under the observation of the Owner and Engineer.

4. If the exfiltration exceeds the maximum allowable amount, the Contractor shall replace or repair the section of the sewer line necessary to meet the specified limits.

B. Gravity Systems (Infiltration/Exfiltration):

1. When pipes are installed below the groundwater level, an infiltration test shall be used in lieu of the exfiltration test. The total infiltration shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at a minimum test head of two feed above the crown of the pipe at the upstream manhole or two feet above the existing ground water whichever is greater.

2. The pipe shall be laid so that infiltration/exfiltration does not exceed 50 gallons per inch of diameter of pipe per mile of line for a 24 hour period. For pipe within the 25-year flood plain, the infiltration/exfiltration shall not exceed 10 gallons per inch diameter per mile of pipe per 24 hours of the minimum test head.

3. The Contractor shall furnish a pump of sufficient capacity to remove the infiltration.

4. Hydrostatic Tests for gravity systems shall be performed in accordance with 30 TAC 317.2(a)(4)(A) and as directed by the Engineer.

5. If the exfiltration exceeds the maximum allowable amount, the Contractor shall replace or repair the section of the sewer line necessary to meet the specified limits.

C. Deflection Test:

1. A deflection test shall be performed on all flexible pipes (PVC and Hobas).

2. The deflection test shall conform to the requirements of 30 TAC 317.2(a)(4)(C) including testing after the final backfill has been in place for at least 30 days.

3. The test shall be performed without mechanical pulling devices.

4. The mandrel shall have an outside diameter equal to 95% of the inside diameter of the pipe. A rigid mandrel with 9 runners shall be provided. The mandrel shall withstand 200 psi and the barrel shall have a length of at least 75% of the inside diameter of the pipe.

5. If the deflection exceeds the maximum allowable amount (5%), the Contractor shall replace or repair the section of the sewer line necessary to meet the specified limits.

D. Upon completion of all required testing, the contractor shall provided a signed and notarized affidavit certifying that the system has been tested and meets applicable requirements.

E. System Flushing:

1. Upon completion of each sewer line or segment of line the contractor shall flush the sewer line with a sufficient quantity of clean water. The flushing shall be performed until the water runs clear and clean.

2. The quantity of water shall be sufficient to properly flush the line and shall not be less than 200 gallons per minute. The contractor shall be responsible for acquiring the necessary water and facilities for flushing.

F. Final Inspection:

1. Prior to final inspection, the Contractor shall complete all work on the portion of the line to be tested. The ditches shall be dressed and debris removed.

2. The final inspection shall include the entire length of the line and include clean up.

3. All defects noted shall be repaired by Contractor at his own expense, prior to final payment.

END OF SECTION