

AMENDMENTS TO
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

1.24 PROTECTION OF WORK AND OF PERSONS & PROPERTY

1.24.3 Add the following to this section:

(a) Description:

This section covers excavation and supporting systems for trenches to protect the safety of workers and property adjacent to the site. This specification shall govern for construction of all types of trenches and excavations less than 15 feet in width. These specifications were developed in general conformance with the Occupational Safety and Health Administration (OSHA) standards as contained in Subpart P, Part 1926 of the Code of Federal Regulations. Other OSHA construction standards shall be followed where applicable.

(b) Products:

The CONTRACTOR shall submit to the OWNER prior to the beginning of any trench excavation, for approval, design calculations and fabrication drawings for the proposed trench shoring system to be used on the project certified by an engineer registered in the State of Texas.

(c) Execution:

(1) General: These specifications apply to any trench excavation which is over five (5) feet in depth from the ground surface, or trench excavations that are less than five feet in depth located in areas where unstable soil conditions are present. (Ref. OSHA, Safety and Health Regulations, Part 1926, Subpart P, Paragraph 1926.652, Subparagraph (b). "Unstable" soil conditions refers to soils which will slough or move under load or vibration.) These specifications also apply to shored trenches and excavations less than 15 feet in width.

(2) CONTRACTOR'S Responsibility:

(A) These specifications address the safety of workers in a trench excavation and it, in no way, relieves the CONTRACTOR of his responsibility and liability to insure the safety of the project and workers.

(B) The CONTRACTOR must identify a qualified person in the CONTRACTOR's firm responsible for performing adequate inspections of the trench excavations to assure that conditions have not changed that may make the trench excavation or bracing less safe.

- (C) It is the CONTRACTOR's responsibility to insure that all excavation work and site conditions are within the regulations as established by OSHA. Any property damage or bodily injury (including death) that arises from use of the trench shoring system, from CONTRACTOR's negligence in performance of contract work, or from the OWNER's failure to note exceptions to the trench safety system shall remain the sole responsibility and liability of the CONTRACTOR.
- (D) The CONTRACTOR must notify the OWNER verbally immediately and in writing within three (3) working days of discrepancies in the soil conditions encountered during the excavation from those denoted on drawings. The OWNER or OWNER's representative will evaluate the soil conditions to determine if changed conditions warrant modification to the scope of contract. It is the CONTRACTOR's responsibility to take immediate action to assure the safety of the workers and adjacent property.

(3) Trench Design:

- (A) The CONTRACTOR's registered professional engineer shall design the trench shoring system to accommodate any anticipated live load surcharge.
- (B) All trenches over five (5) feet deep shall be sloped, shored, sheeted, braced or otherwise supported. Trenches less than five (5) feet deep located in areas of hazardous ground movement, shall be effectively protected. If soil conditions warrant in deep excavations, the sides of the trench above a 5-foot level may be sloped to preclude collapse. In trenches wider than six (6) feet, a minimum bench four (4) feet wide shall be provided on both sides of the excavation at the toe of the sloped portion.
- (C) Alternate designs for use of steeper slopes or the use of supporting systems; i.e., piling, cribbing, shoring, sliding trench box etc., may be submitted in drawing form, designed and sealed by a professional engineer registered in the State of Texas to the OWNER for review. The OWNER will review for general compliance to the requirements set forth by House Bills 662 and 665. OWNER's review does not constitute acceptance, and the sole liability for the design rests with the CONTRACTOR and CONTRACTOR's engineer. These drawings must meet accepted engineering requirements and standards as well as all applicable OSHA standards and regulations.

(4) Inspection:

- (A) OWNER: If questions arise concerning interpretation of subsurface conditions, test excavations may be performed to familiarize the CONTRACTOR and/or his representative with soil types and stratification.

provide protection from the dangers of the open trench.

- (15) Walkways or bridges with guardrails shall be provided where people or equipment are required or permitted to cross over trench excavations.

(6) Special Considerations:

- (A) Precautions shall be taken by decreasing the slope or increased shoring of the sides of trench excavations adjacent to a previously backfilled excavation or fill area. This includes areas where the separation between the fill and the excavation is less than the depth of the excavation.
- (B) If groundwater is encountered, it shall be adequately controlled to a point such that no water seepage occurs on the excavation slopes or bottom. The use of tight sheeting, pumping, drainage or similar control measures shall be planned and directed by the CONTRACTOR. Consideration shall be given by the CONTRACTOR to the existing moisture balances in surrounding soils and the effects on foundations and structures if it is disturbed.
- (C) In rock excavations, the face and slope of the excavation shall be inspected by the CONTRACTOR's safety person for joints and seams or other discontinuities that may cause block failures. Vertical slopes (90°), without bracing or use of a trench box, will not be allowed in any rock material except as shown.

(7) Definitions:

Reference: OSHA Safety and Health Regulations, Part 1926, Subpart P, Paragraph 1926.653.)

"Braces" - The horizontal members of the shoring system whose ends bear against the uprights or stringers.

"Changed conditions" - Where soil conditions such as moisture content, groundwater, development of desiccation cracks or joints, or soil stratigraphy change from those originally designated in the boring logs or following initial excavation.

"Dewatering System" - A mechanical system which artificially lowers the static groundwater to a level which prevents groundwater seepage into the excavation. These include well-points, sumps, pumping wells, or cut-off walls.

"Groundwater" - Water that is present in the soil in sufficient quantities that it will flow and collect at a point. This includes a natural aquifer water level or a perched groundwater on top of an impervious layer.

"Lagging" - Horizontal boards supported by the flanges of two H-piles that are used to separate the natural soil from the excavation.

"Rock" - A mass of soil particles that cannot be excavated by hand. This includes

any weathered rock that contains soil seams. Shale is to be considered a rock material.

"Running Soil" - Soils that possess a fluid behavior generally brought about by excess moisture or imbalanced hydrostatic (water) conditions.

"Sheet Pile" - A pile or sheeting that may form one of a continuous interlocking line, or a row of timber, concrete, or steel pile, driven in close contact to provide a tight wall to resist the lateral pressure of water, adjacent earth or other materials.

"Sides" - Also referred to as "Walls" or "Faces". The vertical or inclined earth surfaces formed as a result of excavation work.

"Slope" - The angle with the horizontal at which a particular earth material will stand indefinitely without movement.

"Stringers" - Also referred to as "Wales". The horizontal members of a shoring system whose sides bear against the uprights or earth.

"Trench" - An Excavation made below the surface of the ground whereby the depth is greater than the width, but the width is less than 15 feet. A trench may consist of the void between unsupported earth and the wall of a structure if the wall is within 15 feet of the unsupported earth.

"Trench Shield" - A shoring system composed of steel plates and bracing, welded or bolted together, which support the walls of a trench from the ground level to the trench bottom and which can be moved along the trench bottom as work progresses.

"Uprights" - Vertical members of a shoring system.

2.2 PORTLAND CEMENT CONCRETE AND RELATED MATERIALS

2.2.10 Replace this entire section with the following:

(a) Description of Work: This item shall consist of providing and installing a resilient and adhesive joint sealing filler capable of effectively sealing joints and cracks in pavements.

(b) Products:

(1) Joint Sealers: The sealant shall have a minimum of 75 percent extensibility at a temperature range of minus 50 degrees F. to 200 degrees F.

The sealants shall be Dow Corning 888 or Dow Corning 890-SL silicone highway joint sealant as manufactured by Dow Corning Corp., Midland, Michigan 48647.

Before installation of either of these materials, the Contractor must supply certification by an independent testing laboratory that the material meets the requirements of Table 1.

(2) The backer rod shall be a joint filler stop of closed cell polyethylene foam of

sufficient size to provide a tight seal. The backer rod shall be sized such that when installed in a saw cut joint it shall prevent the sealant from flowing to the bottom. The backer rod shall be compatible with the joint sealant to act as a bond breaker, and sized according to the manufacturer's recommendations.

A bond breaking polyethylene tape will be required on top of all expansion joint fillers, cork or redwood to prevent the sealer from bonding to the expansion joint filler. The tape shall be of sufficient width to completely cover the expansion joint filler. The tape shall be compatible with the joint sealant to act as a bond breaker and installed per the manufacturer's recommendations.

- (3) Expansion joint filler shall be either cork meeting the requirements of AASHTO M153, Type II or redwood boards meeting the requirements of NCTCOG. The filler for each joint shall be furnished in a single piece for full depth and width required for joint, unless otherwise specified by the City. When the use of more than one piece is authorized for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the City.

Each lot or batch of sealing compound shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, and the safe heating temperature and shall be accompanied by the manufacturer's certification stating that the compound meets the requirements of this specification.

(c) Execution

- (1) Time of Application: The joints shall be sealed immediately following the curing period of the concrete, weather permitting, and prior to opening to traffic. During application of joint sealant, the weather shall not be rainy or foggy and the temperature shall be above 40 degrees F.
- (2) Equipment: Equipment necessary for construction of this work shall be in first-class working condition and approved by the City prior to beginning work. The equipment shall be as recommended by the joint sealant manufacturer.

The joint sealant equipment shall consist of power-driven apparatus capable of extruding the material at a continuous feed. The extruding nozzle tip of the machine shall be designed to fill the joint uniformly.

The equipment for cleaning joint openings shall consist of plows, powered brooms or wire brushes, air compressors, and joint cleaning and grooving machines necessary to produce a clean and dry joint.

TABLE I - SILICONE SPECIFICATIONS

<u>Test Method</u>	<u>Test</u>	<u>Material Requirement</u>
As Supplied		
MIL-S-8802	Flow, maximum, inches	0.2
MIL-S-8802	Extrusion Rate, grams per minute	90 to 250
MIL-S-8802	Tack-Free Time, minutes	35 to 75
ASTM D 1475	Specific Gravity	1.450 to 1.515
Upon Complete Cure		
ASTM D 2240	Durometer ¹ , Shore A	15 to 25
ASTM D 412, Die C	Modulus, at 150% elongation ¹ , psi maximum	45
ASTM D 412	Elongation ¹ , % minimum	1200
ASTMD 3583 ² (Modified)	Adhesion to Concrete ¹ , minimum % elongation	500
Performance		
ASTM C 719	Movement, 10 cycles @ +100/-50%	No Failure
ASTM C 793-75	Accelerated Weathering, at 5,000 hours	No Cracks, Blisters or Bond Loss

¹Sample cured 7 days at 25° +/- 1° C(77° +/- 2°F) and 50 +/- 5% relative humidity. Proper joint design and proper joint preparation are necessary for maximum performance.

²Joint design uses 1/2 inch x 1/2 inch x 2 inch configuration.

- (3) Preparation of Joints: The cut faces of the joint shall be thoroughly cleaned of all foreign materials, as may be required for proper installation and bonding of the joint sealer or filler, including residue from water flushing operations, by sandblasting as required. The use of a portable hand saw will not be permitted for cleaning joint faces.

After complete drying, the joint shall be sandblasted. The sandblaster nozzle shall be attached to a mechanical aiming device so as to direct the sandblast at approximately a 45 degree angle and at a maximum of two (2) inches from the faces of the joint. Both joint faces shall receive sandblasting.

After sandblasting the joints shall be blown out using filtered, oil free and moisture free, air at a minimum of 90 psi and 120 cfm. Blowing out of the joint shall be accomplished by using an approved blow tube which will fit into the joint.

After blowing, the joint shall be checked for any residual dust or coating. If any is found, the sandblasting and blowing operations shall be repeated until the joint is cleaned. The cleaned joints shall be sealed the same day as cleaned. Joints left open overnight shall be recleaned prior to sealing.

- (4) Applicable Test Methods:

ASTM D2240 Tests for Rubber Properties - Durometer Hardness

ASTM D3583 Joint Sealant, Hot applied, Elastomeric Type, for Portland Cement Concrete Pavements or Joint Sealant, Hot Applied, Elastomeric, Jet-Fuel-Resistant Type, for Portland Cement Concrete Pavements, Testing.

ASTM C719 Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman cycle)

ASTM D793 Test Method for Effects of Accelerated Weathering on Elastomeric Joint Sealants.

2.13 VALVES

- 2.13.1.(a) Add the following to the end of the second paragraph:

Valves smaller than 3" shall be brass.

- 2.13.1.(s) Add the following to the end of this section:

All 3"-12" valves shall have a minimum operating pressure of 175 psi. Valves greater than 12" shall have a minimum operating pressure of 150 psi. Gate valve connections shall conform to AWWA C111 and ANSI A21.11.

4.2 ROLLING

- 4.2.1 Revise Section, Adding:

Rolling shall continue until no further compression can be obtained and all roller marks are eliminated. The Contractor shall be required to use both a steel wheel roller conforming to Item 4.2.2 (NCTCOG Specs.) and a pneumatic tire roller conforming to Item 4.2.4 (NCTCOG Specs.).

4.2.2 Delete 1st and 2nd Sentences. Revise Section, Adding:

Rolling shall be considered incidental work and shall not be paid for as a separate item.

4.9 PORTLAND CEMENT MODIFICATION OF SUBGRADE SOILS

4.9.4.(f) Add the following section:

Surface Tolerance: Subgrade surfaces after completion of lime stabilization operations shall be smooth and within the tolerance of plus .05 and minus 0.1 foot of grades and levels required from the construction shown.

4.9.4.(g) Add the following section:

CONTRACTOR shall notify the OWNER'S representative for routine testing in conjunction with the work of this section. The compacted subgrade should be tested for in place density and moisture content at a frequency of one test per 5000 square feet within 48 hours prior to pavement construction.

5.8 PORTLAND CEMENT CONCRETE PAVEMENT

5.8.2.(g) Add the following to the beginning of this section:

Remove impounded water and debris from spaces to be occupied by concrete, before depositing any concrete. Wet wood forms with water.

5.8.3.(e) Add the following to the end of this section:

Forms shall remain in place at least 12 hours after the concrete has been placed. Remove forms without injuring concrete. Satisfactorily repair any concrete found defective after form removal.

Curbs shall be backfilled within twelve (12) hours after the removal of forms.

5.8.6.(c) Revise "Item 5.8.7.(2)" in eighth paragraph to read "Item 5.8.6.(b)".

6.7 UNDERGROUND CONDUIT INSTALLATION

6.7.3.(c) Add the following to the end of the third paragraph:

Valves shall be installed with the opening stem upright. Valve boxes shall be of sufficient length to provide an unobstructed vertical opening from the ground surface to the operating nut. The top of the valve box shall be installed at finish grade with

a 12"x12"x4" thick level concrete pad surrounding the top.

6.7.3.(s).(B).(2).(i) Add the following to the end of this section:

The flushing velocity in the water line shall be at least 2.5 feet per second. The water piping shall then be disinfected using a chlorine solution in water of at least 50 mg/1 available chlorine. The chlorinated water solution shall remain in the piping for at least 24 hours, and at the end of this period the chlorine concentration shall be at least 25 mg/1. Final flushing shall then be accomplished to remove chlorine concentrations greater than 2.0 mg/1. All requirements of AWWA Specifications C601 "Disinfecting Water Mains" shall apply. The requirements of this paragraph apply equally to new pipe and fittings, and to existing pipe lines into which connections have been made, or which may have been otherwise disturbed to the extent that contamination may have occurred.

6.7.4.(b).(1) Add the following to the end of this section:

Provide two copies of materials certificates signed by the material producer and the CONTRACTOR certifying that each material item complies with, or exceeds, specified requirements. The certificates shall be provided at the site with delivery of the materials.

6.7.4.(b).(9) Replace first paragraph with the following:

Joints in Storm Sewers: Reinforced concrete pipe joints shall be tongue and groove with either cold applied preformed plastic gaskets or rubber gaskets in accordance with TxDOT Item 464. Gasket material shall be placed in the tongue and groove and compressed.

6.7.4.(c).(2).(C) Add the following section:

Cleaning up and Repairing. The sewers shall be kept clean during the progress of the work, and upon completion shall be thoroughly cleaned. All needed repairs shall be made before this final cleaning. The CONTRACTOR shall provide suitable tools and labor to clean the sewers at his own expense. Any excessive leakage of water into the sewers, or any deviation from proper grade alignment such as to make the work, in the opinion of the ENGINEER, not consistent with first class work, shall be promptly corrected by the CONTRACTOR at his own expense. After a section of line is installed and backfilled, restoration of affected property shall not be delayed; cleanup shall progress with the work. All materials, tools, temporary structures, and excess excavation shall be removed, cleaned, smoothed, graded, and/or finished in a workmanlike manner at the completion of the work.

6.7.4.(f).(3) Add the following to the end of this section:

Tops of junction boxes shall be set flush with finish grade. Joints in precast sections shall be watertight and sealed with an elastomeric or mastic sealant. Wall openings around pipes shall be sealed on the outside with a fillet of concrete or grout and on the inside with grout. Inverts shall be formed with grout or concrete to permit a smooth flow through the structure and prevent deposition of solids or sediment.

6.7.4.(g).(2).(C) Add the following section:

Tops of manholes shall be set flush with finish grade. Joints in precast sections shall be watertight and sealed with an elastomeric or mastic sealant. Wall openings around pipes shall be sealed on the outside with a fillet of concrete or grout and on the inside with grout. Inverts shall be formed with grout or concrete to permit a smooth flow through the structure and prevent deposition of solids or sediment.

8.8 SAWING

8.8.3.(c) Add the following to the end of this section:

Saw joints after completion of finishing operations as soon as concrete has hardened to the extent necessary for operation of saws without causing chipping of joints or damage to adjacent concrete surfaces. Saw joints within 24 hours after concrete is poured.

8.9 PAINTING

8.9.3.(a) Add the following to the beginning of this section:

Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing time and drying time between coats shall be furnished by the manufacturer and strictly followed by the CONTRACTOR.

8.9.3.(a) Add the following to the end of this section:

Special Surface Preparation:

- (1) Ferrous Metal Surfaces: Rust and mill scale shall be removed by power tool cleaning, as specified by the Steel Structures Painting Council.
 - (A) All weld fluxes shall be power tool cleaned as specified by the Steel Structures Painting Council and washed thoroughly with water to remove all weld flush spatters and alkali contaminants.
 - (B) Shop primer coats that have been ruptured or marred shall be wire brushed to bare metal and reprimed with primer specified.
 - (C) Surface preparation for submerged ferrous metal surfaces shall be a near white metal blast in accordance with Steel Structures Painting Council SSPC-10-63T. Metal surfaces in critical areas (non-submerged) shall be given a SSPC-8-6-63 commercial blast cleaning.
- (2) Concrete and Masonry Surfaces: Surfaces shall be allowed to dry at least 30 days before painting. Glaze, efflorescence, laitance, dirt, grease, oil, asphalt, surface deposits of free iron and other foreign matter shall be removed prior to paintings.

8.9.3.(m) Add the following section:

Pavement markings consist of lane striping, stop bars and turn lane markings. Traffic lane striping shall be white extruded thermoplastic 10' long by 4" wide with 30' skip and white/red dual reflective Stimsonite reflectors at 80' centers. Turn lanes shall be marked with dual white ceramic reflectors at 36" centers for the entire length of storage. Stop bars shall be 18" wide crossing all traffic lanes and be located at all major intersections.

9.1 TESTING

9.1.1 Add a new paragraph immediately after section 8.9.

Testing of Materials: Samples of all materials for tests shall be taken by the Owner's authorized representative at the discretion of the Owner. The initial sampling and testing of materials shall be made at the expense of the Owner. In the event the initial sampling and testing does not comply with the specifications, all subsequent testing of the material in order to determine if the material is acceptable will be at the Contractor's expense.

9.2 BARRIERS AND WARNING SIGNS

Add the new paragraphs immediately after section 9.1.

9.2.1 The Contractor shall be held responsible for all damages to the work and other public or private property due to the failure of warning devices, barricades, signs, lights or other precautionary measures in protecting said property; and whenever evidence is found of such damages, the Owner may order the damaged portion immediately removed and replaced by and at the cost and expense of the Contractor.

Minimum standards for safeguarding pedestrian and vehicular traffic are contained in the "Manual on Uniform Traffic Control Devices", Federal Highway Administration of the U. S. Department of Transportation and the "Texas Manual on Uniform Traffic Control Devices", Texas Department of Transportation.

9.3 PAVEMENT MARKINGS

Add the following section immediately after paragraph 9.8.

9.3.1 DESCRIPTION:

General. The Contractor shall be responsible for providing and installing all pavement markings necessary to complete the project. Typical details of permanent pavement markings are provided in the construction plans. The Contractor shall begin paint application no less than 45 days and no more than 75 days after the substantial completion date as provided in Article 3.1 of the Standard Form of Agreement. Between the time of substantial completion and paint application, the Contractor shall provide temporary pavement markings. The Contractor shall submit the method and material to be used for the provision of temporary pavement markings to the Engineer, in submittal form, for approval. The Contractor shall

provide maintenance of temporary pavement markings until such time they are replaced by permanent pavement markings.

- (a) The paint to be used is defined by TXDOT specifications for "waterborne" paint. Paint will be accepted if it is in accordance with the TXDOT Departmental Materials Specification, D-9-8200 as amended.

Furnish labor, materials, equipment, transportation, and shop services required for the painting as specified herein or indicated on the drawings.

Where not specifically mentioned, work shall be painted or finished the same as specified for similar items.

- (b) **Quality Assurance:** All paints shall be used in strict accordance with the specifications of the manufacturer and with all other applicable codes and standards. A qualified representative of the paint manufacturer shall be available for consultation at the site, as necessary, to ensure that surface preparation and application of their product is being performed in accordance with their specifications.
- (c) **Product Delivery, Storage and Handling:** Paints shall be in sealed containers that legibly show the designated name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warning and special precautions and name of manufacturer. Provisions will be made for a secure space for the storage of all paint materials and equipment for the exclusive use of the painter who will, in turn, maintain and leave it free from hazards due, for example, to improperly stored rags or thinners.

9.3.2 MATERIALS:

- (a) **General:** All materials shall be applied in strict accordance with manufacturer's directions as printed on the container, and any thinning required shall be done in the manner prescribed and exclusively with the type of reducer recommended by the manufacturer.
- (b) **Reflective Material:** Reflective material shall consist of glass beads added to the surface of the final coat of paint prior to setting, so that the beads shall have proper adhesion. The glass beads shall be in accordance with TXDOT Departmental Material Specification, D-9-8290 as amended. Special care shall be taken with rapid dry paint.

Glass beads shall be mechanically applied at a rate of six to eight pounds of beads per gallon (0.72 to 0.96 kg per litre) of paint. Glass beads shall be applied to pavement markings, curbs and crosswalks by use of a dispensing device developed for this purpose or other methods approved by the Owner.

9.3.3 CONSTRUCTION METHODS:

(a) General:

- (1) Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing time and drying time between coats shall be furnished by the manufacturer and strictly followed by the Contractor.
- (2) Pavement markings shall consist of lane striping, stop bars and turn lane markings. Pavement markings shall be as shown on the plans.

(b) Preparation of Surfaces: The Contractor shall be held responsible for the finished appearance and satisfactory completion of his work. And, therefore, he shall not commence any painting until surfaces to be painted are in proper condition in every respect. Drop cloths must be provided by the Contractor to prevent paint material from falling on or marring any adjacent surface not being painted. Any damage resulting from the neglect of this provision will be corrected at the expense of the Contractor. All surfaces shall be clean, free of dirt, grease and any foreign matter that would adversely affect the finished appearance or protective properties of the paint applied. If for any reason the surface cannot be properly prepared by customary cleaning, the condition shall be promptly reported to the Engineer, or the Contractor shall assume the responsibility for rectifying any unsatisfactory finish resulting.

(c) Application:

- (1) All materials shall be applied neatly so as to dry uniformly to the color and sheen specified, free from runs, sags, wrinkles, shiners, streaks, and brush marks.
- (2) No exterior painting shall be undertaken at temperatures under 45 degrees F. or immediately following a rain, frost, or dew. Paints other than those specified follow manufacturer's temperature recommendations.
- (3) Any work which does not meet the approval of the Engineer shall be immediately corrected.
- (4) All coats of paint shall be thoroughly dry before applying succeeding coats. All primer and intermediate coats of paint shall be sanded lightly and dusted before succeeding coats of paint are applied. Manufacturer's recommendations must be strictly adhered to.

(d) Clean-up: Upon completion of the work, all misplaced paint, spots or spills shall be removed and work left in a condition acceptable to the Engineer. The painter shall remove from premises all empty containers and all other rubbish and debris resulting from his work and shall leave the entire premises in a neat and clean manner.

END OF SECTION

MOBILIZATION

PART 1 - GENERAL

1.01 Description of Work:

- A. Mobilization and preparatory work shall include mobilization of construction equipment, materials, supplies, appurtenances and the like, manned and ready for commencing and continuing the Work as well as the subsequent demobilization and removal from the Site of such equipment, temporary installation, appurtenances and the like upon completion of the Work.
- B. Mobilization and preparatory work shall include assembly and delivery to the site equipment, materials, and supplies necessary for the prosecution of the Work; and clearing of and preparation of the Contractor's work area; the complete assembly in working order, of equipment necessary to perform the required Work; personnel services and equipment rental on work preparatory to commencing actual work; plus other preparatory work required to permit commencement of the actual work on construction items for which payment is provided under the terms of the Contract.
- C. The Contractor shall conduct his work in accordance with the requirements described in these Specifications.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

PART 4 - METHOD OF MEASUREMENT

- 4.01 Measurement for Mobilization will be made on a lump sum basis wherein no measurement will be made.

PART 5 - BASIS OF PAYMENT

5.01 Payment:

- A. The value allocated to mobilization shall not exceed three (3%) percent of the Total Base Bid amount.
- B. Payment for mobilization will be made in equal portions on the first three (3) progress payments, provided the Owner is satisfied the Contractor is making a reasonable effort to mobilize for construction in a timely manner.

END OF SECTION

CHAIN LINK FENCE SPECIFICATIONS

PART 1 - GENERAL

- 1.01 **Description of Work:** The fences to be erected shall be of chain-link fabric supported on posts and shall replace the existing fences. The existing fences shall be used for locating the new fence, line and grade. The overall height and the fabric height shall be eight feet.

PART 2 - MATERIALS: Shall be new, zinc coated steel.

- 2.01 The fabric shall be woven with a 9 gauge core wire in a 2 inch mesh. Galvanized steel fabric shall conform to the requirements of ASTM A392, Class II.
- 2.02 Post, rail, and braces furnished for use in conjunction with zinc coated steel fabric shall be of zinc coated steel pipe. Galvanized steel pipe shall conform to the requirements of ASTM A120, Schedule 40, except the hydrostatic testing requirements is waived. Galvanizing shall be in accordance with ASTM A123.
- 2.03 Steel used in all other materials shall be ASTM Grade 45, galvanized in accordance with the requirements of ASTM A123.
- 2.04 Gate frames shall conform to materials in 7.2.3 and gate fabric shall conform to materials in 7.2.1.
- 2.05 Wire fabric ties shall be 9 gauge galvanized steel and tension wire shall be 7 gauge coiled spring wire, zinc coated.
- 2.06 Miscellaneous steel fittings and hardware shall be wrought or cast as appropriate to the articles, and sufficient in strength to provide a balanced design when used in conjunction with fabric, posts, and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A153.
- 2.07 Concrete shall be of commercial grade with a minimum 28 day compressive strength of 2500 psi. Samples of each batch to be supplied to the owner at the time post are set.
- 2.08 Marking: Each roll of fabric shall carry a tag showing the kind of base metal, kind of coating, the gauge of the wire, the length in the roll, and the name of the manufacturer. Post, wire and other fittings shall be identified as to manufacturers, kind of base metal and the kind of coating. Tags and other identification are to be submitted to the Town's representative as work progresses.
- 2.09 Vinyl Coating: All fencing and gates shall be black vinyl coated matching the existing vinyl coated fence around the water tower site.

PART 3 - EXECUTION

- 3.01 Clearing Fence Line: All obstacles and debris which will interfere with the proper construction of the fence shall be removed for a minimum of one foot on each side of the fence centerline before starting fencing operation. This includes all concrete base material for the old fence posts.

All holes remaining after post and stump removal shall be refilled with suitable soil and shall be compacted properly with tampers.

Surface irregularities shall be graded so that the fence shall conform to the general contour of the ground, and the bottom of the fence shall be placed a uniform distance above the ground.

- 3.02 Installing Posts: All post shall be spaced no more than 10 feet apart. Post shall be set in concrete bases, with a minimum of 2 inches of concrete between the bottom of the post and the bottom of the post hole. Post holes of line post shall be a minimum of 9 inches in diameter with a minimum of 30 inches of post under ground. Post holes for terminal, brace, and gate posts shall be a minimum of 12 inches in diameter with a minimum of 36 inches of post under ground.

The concrete shall be thoroughly compacted around the posts by vibrating and shall have a smooth finish with footing tops at least 1 inch higher than the ground and sloped to drain away from the posts. All post shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within 7 days after the individual post footing is completed.

Post dimensions: Line post shall have minimum O.D. of 2-3/8" and weight 3.65 lbs. per foot. All other post shall have minimum O.D. of 2-7/8" and weigh 5.69 lbs. per foot.

- 3.03 Installing top rails: Top rails shall be at least 2" below the top of the fabric. the coupling used to join the top rial lengths shall allow for expansion.
- 3.04 Installing braces: Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.
- 3.05 Installing fabric: The wire fabric shall be firmly attached to the posts and properly braced. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than 1 inch or more than 4 inches from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

Any opening under fences, wherein the bottom of the fence wire is more than 4 inches above ground and the total area of the opening is 96 sq. inches or more, shall be closed. Such locations of small natural swells or drainage ditches where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched thereon to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches or less.

- 3.06 Installing gates: Gates shall be fabricated from the same materials as the fence, 8 feet high with rails at least two inches below the fabric. The sizes and number of gates are indicate don the bid form.

PART 4 - METHOD OF MEASUREMENT

- 4.01 Chain-link fence will be measured for payment by the linear foot. Measurement will be along the top of the fence from center to center of end posts, excluding the length occupied by gate openings.
- 4.02 Gates will be measured as complete units.

PART 5 - BASIS OF PAYMENT

- 5.01 Payment for chain-link fence will be made at the contract unit price per linear foot. The price for fencing shall include all cost, clearing and fence removal, except gates.

5.02 Payment for gates will be made at the contract unit price for each gate.

5.03 The prices for fences and gates, in total, shall be full compensation for furnishing all materials, and for all preparation, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the items.

END OF SECTION

DEMOLITION

General

1. **Description:** Provide demolition, salvage and protection of existing structures and trees as shown on Drawings or specified.
2. **Related Work specified elsewhere:**
 - A. Tree Protection
 - B. Earthwork
3. **Notification of Owners of Utility Lines and Equipment:** Notify any corporation, company, individual or local authority owning conduits, wires, pipes or equipment on site affected by Demolition work. Remove such items and pay fees or costs in conjunction. Cap lines in accordance with instructions of governing authorities. This is to include existing irrigation lines and related wiring.
4. **Protections:** Protect existing surfaces of building equipment or other materials scheduled to remain. Protect trees and other vegetation.
5. **Examination of Site:** Before submitting proposal, visit and examine site to ascertain actual nature and scope of demolition and salvage work. Claims for extra compensation on account of additional labor, materials or equipment required for difficulties encountered in demolition and salvage work will not be recognized.

Execution

1. **Demolition Operations:**
 - A. Prior to demolition operations, disconnect and cap off irrigation and utility service lines not required for new construction in accordance with requirements of governing authorities, applicable ordinances and regulations. If Owner deems necessary, ball and burlap predetermined plant material and relocate to Owner approved site.
 - B. Erect necessary barricades and protective measures as required. Verify that tree protection devices are in place.
 - C. Execute demolition of surfaces in a careful and orderly manner with least possible disturbance or damage to adjoining surfaces.
 - D. Materials and debris resulting from demolition operations will be removed from the site.
 - E. Remove pavements, structures, utilities, and the like to the depth of their structure.
 - F. Leave construction areas clean and ready for other trades.
 - G. Remove pavements sub-base to the depth of the base material.
 - H. Do not remove or damage trees or other vegetation unless noted to be removed.

Salvage: Salvage items discussed in preconstruction meeting. Clean and deliver to Town of Addison. If Owner deems necessary, have predetermined plant material professionally balled and burlapped by reputable and Owner approved company and relocated to Owner approved site. Here these items are to be professionally planted, staked, mulched, and deep-watered. A written Letter of Guarantee of one year shall accompany all such material.

Final Grading: Refer to Earthwork for final grading requirements.

End of Section

EARTHWORK

General

1. **Description:** Provide complete topsoil stripping and stockpiling, earth excavation, filling, grading, trenching, and backfilling.
2. **Related Work Specified Elsewhere:**
 - A. Tree Protection
 - B. Landscaping
3. **Submittals:** Submit adequate samples of each proposed backfill to the site for Owner's review and approval.
4. **Job Conditions:**
 - A. **Protections:**
 1. Protect reference points, bench marks and monuments from damage or discoloration. Replace or repair immediately points damaged, destroyed or dislocated.
 2. Protect and maintain conduits, drains, inlets, sewers, pipes and wires that remain on property.
 3. Do not leave temporary wood in concrete or fill.
 4. Cover holes and trenches when work is not in progress. Fence or barricade changes of plane more than 45 degrees horizontally and more than 3 feet vertically.
 5. Provide dewatering and drainage to keep excavations free of water.
 6. Protect adjacent surfaces and improvements outside grading limits. Repair any damage immediately.
 - B. **Coordination:** If applicable, coordinate backfill operations with installation of subsurface drainage systems.
 - C. **Soil Classification:** Excavated materials are not classified as to type. Excavation includes all material encountered at site including rock rubble and debris.

Materials

1. **Select Fill:** Cohesive fill with liquid limit of less than 35 percent and plasticity index ranging from 5 to 15. Select fill shall be free of any lumps or stones larger than 1 1/2 inches diameter.
2. **Imported Topsoil:**
 - A. Friable, dark loamy soil, fertile, free from rubble, stones, clay lumps, extraneous material, plant roots and reasonably free of weeds. Topsoil containing Nutgrass or Dallisgrass will be rejected.

B. Physical properties as follows:

Clay - Between 7 - 27 percent.

Silt - Between 28 - 50 percent.

Sand - Less than 52 percent.

3. Site Topsoil:

A. Suitable topsoil material is excavated from on site.

B. Suitable soil is defined as dark brown sandy clay loam or dark brown blackland topsoil free of rocks greater than 1" in diameter, weeds, roots and other objectional materials. Suitable soil will be determined by the Architect/Owner.

4. Subsoil Material: Soil excavated from construction areas free of rocks (larger than 2 1/2 inches) and construction debris.

5. Stock Piles: Topsoil and excess subsoil material cut from construction areas which is suitable for backfilling shall be stockpiled in separate piles as directed by Architect/Owner. Location of stock piles shall be subject to approval of Owner.

6. Surplus Materials: Remove from site any excess materials and excavated materials unsuitable for use as fill and backfill. Materials containing rubbish or debris shall be immediately removed and legally disposed of off-site.

Execution

1. Preparation:

A. Remove abandoned, inactive utilities to point not less than 3 feet below finish grade. Plug or cap remaining lines in manner acceptable to utility company.

B. Report encounter of active utilities not indicated by the Contract Documents to Architect/Owner. Disposition shall be as directed with adjustment in Contract amount. Extra payment will not be authorized for work that could have been foreseen by careful examination of site.

C. Notify respective utility companies of damage caused to active utilities and protect active utilities pending instruction for disposition.

D. Strip and stockpile site topsoil and subsoil material for future use.

E. If applicable, verify that drainage system is complete.

F. Verify that waterproofing is complete.

2. Backfilling/Filling:

A. General:

1. Before filling, clean area debris, large rocks, formwork and loose material. Area to be filled shall be approved by Architect/Owner before filling is started.

2. Prior to filling under pavements proof-roll subgrade with a rubber tired roller of sufficient weight. Weak areas or areas where excessive pumping is noted shall be removed and replaced with Select Fill. Once the subgrade is uniformly stable, compact the area as noted herein.
3. Brace retaining walls and grade beams while placing fill or backfill material.

B. Select Fill:

1. Place under pavements in a uniform thickness.
2. Place in maximum 8" lift compacted to approximately 90% of Standard Proctory density at $\pm 3\%$ of optimum moisture content.

C. Backfill - Site:

1. Prior to placing backfill, scarify surface of ground to a depth of 4 inches. Moisture content of loosened material shall be such that first layer of fill will readily bond to surface. Do not place fill on subgrade that is muddy, frozen or contains frost.
2. Place in 8 inch maximum lift and compact to approximately 85 percent of Standard Proctor density.

D. Backfill - Under Pavements: Follow procedures noted in C. above, except compact lifts to 90% of Standard Proctor density.

3. **Finish Grading:**

- A. Grade uniformly with rounded surfaces at tops and bottoms of abrupt changes in plane. Hand-grade steep slopes and areas that are inaccessible for machine work and areas around existing trees. DO NOT cut or fill around trees unless approved by the Architect and Owner.
- B. Protect graded areas from undue erosion. Repair and regrade if required. Refill and compact where settlement occurs.
- C. Grade areas to elevations and slopes indicated without depressions causing pocketing of surface water or humps, producing localized runoff and gulying. Ponding of water on-site is not allowed. Finish surfaces to be not more than 0.10 foot above or below established grade as follows:
 1. Lawn Areas - Provide a minimum of 6" of Imported Topsoil or Site Topsoil over the lawn. If rock is encountered, overexcavate to a dept the one (1) foot and backfill with Topsoil.
 2. In areas where fill will exceed 6" (except where Select Fill is called for), place Imported Topsoil or Site Topsoil to a minimum depth of two (2) feet. If more than two (2) feet of fill is required, Subsoil Material may be used to within two (2) feet of finish grade.
 3. Planting Beds - Grade these areas to a subgrade of 6" below finish grade. Complete final backfill with prepared soil mix as provided in the landscaping section.

- 4. Cleanup:** Remove excess materials from site promptly to prevent large accumulations. Store reusable material neatly in designation locations. Upon completion of the project any remaining surplus materials must be removed and legally disposed of off site.

End of Section

SUPPLEMENTAL LANDSCAPE AND IRRIGATION SPECIFICATIONS

SECTION 01532 - TREE PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide protection of existing trees scheduled to remain and furnish all supplementary items necessary to complete the protection barricade installation and root pruning.

1.02 SITE CONDITIONS

- A. Most of the existing trees are located on the drawings. Protect these trees and all other trees outside of the building footprint and roadway/parking area unless they are scheduled to be removed.

1.03 TREE TAGGING

- A. Identify trees to be preserved with permanent flagging tape.

1.04 PROTECTION/ROOT PRUNING

- A. Protect trees by barricading each tree or group of trees outlined on the drawings.
- B. Do not cut or fill within the line of the barricade or within the drip line of the trees.
- C. Complete root pruning prior to beginning parking area and building construction.

1.05 GUARANTEE

- A. Guarantee existing trees against damage until final acceptance of the project. Repair any damage which, in the opinion of the landscape architect, can be satisfactorily corrected.

1.06 DEFINITIONS

- A. Disturbance/Damage: Physical or visual change to the trees which, in the opinion of the landscape architect, is detrimental to the trees being protected. Such disturbance may be caused by equipment, material, or personnel.
- B. Violation: Damage to trees caused by any construction or delivery vehicle, construction material storage, or disposal of solid or liquid debris shall be considered a violation.

PART 2 - PRODUCTS

2.01 BARRICADES

- A. Fence Material: 12½ ga. galv. stock fence, 4'-0" tall or Plastic Snow fence.
- B. Post: Steel T post, 6'-0" long.

2.02 EQUIPMENT

- A. Complete root pruning with a "Ditch Witch" type trenching machine.

PART 3 - EXECUTION

3.01 TREE PROTECTION

- A. Install prior to any mobilization on the site.
- B. Barricade: Install barricades around trees at their drip line unless construction is scheduled to encroach closer to the trunk. In this event, relocate the fence to within 4' of the trunk. Where construction comes closer than 4', protect the trunk by planking as detailed.

3.02 ROOT PRUNING

- A. If construction encroaches within the dripline, provide root pruning as described.
 - 1. Cut trenches 2'-6" deep, 1'-0" behind the proposed back of curb or building perimeter line.
 - 2. After trenching, carefully inspect exposed roots and saw cut any flared ends smooth.
 - 3. After trenches are cut and reviewed by landscape architect, backfill with soil to the original grade and water backfill thoroughly.
 - 4. Do not proceed with backfill until trenches are reviewed.

3.03 MAINTENANCE

- A. Maintain tree protection barricades in a newly installed condition through final acceptance or until construction has been completed in the area of the tree(s).
- B. Deep-water protected trees weekly during dry periods, and spray tree crowns periodically to reduce dust accumulation on the leaves.

3.04 PENALTY

- A. If any tree is damaged and, in the opinion of the landscape architect, cannot be satisfactorily repaired, then a fine of \$100 per caliper inch will be assessed against the contractor. Caliper measurements will be taken as follows: up to and including 4" caliper, 6" above ground level; over 4", 4'-0" above ground level.
- B. If the landscape architect agrees that the damage can be satisfactorily repaired, then complete this work by a qualified arborist to the satisfaction of the owner/landscape architect.

END OF SECTION

SECTION 02217 - TREE PRUNING

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Complete removal of dead, dying, diseased, weak, crossing, or unsightly branches.

1.02 RELATED REQUIREMENTS:

- A. The GENERAL PROVISIONS, SUPPLEMENTAL GENERAL PROVISIONS, SPECIAL PROVISIONS, and Division 1 - GENERAL REQUIREMENTS are hereby made a part of this Section.
- B. Section 01500 - TEMPORARY FACILITIES: Tree Protection

1.03 QUALITY ASSURANCE:

- A. Complete work under the supervision of a licensed arborist with a minimum 5 years experience completing work of similar scope.
- B. Work will be done in accordance with Class I procedures as developed by National Arborists Association, Inc.
- C. Provide references for verification.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Tree Paint
 - 1. Type: Water proof asphalt based paint with anti-septic properties, manufactured for use on tree wounds.
 - 2. Source: R.I.W. Tree Surgery Paint by Toch Bros., New York, or Sherwin-Williams Pruning Compound.

PART 3 - EXECUTION

3.01 PROCEDURES:

- A. Review work with architect to determine general intent of pruning operation.
- B. Do not proceed until review is complete.

3.02 PRUNING:

- A. Provide removal of dead and diseased branches plus other branches to raise trees as directed by architect.
1. Make cuts and shape sufficiently close to parent stem so that healing can readily start under normal conditions.
 2. Limbs over 2 inches in diameter shall be removed by stub-cutting to prevent splitting. Provide lowering of branches by proper ropes so as not to damage other limbs by falling.
 3. Provide approved tree paint for cuts over two inches in diameter.
 4. Provide disinfection of tools after each cut with a 20% alcohol solution on trees where there is known danger of transmitting disease on tools.
- B. Comply with Class I pruning procedures.

3.03 CLEANUP:

Provide prompt removal of clippings and debris from site. Leave site in broom clean condition.

END OF SECTION

SECTION 02810 - IRRIGATION SYSTEM

PART I - GENERAL

1.1 DESCRIPTION

- A. Provide complete landscape irrigation system as shown on drawings as described herein.

1.2 RELATED SECTION

- A. Landscaping planting - Section 02900
B. Grass planting - Section 02930

1.3 QUALITY ASSURANCE

- A. Substitutions:
1. Time: To be considered, submit substitution request in writing 7 days prior to bid opening.
 2. Required Submittal Material:
 - a. Sample proposed substitute sprinkler.
 - b. Manufacturer's data on sprinkler discharge rates (GPM), minimum allowable operating pressure, maximum allowable spacing and distance of throw.
 - c. Detailed pressure loss computations if proposed substitute differ from those specified.
 - d. If proposed substitute requires a change in head and piping layout as designed, submit detailed drawings showing design changes and proposed layout.
 3. Approval: Approval of proposed substitute will not relieve responsibility for providing a system that will operate according to intent of originally designed system.
- B. Installer: System installation must be supervised by an irrigator licensed in State with a minimum 5 years continuous experience installing systems of this size and complexity.
- C. Testing: Perform required testing under observations of Architect. Give 48 hours notice that such tests are to be conducted.
- D. Assembly Procedures: Do not alter design hydraulics by installing additional tees or elbows unless approved by Architect.

1.4 REFERENCES STANDARDS:

- A. American Standard for Testing and Materials (ASTM) - Latest edition.
1. D2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
 2. D2464 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Thread, Schedule 80
 3. D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
 4. D2467 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Socket Type, Schedule 80
 5. D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
 6. D2287 Flexible Poly Vinyl Chloride (PVC) Plastic Pipe
 7. F656 Poly Vinyl Chloride (PVC) Solvent Weld Primer
 8. D2855 Making Solvent - Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings

1.5 SUBMITTALS

- A. Procedure: Comply with Division I requirements.
- B. Product Data: Submit copies of equipment manufacturer's specifications and literature for approval.
- C. Project Record Documents
 - 1. Comply with Division I requirements.
 - 2. Locate by written dimension, routing of mainline piping, remote control valves and quick coupling valves. Locate mainlines by single dimensions from permanent site features provided they run parallel to these elements. Locate valves, intermediate electrical connections, and quick couplers by two dimensions from a permanent site feature at approximately 70 degrees to each other.
 - 3. When dimensioning is complete, transpose work to mylar reproducible tracings. Tracings will be provided by Architect.
 - 4. Submit completed tracings prior to final acceptance. Mark tracings "Record Prints Showing Significant Changes". Date and sign drawings.
 - 5. Provide three complete operation manuals and equipment brochures neatly bound in a hard back three-ring binder. Include product data on all installed materials. Include warranties and guarantees extended to the Contractor by the manufacturer of all equipment.
- D. Water Pressure: Prior to starting construction, determine if static water pressure is as stated on Drawings. Confirm findings to Architect in writing. If static pressure varies from pressure stated on drawings, do not start work until notified to do so by Architect.
- E. Quick Coupler Keys: Provide 3 coupler keys with boiler drains attached using brass reducer.
- F. Controller Keys: Provide two sets of keys to controller enclosure(s).

1.6 COORDINATION

- A. Complete sleeve installation (not otherwise provided) in coordination with paving and other concrete pours.
- B. Coordinate to ensure that electrical power source is in place.
- C. Coordinate system installation with work specified in other Sections and coordinate with landscape installer to ensure plant material is uniformly watered in accordance with intent shown on drawings.

1.7 WARRANTY AND MAINTENANCE

- A. Extend to the Owner warranties and guarantees provided by the manufacturer of all equipment used.
- B. Fully warranty materials and workmanship for a minimum of one year after final acceptance.
- C. Limit warranty to repair and replacement of defective materials and workmanship, including repair of backfill settlement.

1.8 CONNECTION TO DOMESTIC WATER SUPPLY

- A. Complete connection to water supply in accordance with governing codes and regulations.
- B. Secure any required permits which will be supplied by the Town of Addison at no cost to the Contractor.

PART 2 PRODUCTS

2.1 DEFINITIONS:

- A. Mainline: Piping from water source to operating valves. Hydrant lines and lines supplying quick coupling valves (QCV) are considered mainlines.
- B. Lateral Piping: Piping from operating valves to sprinkler heads.

2.2 POLYVINYL CHLORIDE PIPE

- A. Polyvinyl Chloride Pipe (PVC): Manufactured in accordance with standards noted.
 - 1. Marking and Identification: Permanently marked with SDR-21, Class 200, ASTM standard number, and the NSF (National Sanitation Foundation) seal. Provide pipe free of blisters, internal striations, cracks, or other defects.
 - 2. Mainline - Schedule 40
 - 3. PVC Pipe Fittings: Schedule 40.
 - 4. Sleeves and laterals - Class 200.
- B. Pipe Connection Materials:
 - 1. General: Do not use cross fittings. Separate fittings at least 12 inches. Use reduction tees, not reducer bushings. Allow 1'-6" outside of sleeves before first fitting.
 - 2. Slip fittings: Use primer and adhesive solvent. Cans of primers and solvents to have labels intact and stamped with date of manufacture. Cans dated over two years old will not be permitted. Do not thin primer or solvent.
 - 3. Threaded fittings: PVC to PVC, or PVC to copper, use Teflon tape.
 - 4. Flexible PVC: Use only solvents made for flexible pipe such as Uni-fuse #20 by Sureguard Corporation.

2.3 COPPER PIPE MATERIALS

- A. Copper Tubing: Hard, straight length of Type "M" only. Provide pipe free of internal striations, cracks, or other defects. Copper tube of foreign extrusion or irrigation tubing (thin wall) will be rejected.
- B. Copper Tube Fittings: Cast brass of wrought copper, sweat-solder type.
- C. Pipe Connection Materials: Threaded fitting, copper to copper, copper to brass, copper to PVC: Teflon tape.

2.4 MISCELLANEOUS MATERIALS

- A. Wire: Type UF with 4/64 inches insulation, Underwriters Laboratory (UL) approved for direct underground burial in National Electrical Code Class II Circuit (30 volts AC or less). Size according to controller manufacturer's recommendations and consideration of length of run, but no smaller than #14. Use red for control wire and white for ground.
- B. Nipples:
 - 1. For lawn heads: Threaded polyethylene, nominal 1/2 inch by \pm 6 inches.
 - 2. For rotary heads: Use Lasco T 222-312, 3/4 in. swing joints.
- C. Pea Gravel: Washed native aggregate graded 3/4 to 1-1/2 inches.

2.5 IRRIGATION EQUIPMENT: Refer to drawing notes and legend.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine areas to be sprinkled and conditions under which irrigation sprinkler system is to be installed.
- B. Verify that interfacing work specified elsewhere is complete.
- C. Notify Architect in writing of conditions detrimental to proper irrigation coverage and timely completion of Work.
- D. Do not proceed until conditions are satisfactory.

3.2 INSTALLATION

- A. General
 - 1. Compliance: Complete installation in strict accordance with manufacturer's recommendation which shall be considered a part of these specifications.
 - 2. Staking: Stake location of each sprinkler for approval of Architect before proceeding. Do not exceed manufacturer's maximum spacing limits.
 - 3. Piping Layout: Piping layout is diagrammatic. Route piping around trees and shrubs to avoid damage to plantings. Do not dig within balls of newly planted trees and shrubs.

4. Discrepancies

- a. Point out any discrepancy between the drawings and the field conditions that may affect uniform coverage. Do not proceed until any design change made necessary by such discrepancy is approved.
 - b. Should such changes create extra cost, approval for extra compensation shall be obtained in writing before commencing work.
 - c. Should such changes create a savings in cost, a written reduction in the contract price shall be approved in writing before commencing work.
 - d. If Contractor fails to comply with a. above, and proceeds with the installation, then the Contractor assumes responsibility for cost of subsequent system modifications to assure that uniform water coverage is achieved.
- B. Excavations: Excavations are unclassified and include earth, loose rock, or combinations, in wet or dry state. Backfill trenches with material removed except if rock is encountered, haul this material off site and backfill to ensure a minimum of 3 inches of rock free soil surrounding pipe.
- C. Water Meter and Backflow Prevention: Refer to drawings.

3.3 PIPE INSTALLATION

- A. General: Do not place more than two pipes in each trench.
- B. Mainline Piping: Install in 4 inch wide trenches with minimum of 18 inches of cover over pipe, but no more than 24 inches of cover.
- C. Lateral Piping: Install in 4 in. wide trenches with minimum 12 inches of cover over pipe, but no more than 18 inches of cover.
- D. Trenching: Provide firm, uniform bearing for entire length of pipe to prevent uneven settlement. Wedging or blocking of pipe is not permitted. Remove foreign matter from inside of pipe before welding. Keep inside of piping clean during and after layout.
- E. Inspection: Prior to trench backfill, arrange for the city inspector to review piping.
- F. Backfill: Water jet and compact to prevent after settling. Hand rake trenches and adjoining areas to leave grade in condition equal to before installation.

3.4 PVC PIPE AND FITTINGS ASSEMBLY

- A. Solvent: Use solvent and procedures recommended by manufacturer to make solvent-welded joints. Thoroughly clean pipe and fittings before applying solvent.
- B. PVC to Metal Connections: Use Teflon tape.
- C. Threaded PVC Connections: Use threaded PVC adapters into which pipe may be welded. Use Teflon tape on threads.

3.5 COPPER PIPE AND FITTINGS ASSEMBLY

- A. Clean pipe and fittings thoroughly and buff connections with sand paper to remove residue from pipe.
- B. Flux pipe and fitting and solder connection using "No-Lead" solder.

3.6 REMOTE CONTROL AND GATE VALVES

- A. Provide valves in accordance with materials list and size according to drawings.
- B. Install valves in a level position in accordance with manufacturer's specifications.
- C. Center a plastic valve box, over valve, flush with finish grade. Provide valve box extensions as required.
- D. Install 0.5 cubic feet washed pea gravel in bottom of valve box.

3.7 SPRINKLERS

- A. General: Provide in accordance with materials list, with nozzling in accordance with Drawings. Change nozzle degree and trajectory if wind conditions affect coverage. Receive approval from the Architect prior to any change. Install heads adjacent to walks and curbs 2 inches clear of paving.
- B. Lawn Heads: Attach sprinklers to lateral piping with flexible PVC nipples. Firmly tamp soil around base plate and leave head plumb. Set top of sprinkler 1/4" above finish grade. Refer to drawing details.
- C. Rotary Heads: Attach to lateral piping with pre-manufactured Lasco swing joint assemblies and schedule 80 PVC. Refer to drawing details.

3.8 QUICK COUPLING VALVES (QCV)

- A. Provide in accordance with materials list and as detailed on Drawings. Stake with galvanized pipe securely attached to QCV with two stainless steel worm gear clamps.

3.9 WIRING

- A. No conduit shall be required for U.F. wire, unless otherwise noted on Drawings. Tuck wire under piping.
- B. Make wire connections with King connectors according to manufacturer's recommendations.
- C. Provide a separate wire from controller to each electric valve. Provide a common neutral wire from controller to valves served by a particular controller, color coded white..
- D. Provide a 36-inch long wire coil at valves.
- E. Bundle wires together with waterproof electrical tape at ten foot intervals.
- F. Do not splice wire between valve boxes unless approved by the Owner. If approved, complete splices within 10 in. around valve boxes.

3.10 TEMPERATURE SENSOR

- A. Exterior Controller: Securely mount sensor on bottom of controller. Remove bracket usually supplied with unit and reuse bolts.

3.11 CONTROLLERS

Controllers are to be installed on the appropriate pedestal affixed to a permanent concrete pad via (4) bolts. All wiring is to enter the pedestal via gray PVC sweep elbows extending through the pad. Control wiring and 120-V services are to be separated with each having its own access elbow. Check Town's electrical codes for proper 120-V service installation. All controllers are to be permanently wired for quick attachment of Irritrol RVC unit: use Irritrol cable ADP-1. All controllers are to be properly and permanently wired with a miniclick freeze sensor or equal.

Revise w/ Rainmaster

3.12 TESTING

- A. Notify Architect to review work 48 hours prior to testing pipe and fittings for leaks.
- B. Test laterals and mains for a period of four hours under static pressure. If leaks (or pressure drops) occur, correct defect and repeat test.

3.13 FINAL ADJUSTMENT

- A. Make final adjustments of sprinkler system prior to Architect's final inspection.
- B. Flush system by removing nozzles from heads.
- C. Adjust sprinklers for proper operation and proper alignment for direction of throw.
- D. Adjust each section for operating pressure and balance to other sections by use of flow adjustment on top of each valve. Correct operating pressure at last head of each section - 50 psi for rotary heads and 20 to 25 psi for spray heads.
- E. Adjust nozzling for proper coverage. Prevailing wind conditions or slopes may indicate that arc of angle or trajectory of spray should be other than as shown on drawings. Change nozzles to provide correct coverage.

3.14 CLEANUP

- A. Keep premises clean and neat.

END OF SECTION

SECTION 02846 - SITE AND STREET FURNISHINGS

PART 1 - GENERAL

1.1 DESCRIPTION

Provide miscellaneous site and street furnishings as shown on Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Cast-In-Place Concrete - Section 03300.

PART 2 - PRODUCTS

2.1 FURNISHINGS: Refer to Schedules on Plans

PART 3 - EXECUTION

3.1 INSTALLATION (GENERAL)

- A. Install items in accordance with approved Shop Drawings and manufacturer's instructions.
- B. Install plumb and level, anchored rigid and secure, and in true alignment with related and adjoining work.
- C. Provide anchoring devices and fasteners as required for property installing items.
- D. Upon completion, re-examine work and correct to insure that installation is firm, tight, anchored, in true alignment with near fits, without distortions, unsightly fastenings, raw edges or protrusions.

3.2 FURNITURE

- A. Locate as shown on the drawings.
- B. Coordinate bench with concrete trade.
- C. Delay final installation until near final acceptance.

3.3 CLEAN UP

Upon completion of work covered in this section, the Contractor shall clean up all work areas by removing all debris, surplus material and equipment from the site. All paved surfaces shall be swept clean.

END OF SECTION

SECTION 02900 - LANDSCAPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide complete landscaping shown on drawings and described herein.

1.2 RELATED SECTIONS

- A. Irrigation System - Section 02810
- B. Lawns and Grass - Section 02930
- C. Earthwork - Section 02200

no specs?

1.3 QUALITY ASSURANCE

- A. Comply with applicable federal, state and county regulations governing landscape materials and work.
- B. Architect reserves right to review materials at growing site.
- C. Observation at growing site does not preclude right of rejection at job site. Plants damaged in transit or at job site shall be rejected.
- D. Personnel: Employ only qualified personnel familiar with required work.

1.4 REFERENCED STANDARDS

- ✓ A. American Standard for Nursery Stock, Edition approved October 27, 1980 by American National Standards Institute, Inc. (Z60.1) - plant materials.
- ✓ B. Hortus Third, 1976 - Cornell University - plant nomenclature.

1.5 SUBMITTALS

- A. Samples: Provide representative quantities of sandy loam soil, mulch, bed mix material, gravel, and crushed stone. Samples shall be approved by Architect before use on project.
- B. Product Data: Submit complete product data and specifications on all other specified materials.
- C. Submit three representative samples of each variety of ornamental trees, shrubs, and groundcover plants for Architect's approval. When approved, tag, install and maintain as representative samples for final installed plant materials.
- D. File Certificates of Inspection of plant material by state, county, and federal authorities with Architect, if required.
- E. Soil Analysis: Provide sandy loam soil analysis if requested by the Architect.

*City To Field
Soil Test*

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Preparation:

1. Balled and Burlapped (B&B) Plants: Dig and prepare shipment in a manner that will not damage roots, branches, shape, and future development.
2. Container Grown Plants: Deliver plants in container sufficiently rigid to hold ball shape and protect root mass.

B. Delivery:

1. Deliver packaged materials in sealed containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
2. Deliver only plant materials that can be planted in one day unless adequate storage and watering facilities are available on job site.
3. Protect root balls by heeling in with saw dust or other approved moisture retaining material if not planted within 24 hours of delivery.
4. Protect plants during delivery to prevent damage to root balls or desiccation of leaves. Keep plants moist at all times. Cover all materials during transport.
5. Notify Architect of delivery schedule 48 hours in advance so plant material may be observed upon arrival at job site.
6. Remove rejected plant material immediately from site.
7. To avoid damage or stress, do not lift, move, adjust to plumb, or otherwise manipulate plants by trunk or stems.

1.7 JOB CONDITIONS

A. Planting Restrictions:

Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practices.

B. Protection:

1. Do not move equipment over existing or newly placed structures without approval of Architect and General Contractor.
2. Provide board-roading as required to protect paving.
3. Protect other improvements from damage, with protection boards, ramps and protective sheeting.

C. Utilities:

1. Determine locations of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, if required, to minimize possibility of damage to underground utilities.
2. Coordinate work with irrigation contractor to prevent damage to underground sprinkler system.

D. Condition of Surfaces:

Landscape areas will be left as described in Section 02200, Earthwork. Complete bed preparation as noted herein.

1.8 WARRANTY

- A. Warranty plants for one year after final acceptance. Replace dead materials and material not in vigorous, thriving condition as soon as weather permits and on notification by Owner. Replace plants, including trees, which in opinion of Architect have partially died thereby damaging shape, size, or symmetry.
- B. Replace plants with same kind and size as originally planted, at no cost to Owner. Provide one-year warranty on replacement plants. Trees may be replaced at start of next planting or digging season. In such case, remove dead trees immediately. Protect irrigation system and other piping, conduit or other work during replacement. Repair any damage immediately to the Owner's satisfaction.
- C. Warranty excludes replacement of plants after final acceptance because of injury by storm, drought, drowning, hail, freeze, insects or diseases.
- D. At end of warranty period, remove staking and guying materials.

1.9 MAINTENANCE

- A. Water: Will be available on site. Provide necessary hoses and other watering equipment required to complete work.
- B. Maintain plantings and trees by watering, cultivation, weeding, spraying, cleaning and replacement as necessary to keep landscape in a vigorous, healthy condition and rake bed areas as required until final acceptance.
- C. Coordinate watering schedules with irrigation contractor during installation and until final acceptance. Provide deep root watering to newly installed trees.
- D. Monitor sump pits at trees daily and dewater pits if standing water persists.

Sump Pits?

PART 2 - PRODUCTS

2.1 PLANTS

- A. General: Well-formed No. 1 grade or better nursery grown stock. Listed plant heights are from tops of root balls to nominal tops of plants. Plant spread refers to nominal outer width of the plant, not to the outer leaf tips. Plants will be individually approved by the Architect and his decision as to their acceptability shall be final.
- B. Shrubs and Groundcovers: Nursery grown, healthy, vigorous, of normal habit of growth for species, free from disease, insect eggs and larvae. Specified sizes are before pruning and measured with branches in normal position. Plants shall be well rooted and established in the container.

- C. Ornamental and Shade Trees: Nursery grown (unless otherwise noted), healthy, vigorous, full-branched, well shaped, symmetrical, trunk diameter and height requirements as specified. Balls shall be firm, neat, slightly tapered and well burlapped. Trees with loose or broken balls at time of planting shall be rejected. Root balls shall be nine (9) inches in diameter for each inch caliper, measured six (6) inches above root ball for up to and including four (4) inch caliper, and twelve (12) inches above root ball for trees larger than four (4) inch caliper. Trees shall be free of physical damage such as scrapes, bark abrasions, split branches, mistletoe or other parasitic growth.

2.2 SOIL PREPARATION MATERIALS

A. Sandy Loam:

- Handwritten notes:*
Caliper
1/2" x 4"
Ryerson
1. Friable, fertile, dark, loamy soil, free of clay lumps, subsoil, stones, and other extraneous material and reasonably free of weeds and foreign grasses. Loam containing Dallasgrass or Nutgrass shall be rejected.
 2. Physical properties as follows:
Clay - between 7-27 percent
Silt - between 15-25- percent
Sand - less than 52 percent
 3. Organic matter shall be 3%-10% of total dry weight.
 4. If requested, provide a certified soil analysis conducted by an approved soil testing laboratory verifying that sandy loam meets the above requirements.

- B. Bed Mix: Premixed Bedding Soil as supplied by Vital Earth Resources, Gladewater, Texas; Professional Bedding Soil as supplied by Living Earth Technology, Dallas, Texas or Acid Gro Municipal Mix as supplied by Soil Building Systems, Dallas, Texas.

- C. Commercial Fertilizer: 10-20-10 or similar analysis. Nitrogen source to be a minimum 50% slow release organic Nitrogen (SCU or UF) with a minimum 8% sulphur and 4% iron, plus micronutrients.

2.3 MISCELLANEOUS MATERIALS

- A. Steel Edging: 1/8" x 4" Ryerson steel landscape edging.

- B. Mulch: Partially decomposed dark brown shredded hardwood bark mulch as distributed by Living Earth Technologies, (214)869-4332, Dallas, Texas.

C. Staking Material for Shade Trees:

1. Post: Studded T-Post, #1 Armco with anchor plate; 6'-0" length; paint black.
2. Wire: 14 gauge, single strand, galvanized wire.
3. Rubber hose: 2 ply, fiber reinforced hose, minimum 1/2 inch inside dia. Color: Black.

- D. Gravel: Washed native pea gravel, graded 1 in. to 1-1/2 in.

- E. Filter Fabric: Mirafi 140N by Celanese Fibers Marketing Company, available at Lofland Co., (214)631-5250 or approved equal.

- F. Wrapping Material: Waterproofing crepe tree wrapping paper.

- G. Soilsaver: Four foot (4'-0") wide rolls Ludlow Soil Saver jute mesh available at Dallas Bag and Burlap (214)741-6094.

PART 3 - EXECUTION

3.1 INSPECTION

Examine subgrade upon which work is to be performed and verify detrimental conditions affecting the work. Notify General Contractor or Architect of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Contractor. Refer to paragraph 1.7 - Job Conditions, herein.

3.2 TREE PLANTING

- A. Stake tree locations for approval by Architect.
- B. Tree Pit Excavation: Excavated soil may be used for shade tree backfill if approved for architect. Backfill must be free of subsoils, rock, caliche, and other extraneous material. If backfill is not acceptable, use sandy loam.
- C. Percolation Test: After tree pits are excavated, fill pits with water to determine if pits will adequately drain. If water does not percolate from pits within 24 hours, provide sump pits as detailed on the Drawings.
- D. Shade Trees:
 - 1. Plant in pits twice the diameter of the root balls or to the curb or pavement edge.
 - 2. Backfill with 5 parts excavated soil (or sandy loam) and 1 part peat. Remove excess excavated soil from site. Carefully settle by watering to prevent air pockets.
- E. Ornamental Trees
 - 1. Plant in pits 12 inches greater in diameter than tree ball, backfill with bed mix. Remove excavated soil from site. Carefully settle by watering to prevent air pockets.
 - 2. Determine direction of staking and rotate plants in pit to take advantage of optimum stem orientation.

3.3 TREE SAUCERS

- A. Form a 4 inch high saucer around each tree planted in the lawn areas for deep watering. Add mulch to the top of the ball as detailed and continue deep watering as required to keep uniform moisture around the root ball until final acceptance.

3.4 TREE STAKING

- A. Stake trees as detailed on Drawings immediately following planting operation. Take precautions during staking operation to prevent damage or injury to branches. Orient stakes within each cluster or row of trees in same direction.

3.5 PRUNING

- A. Prune newly planted and transplanted trees as directed by Architect following Fine Pruning, Class I pruning standards provided by National Arborist Association. In general, remove at least one-third of wood by thinning. Do not cut back terminal branches. Remove sucker growth and broken or badly bruised branches.

3.6 TREE WRAPPING

- A. Wrap nursery grown trees. Extend wrapping from ground to a point immediately below lowest branch of each tree or as directed. Securely fasten in place with tacks or staples, so wrapping will remain in place 2 years.

3.7 TREE TRANSPLANTING

- A. Relocate existing trees as noted on the drawings.
- B. Coordinate this effort with site construction to avoid damage.
- C. Complete pruning prior to digging trees according to pruning requirements stated herein.
- D. Dig, ball, and replant trees following procedures required for new trees.

3.8 STEEL EDGING

- A. Provide steel edging at interface of planted areas and lawn areas unless indicated otherwise on Drawings. Set edging as indicated with top of edging one inch above finish grade on lawn side.

3.9 PLANT BED PREPARATION

- A. Excavate or fill to provide 6 inches of Bed Mix for shrubs, groundcover and seasonal color. Haul off excavated soil. Add 4 pounds commercial fertilizer per 100 SF of bed area and mix thoroughly. Where bed areas have been left deeper than 6 inches, backfill with sandy loam to within 6 inches of finish grade followed by 6 inches of Bed Mix as noted above.

3.10 SHRUB AND GROUNDCOVER PLANTING

- A. Place plants in position on bed areas before cans have been removed. Obtain approval from Architect. Architect reserves right to interchange or shift locations of plants prior to planting. Do not remove burlap from B&B plants. Plant where located, setting plants with tops of balls even with tops of beds, and compact soil carefully around each plant ball. Water each plant thoroughly to eliminate air pockets. Carefully prune plants to remove dead or broken branches and hand-rake bed areas to smooth even surfaces.

3.11 SOIL SAVER

- A. Install soil saver in areas shown on Drawings and on slopes greater than 3:1 ratio in accordance with manufacturer's direction.

3.12 TOP DRESSING

- A. After planting has been completed and approved by Architect, top dress bed areas with mulch, 2 inches deep. Delay this operation until near final acceptance.

3.13 CLEAN UP

- A. Keep premises neat and orderly including organization of storage areas. Remove trash and debris from excavated planting areas, preparing beds, or planting plants from site daily as work progresses. Keep paved areas clean by sweeping or hosing.

END OF SECTION

SUPPLEMENTAL WATER LINE CONSTRUCTION SPECIFICATIONS

WATER LINE CONSTRUCTION

General

1. **Description:** Provide and install water lines as shown.
2. **Site Conditions:** The location of the existing water lines shown is approximate. Contractor shall verify location and size of existing lines prior to ordering and manufacture of fittings for connection to existing lines.

Execution

1. Prior to commencement of any construction activity in any area of the project, the Contractor shall contact all companies known to operate utility systems in the area and shall have their facilities physically located.
2. All water main construction shall conform to requirements for corrosion control and testing.
3. All water construction shall conform to Town of Addison Construction Standards and North Central Texas Council of Governments Standard Specifications for Public Works Construction, current edition and as amended herein.
4. All abandonment of existing water mains and appurtenances shall be in conformance with Town of Addison standards and specifications.
5. Thrust blocking will be used on water main construction in addition to restrained joints on all bends, tees, valves, etc.
6. In order to connect to existing water lines, it will be necessary to isolate the existing lines and temporarily remove them from service. The procedure for this work is generally as follows:

The Contractor shall contact Town of Addison inspections when he is ready to tap an existing main.

Town of Addison water distribution will determine the most appropriate valves for isolation of the line and will contact all customers that will be affected by the shutdown.

Town of Addison will determine the most appropriate time to shut down the line and will inform the customers and the Contractor of the maximum duration that the line will be out of service.

The Contractor will make the tap subject to Town of Addison inspection and Town of Addison will bring the line back into service.

The Contractor shall not, for any reason, operate any valves on the water distribution system.

The Contractor should expect that most interruptions in water service must occur at off-peak hours and he should therefore plan to work through the night and on weekends for most of the connection to existing water.

7. The specifications of any utility company or authority notwithstanding, all abandonment in place of utility lines and appurtenances shall conform with the requirements for establishment of proper and uniform subgrade for pavement and other surface or subsurface structures or the abandoned utility shall be physically removed from the ground.
8. All valves at outlets shall be flange by flange joints.



TEXAS UTILITIES ELECTRIC COMPANY

**T. U. ELECTRIC
SPECIFICATIONS FOR
MANHOLE & CONDUIT
LINE FACILITIES**

SPECIFICATION MDD - 5

October 21, 1994

APPROVED BY TUELECTRIC

T.U. ELECTRIC
SPECIFICATIONS FOR MANHOLE
AND CONDUIT LINE FACILITIES

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TU SPEC.: MDD-5

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I SCOPE

This document when applied in conjunction with the construction drawing represents the minimum requirements and specifications for a TU Electric Company manhole and conduit line system.

II DEFINITIONS

- A. Company: Texas Utilities Electric Company and its designated representatives
- B. Contractor: Individual or firm performing work for TU Electric underground service.

III CODES

All applicable building and safety codes shall be followed in the design and construction of the manhole and conduit line system. Included, but not limited to, are the following:

- A. Local City Building Code
- B. The National Electrical Safety Code (NEC)
- C. The contractor shall be familiar with and shall comply with all applicable requirements of these specifications and are intended to comply with OSHA requirements, but if there are any conflicts or omissions, the OSHA requirements shall be met. Any conflict or omission shall not relieve the contractor of responsibility of complying with OSHA requirements.
- D. Local City Location and Coordination Policy (if applicable)
- E. The American Concrete Institute (ACI)
- F. The American Society for Testing and Materials (ASTM)
- G. State Department of Highways and Public Transportation-Utility Accommodation Policy

IV GENERAL

A. UTILITIES

- 1. The Contractor shall locate and protect all existing utilities, whether indicated on the design drawings or discovered during the work. The Contractor shall immediately notify the Company' Authorized Representative when any utility is discovered.

2. The Contractor shall coordinate with the utility owner, and shall allow entrance, opportunity and ample time for all utility relocations, extensions and modifications necessitated by the work.
- B. DEWATERING - The Contractor shall remove all existing standing water located on the work site. Furthermore, the Contractor shall maintain the work site, including excavations, pits and all other depressions, free from surface water.
1. Drainage
 - a. The Contractor shall stockpile all materials, required for or resulting from the work, in a manner which will minimize the obstruction or the natural flow.
 - b. When operations are interrupted by unfavorable weather conditions, the Contractor shall prepare the work site to avoid ponding and erosion.
 2. Clearing - No trees shall be cut or removed, except as directed by the Company's Authorized Representative. The Contractor shall use proper care to prevent damage to trees which are to remain on site.
- C. TRENCH SAFETY - The contractor is responsible for obtaining and implementing the trench safety program. Three copies of the trench safety specifications (certified by a professional engineer) shall be supplied to TU Electric before construction begins.
- D. CONSTRUCTION SCHEDULE - The contractor shall supply a construction schedule to TU Electric before construction begins.
- E. MATERIALS - This is a turnkey job. The contractor shall supply all materials for this job including manholes, necks, frames and covers, con-seal, ground rods, PVC conduit, PVC bends, PVC couplings, tie-wraps, conduit spacers, PVC adhesive, concrete, select backfill, pull strings, G. I. Bends, G. I. conduit, pre-cast switchgear pad, etc., per TU Electric Specifications. See attached amendment to contract for possible exceptions.
- F. SURVEY - Unless otherwise noted, TU Electric shall be responsible for providing all surveying work needed to insure that the duct structure is constructed per the design.
- G. PERMITS - The contractor is responsible for obtaining city permits and all construction shall be in accordance with city specifications. See attached amendment to contract for possible exceptions.
- H. WORKING HOURS - Under normal working conditions the placement of concrete shall be done between the hours of 8:00 A.M. - 4:30 P.M. on week days. TU Electric shall be notified 2 hours prior to the delivery of concrete and shall be present during placement.
- I. STREET CLEAN-UP - The contractor shall be responsible for cleaning paved streets that have been soiled by their construction vehicles within 24 hours of notification.
- J. RAMPS - The contractor may need to install ramps to protect street curbs from damage due to construction vehicle traffic.
- K. TRAFFIC COORDINATION - Contractor shall have flag-men and road signs to coordinate traffic around the job site per city or state requirements.
- L. SPOILS - All unused spoils shall be hauled off the job site by the contractor.
- M. AS BUILTS - Contractor shall supply TU Electric one set of as built drawings upon completion of job.

V COMPANY RESPONSIBILITY - The following shall be performed by, and the responsibility of, the Company:

- A. The Company inspector is to inspect all manhole installations prior to the placing of backfill and all conduit installations prior to the laying of concrete.
- B. The Company inspector is responsible for coordinating all field changes with the local Engineering office.
- C. All testing of concrete and backfill which is deemed necessary by the Company is to be performed by a local testing laboratory at the Company's expense.

VI CONTRACTORS RESPONSIBILITY

A. DIRECT BURIED CONDUIT

1. Direct buried conduit to be limited to a maximum of four conduit per ditch set in standard Carlon spacers with three inch spacing.
2. Ditch bottom should be undisturbed, tamped or relatively smooth earth.
3. All backfill within six inches of conduit should be free of solid material greater than one inch, in maximum dimension, with no sharp edges. The material should fill the voids around the conduit to prevent hot spots and settling.
4. All backfill should be free of debris or other material that may damage the conduit or cause settling.
5. Backfill shall be adequately compacted. Backfill clear of pavement should be compacted to the density of surrounding undisturbed soil. Backfill under pavement should be compacted to not less than 95% of the maximum dry density of surrounding undisturbed soil.
6. When complete all conduit installed will be checked by pulling a mandrel/swab through the entire length of conduit.

B. DUCT STRUCTURE INSTALLATION (concrete encased)

1. All conduit shall be concrete encased and shall be concrete encased with a minimum of 3" of concrete. The top conduits of any duct structure shall have a 3" or 6" minimum cover depending on location site. Refer to construction drawings for duct section. All concrete encasement shall have a pattern finish.
2. Concrete: 5 sack Portland Type I cement, 3/4" maximum size aggregate, 3000 PSI @ 28 days. The slump of the concrete may be increased by the contractor, with the approval by the company inspector or approved representative, in order to facilitate a wetter mix to insure total encasement of the duct. However, the slump should not be increased to the point where the ultimate yield strength of the concrete is jeopardized.
3. Placement: All concrete shall be installed by the use of a hopper, trimmie, chute or pump truck unless otherwise specified by TU Electric's inspector. At no time shall concrete be placed with a front-end-loader or any other similar type of machinery.
4. The duct structure shall be held down with screw-jacks (or by equivalent means) at 20 ft. maximum intervals in order to prevent floating or racking of the duct during placement of the concrete.

5. Conduit, bends, elbows and couplings; PVC conduit shall be 6" type DB, TC-6 DB-60/ASTM F-512, 90 degrees centigrade rated. All bends and elbows shall have a 36" radius. (min.) See attached sketch for any deviation in conduit size.
6. Spacers: Carlon #288RLN (Base) and 289RLN (intermediate) spaced at 5' intervals. Spacers will be required and are to be tied together by non-metallic tie-wraps. Spacers shall also be used to "hold-down" the top row of ducts.
7. When complete all conduit installed will be checked by pulling a mandrel/swab through the entire length of conduit.

C. MANHOLE INSTALLATION

1. Manhole: Precast type, unless otherwise noted, should be supplied by Hefner/Brooks, or Utility Precast octagonal shape, 3-sections 15,000 lbs./section. (See attachment)
2. Preparation: 6" of cushion sand base shall be installed in the bottom of the excavated area prior to the manhole installation. If water or rock is encountered, install a pea gravel base.
3. Installation: A crane will be required to install all manholes and it is the contractor's responsibility to obtain the crane. Con-seal sealant is required on all interfaces.
4. Backfill: Select backfill around manholes and compact to 95%.
5. Entrance grade: The contractor shall install the frame/cover and neck. TU Electric's construction plans show the approximate entrance elevation, however it is the contractor's responsibility to install the necessary amount of neck to bring the top of the cover 2" above finished grade or flush with street grade when cover is in street. Saw cutting or grout-fill may be required to obtain the appropriate entrance elevation.
6. The contractor shall supply one (1)-8' by 5/8" copper ground rod, weld type in each manhole. Ground rod shall be vertically driven in undisturbed soil. If rock is encountered, grounding shall be as directed by TU representative.
7. Concrete pad: The contractor shall install a 5' x 5' x 6" concrete pad around all manhole entrances in all non-paved areas. See attached drawing for reinforced steel.

D. FOUNDATION INSTALLATION (poured in place)

1. Sand: 4" of cushion sand shall be required under all foundations.
2. Concrete: 5 sack, Portland Type 1 cement, 1 1/2" maximum size aggregate, 3000 PSI @ 28 days.
3. Reinforcing Steel: ASTM A-615 & A-305 grade. See attached construction drawing for rebar size.
4. Piers: concrete piers are required under all foundations.
5. Finish: Float finish process followed by slick steel troweling.
6. Chamfer: All vertical and horizontal corners shall have a 3/4" chamfer.
7. Elevation: Top of all foundations shall be 6" minimum above finished grade. See attached construction drawings for further instruction.

8. Ground Rods: The contractor is responsible for providing and installing 8' ground rods, copper weld, 5/8" diameter as shown on the foundation detail drawing.
9. Conduit Projection: Conduit shall extend 4" above the foundation unless otherwise specified.

E. BACKFILL AND COMPACTION

1. Top Soil: Existing top soil shall be replaced. Top soil shall be free of all rock and clay.
2. Backfill: The backfill operation shall begin after the concrete has had time to cure and this curing time is at the discretion of TU's inspector. The backfill shall have no rocks larger than 6".
3. Compaction: 95% requirement
4. Lifts: 1 foot lifts
5. Compaction Test: TU Electric's responsibility
6. Final Grade Elevation: The contractor shall return the excavated area back to the developer's original grade elevation.

F. SUBSTATION FEEDER EXIT INSTALLATION - This covers the procedures and materials to be used during site work at TU Electric substations or switching stations.

1. Company privileges - The Company's Authorized Representative shall have the right to test, at Company expense, all materials secured and work performed.
2. Substation Ground Repair - Substations generally have grounding systems consisting of copper wires buried 1-3 feet beneath the surface which attach to substation structures and perimeter fences. These ground grid wires may exist at any location inside the substation to a few feet outside the substation fence. If this ground grid wire is damaged, the CONTRACTOR shall notify TU Electric and repair the damage. Repair to damaged ground grid wire shall be made using CADWELD welded electrical products only. No alternate materials are acceptable. It is recommended that the person(s) performing the repair be trained and have experience in the CADWELD process. Most repairs to the ground grid wire may be made as shown on TU Electric drawing GNDREPAIR (See attachment). If the scope of the repair required to the substation grounding system is greater than that shown on GNDREPAIR, please contact TU Electric.
3. The Contractor shall maintain access to the work site at all times.
4. Backfill - The Contractor shall backfill all excavations made during the clearing and grubbing operations with compacted fill material. Fill material, placement and finishing shall comply with the provisions of Sections F-10 thru F-12.
5. Excavating
 - a. The Contractor shall excavate to the contours, grades and elevations indicated on the grading plan.
 - b. Excavated materials, suitable for use as fill as determined by the Company's Authorized Representative, shall be placed in compliance with the provisions of Section F-11 in fill or embankment areas indicated on the grading plan.

- c. The Contractor shall haul and dispose of all surplus excavated materials. Disposal shall be away from the site, unless otherwise noted. The Contractor shall meet the requirements of regulatory authorities regarding proper disposal.
9. Fill Material
 - a. Excavated material, with prior approval by the Company's Authorized Representative, may be used as fill material.
 - b. Prior to hauling in fill material, the Contractor shall inform the Company's Authorized Representative of the location of the proposed fill material so that samples may be obtained for required tests.
 - c. Soil suitable for use as fill material shall be free from organic matter and deleterious substances and shall contain no rocks or stones larger than one inch in diameter.
 - d. The soil shall be classified as sandy clays or clayey sands having a Plasticity Index (PI) greater than 4 and less than 12, and a Liquid Limit (LL) less than 30. The Company shall pay for a maximum of two series of the above tests. Any additional tests required by failure of the material to meet the requirements, shall be performed at the expense of the Contractor.
 - e. If the tests performed on the proposed fill material yield satisfactory results, the fill material shall then be tested in accordance with "Maximum Density-Optimum Moisture Test" < ASTM D-698 (Standard Proctor Test), and the results used in compaction.
11. Filling
 - a. The Contractor shall fill to the contours, grades and elevations indicated on the grading plan.
 - b. Fill material shall be placed in lifts not exceeding 12 inches in uncompacted thickness, sprinkled, rolled and compacted to a minimum of 90% of maximum dry density, as determined by ASTM D-698.
 - c. Water necessary to obtain proper moisture content for compaction shall be furnished by the Contractor.
12. Finish Grading
 - a. After all excavating, fills and embankments have been completed, the Contractor shall finish the grading to the contours and elevations indicated on the grading plan. The finish grading shall provide smooth, uniform surfacing, and shall be approved by the Company's Authorized Representative.
 - b. The Contractor shall correct all imperfections, discovered during finish grading, by scarifying the area affected, adding or removing material as required, reshaping and recompacting.
 - c. The Contractor shall not apply yard covering until the subgrade has been approved by the Company's Authorized Representative.
13. Yard Covering (crushed limestone) - The crushed limestone shall conform to Texas State Department of Highways and Public Transportation's 1982 Standard Specifications for Construction of Highways, Streets and Bridges, Item 248.
14. Application of Yard Covering
 - a. The Contractor shall apply, on all areas indicated on the grading plan, sufficient yard covering to obtain a minimum of four inches after compaction.
 - b. Yard covering shall be compacted to a minimum of 90% of maximum dry density, as determined by ASTM D-698.

- c. Under no circumstances shall the Contractor add thin layers of fine materials to yard covering in order to meet the final grade.
- 17. Application of Base Material (Roads and Parking Areas)
 - a. The Contractor shall, unless otherwise noted, supply base material which complies to the provisions of Section F-13.
 - b. The Contractor shall apply, on all limestone roads and parking areas, sufficient base material to obtain a minimum of six inches after compaction.
 - c. Base material shall be compacted to a minimum of 95% of maximum dry density as determined by ASTM D-698.
 - d. Under no circumstances shall the Contractor add thin layers of fine materials to base material in order to meet final grade.
- 18. Final Grading (Roads and Parking Areas)
 - a. The final grading shall provide smooth, uniform surfacing and shall be approved by the Company's Authorized Representative.
 - b. The Contractor shall correct all imperfections discovered during final grading by scarifying the area affected, adding or removing material as required, reshaping and recompacting.

VII VARIANCES

- A. Variances to these specifications shall be submitted in writing and approved by the Company prior to construction.
- B. Any approved variance shall apply only to the particular project for which it was submitted.

VIII 4-WAY MANHOLE DETAIL (See Attachment)

IX 3-WAY MANHOLE DETAIL (See Attachment)

X 2-WAY MANHOLE DETAIL (See Attachment)

XI MANHOLE NECK DETAIL (See Attachment)

XII MANHOLE FRAME AND COVER DETAIL (See Attachment)

XIII 5' X 5' MANHOLE CONCRETE ENTRANCE PAD (See Attachment)

XIV TERMINATION OF A CONDUIT @ RISER POLE (See Attachment)

XV TERMINATION OF A CONDUIT LINE (See Attachment)

TU SPEC.: MDD-5

XVI DEEP WELL SWITCH PAD DETAIL (See Attachment)

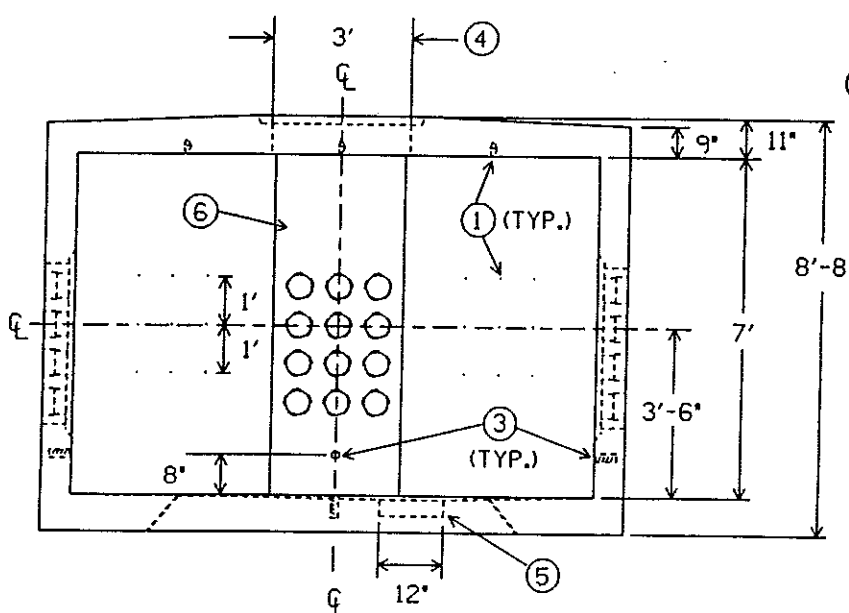
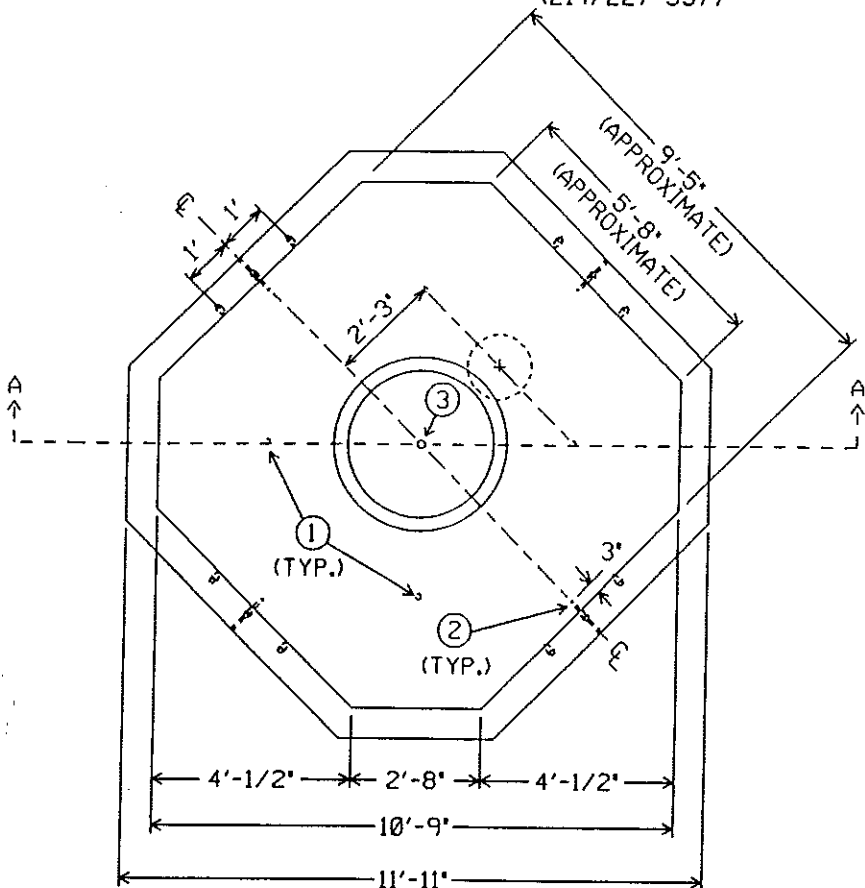
XVII SUBSTATION GROUND WIRE REPAIR DETAIL (See Attachment)

TU ELECTRIC STANDARD MANHOLE

APPROVED SUPPLIER: HEFNER/BROOKS PRODUCTS 914 SERIES
 CLEBURNE, TEXAS
 (817) 477-2941
 UTILITY PRECAST, INC.
 510 E. PLEASANT RUN RD.
 LANCASTER TEXAS
 (214) 227-5577

NOTES:

- ① NON-METALLIC THREADED INSERTS FOR 1/2" - 13 UNC BOLT (40 TOTAL)
- ② 3/4" HOLE FOR GROUND RODS (4 TOTAL AT A 45° ANGLE)
- ③ THREADED INSERTS FOR 1-1/4" COIL BOLT (5 TOTAL)
- ④ REFER TO MANHOLE NECK DRAWING FOR DETAIL OF OPENING
- ⑤ WATERTIGHT 12" SUMP, 4" DEEP, WITH COVER
- ⑥ TERMINATOR OPENING SHALL HAVE A 45° CHAMFER
- ⑦ MANHOLE MAY BE ORDERED WITH 2W X 5H TERMINATORS IN FACE.



SECTION A-A

10/21/94

TU ELECTRIC STANDARD MANHOLE

10/21/94

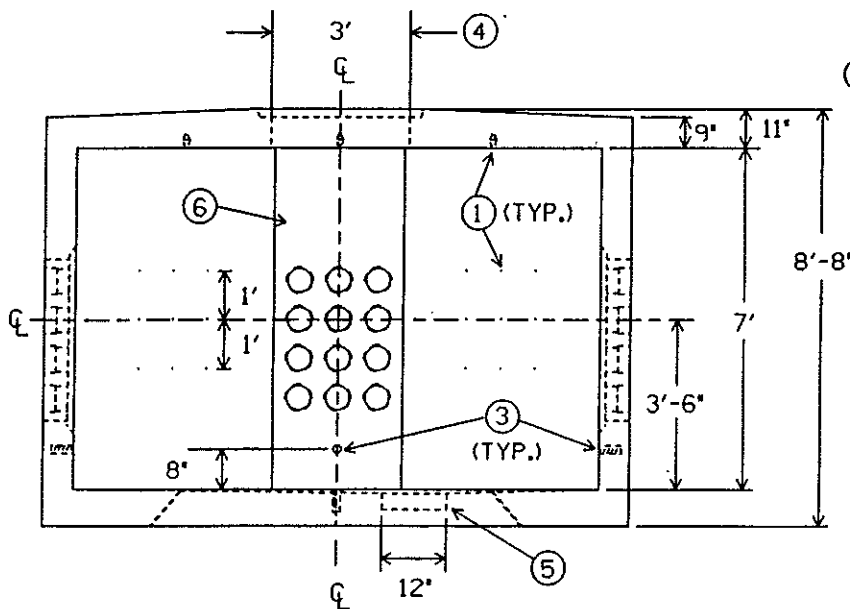
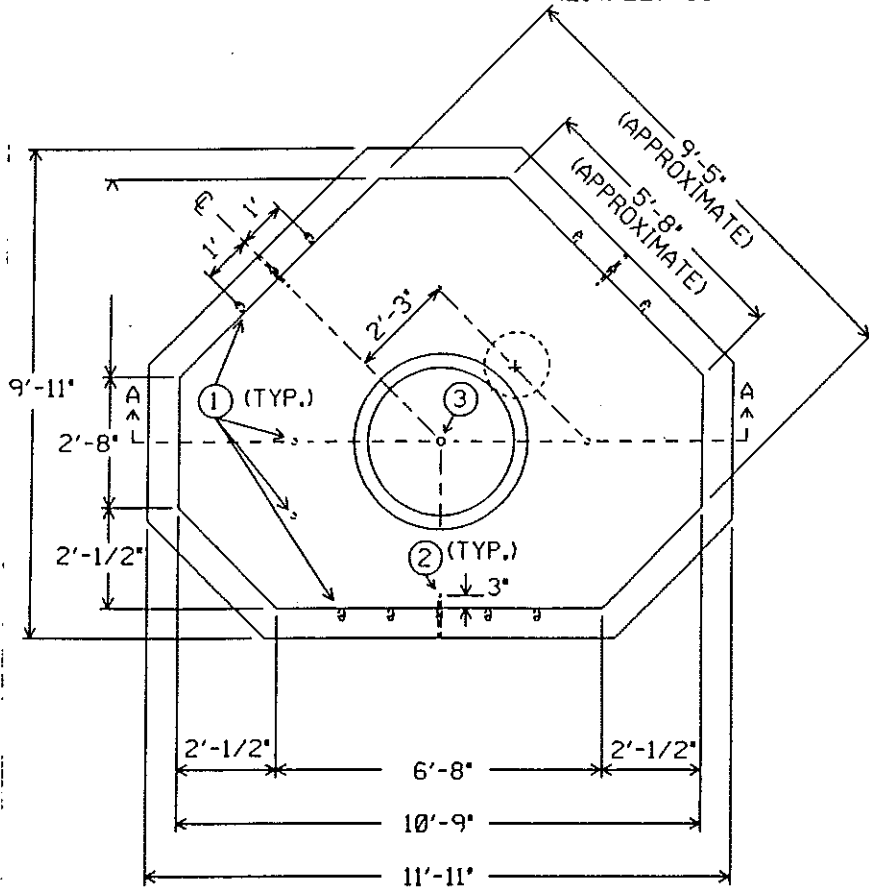
APPROVED SUPPLIER: HEFNER/BROOKS PRODUCTS
CLEBURNE, TEXAS
(817) 477-2941

914 SERIES

UTILITY PRECAST, INC.
510 E. PLEASANT RUN RD.
LANCASTER TEXAS
(214) 227-5577

NOTES:

- ① NON-METALLIC THREADED INSERTS FOR 1/2" - 13 UNC BOLT (38 TOTAL)
- ② 3/4" HOLES FOR GROUND RODS (3 TOTAL AT A 45° ANGLE)
- ③ THREADED INSERTS FOR 1-1/4" COIL BOLT (4 TOTAL)
- ④ REFER TO MANHOLE NECK DRAWING FOR DETAIL OF OPENING
- ⑤ WATERTIGHT 12" SUMP, 4" DEEP, WITH COVER
- ⑥ TERMINATOR OPENING SHALL HAVE A 45° CHAMFER
- ⑦ MANHOLE MAY BE ORDERED WITH 2W X 5H TERMINATORS IN FACE.



SECTION A-A

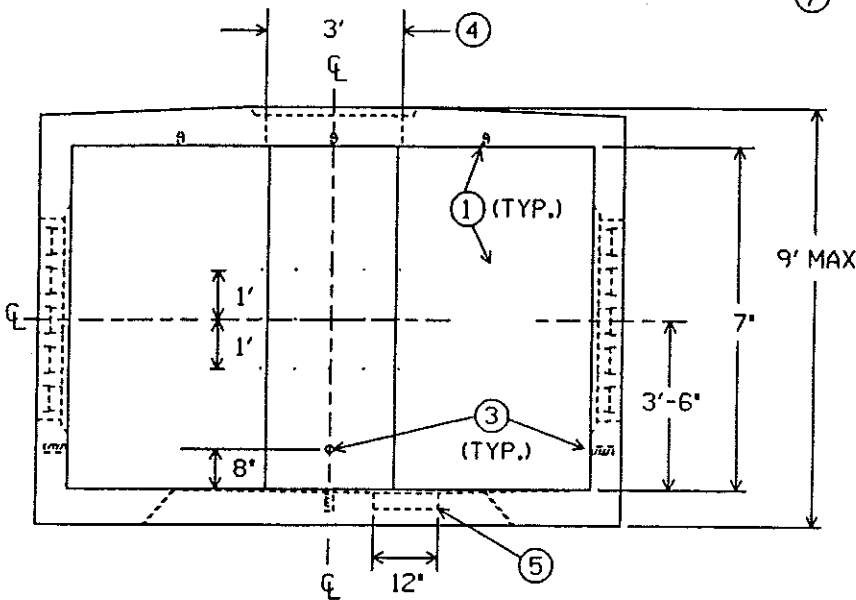
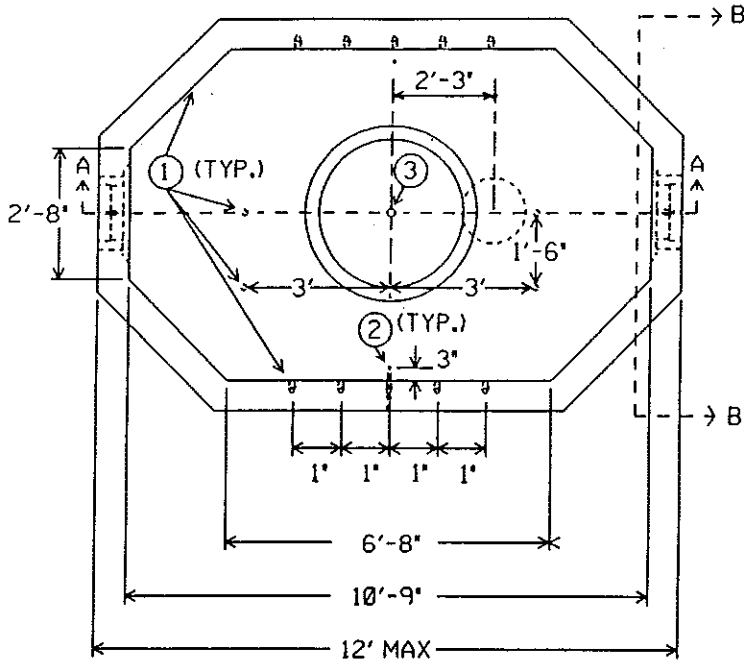
SPECIFICATIONS FOR OCTAGONAL MANHOLES WITH TERMINATORS ON TWO FACES (2-WAY MANHOLES)

APPROVED SUPPLIERS: HEFER/BROOKS PRODUCTS
CLEBURNE, TEXAS
(817) 477-2941

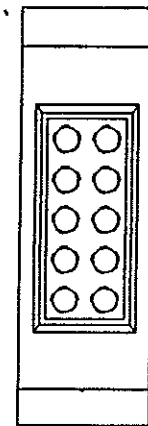
UTILITY PRECAST, INC.
510 E. PLEASANT RUN RD.
LANCASTER TEXAS
(214) 227-5577

NOTES:

- ① NON-METALLIC THREADED INSERTS FOR 1/2" - 13 UNC BOLT (34 TOTAL)
- ② 3/4" HOLES FOR GROUND RODS (2 TOTAL AT A 45° ANGLE)
- ③ THREADED INSERTS FOR 1-1/3" COIL BOLT (4 TOTAL)
- ④ REFER TO MANHOLE NECK DRAWING FOR DETAIL OF OPENING
- ⑤ WATERTIGHT 12" SUMP, 4" DEEP, WITH COVER
- ⑥ TERMINATOR OPENING SHALL HAVE A 45° CHAMFER
- ⑦ MANHOLE MAY BE ORDERED WITH 3W X 4H TERMINATORS IN FACE.



SECTION A-A

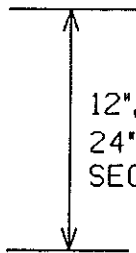
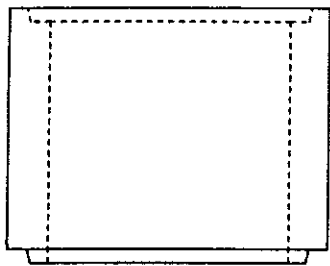


SECTION B-B

APPROVED SUPPLIERS: BROOKS PRODUCTS
CLEBURNE, TEXAS
(817)477-2941

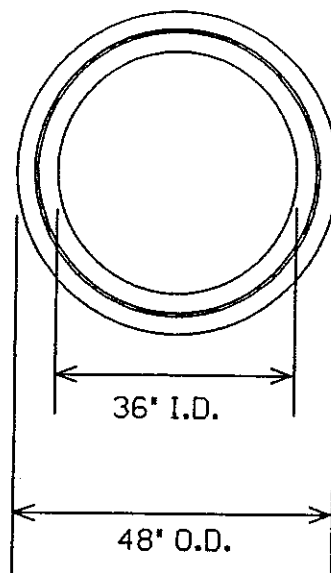
UTILITY PRECAST, INC.
510 E. PLEASANT RUN RD.
LANCASTER TEXAS
(214) 227-5577

SIDE VIEW



12", 18",
24", AND 36"
SECTIONS

TOP VIEW



36" I.D.

48" O.D.

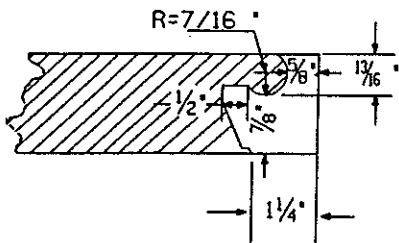
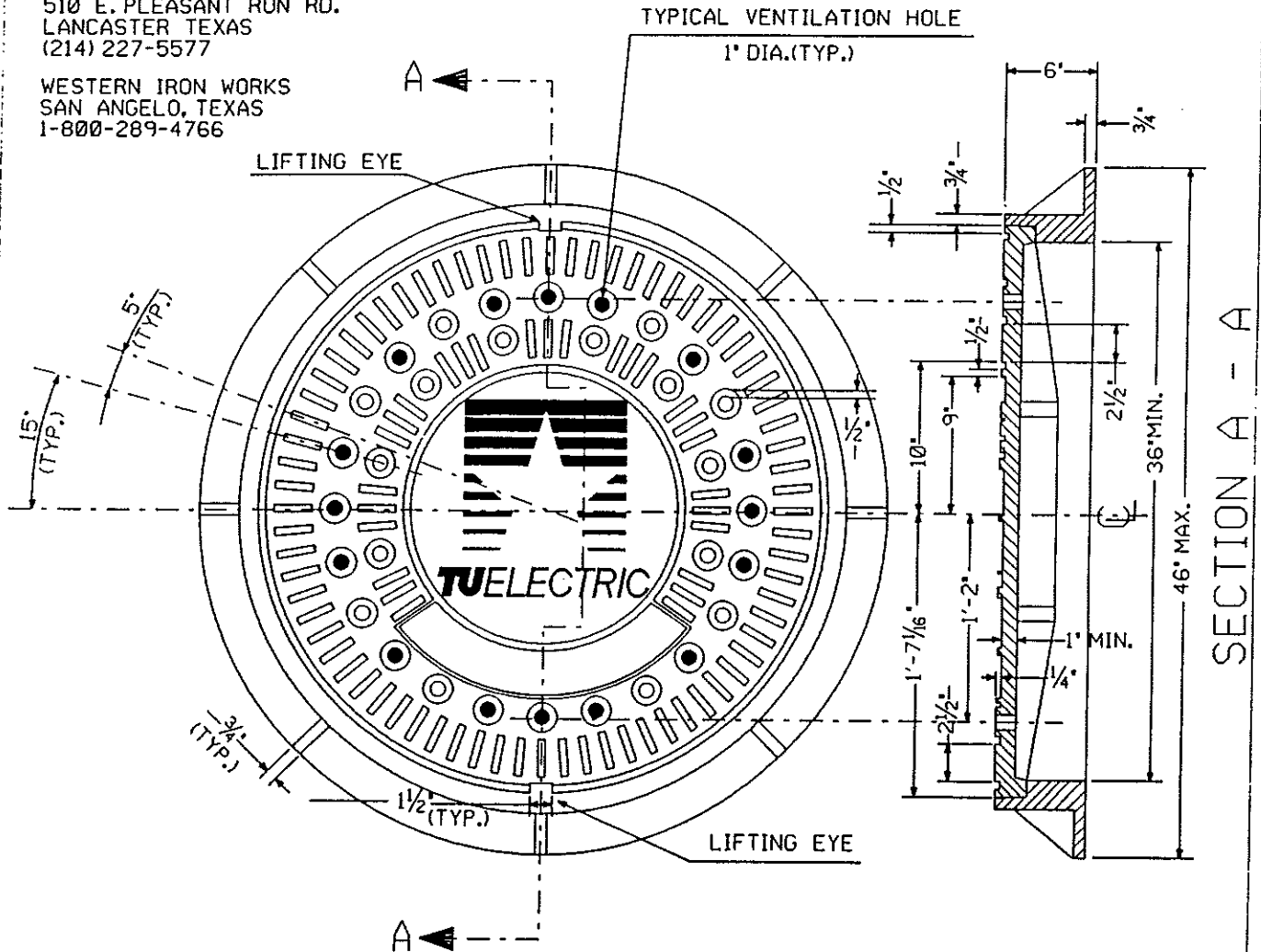
MANHOLE COVER AND FRAME FABRICATION DETAIL

APPROVED SUPPLIERS:

HEFNER/BROOKS PRODUCTS
CLEBURNE, TEXAS
(817)477-2941

UTILITY PRECAST, INC.
510 E. PLEASANT RUN RD.
LANCASTER TEXAS
(214) 227-5577

WESTERN IRON WORKS
SAN ANGELO, TEXAS
1-800-289-4766



LIFTING EYE SECTION DETAIL

GENERAL NOTES

BEARING SURFACE BETWEEN COVER AND FRAME SHALL BE MACHINED.

COVER AND FRAME SHALL BE CONSTRUCTED TO H-20 TRAFFIC LOADING.

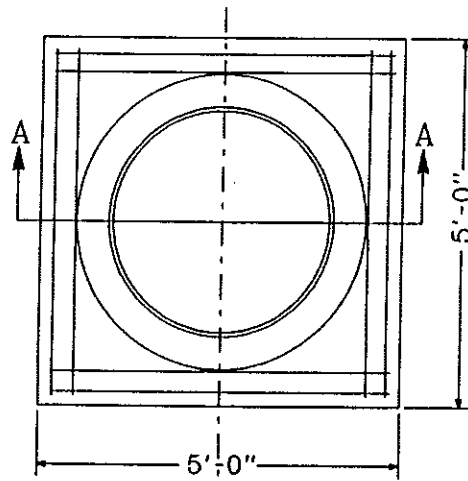
COVER AND FRAME SHALL BE CONSTRUCTED OF GRAY CAST IRON.

MANHOLE COVER AND FRAME SHALL NOT EXCEED 700 lbs.

SECTION A - A

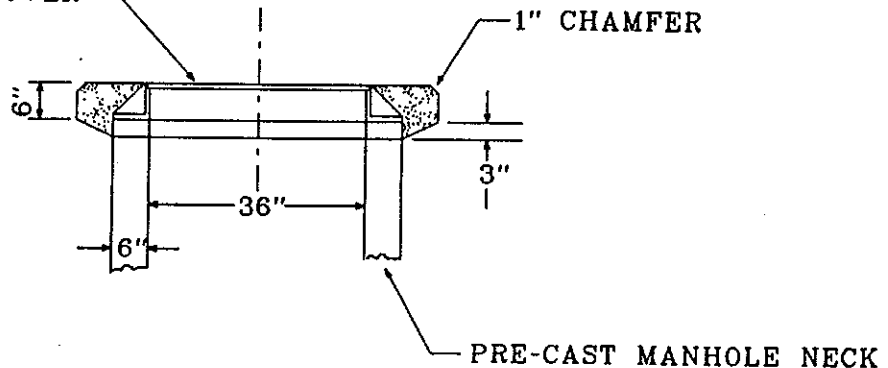
CONCRETE SLAB FOR MANHOLE CASTING

8- #3 REINFORCING BARS -
4'-9" LONG



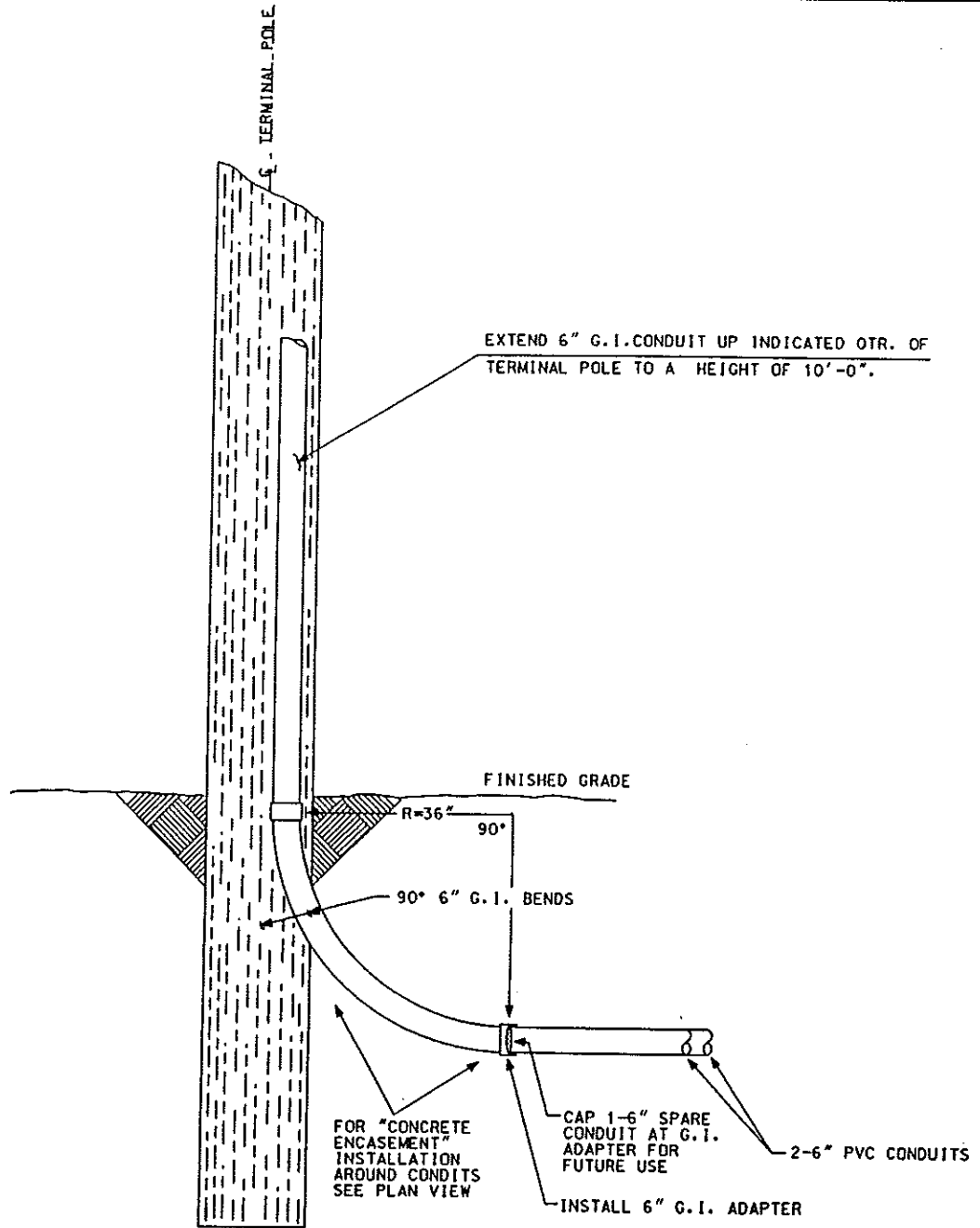
PLAN

MANHOLE FRAME & COVER

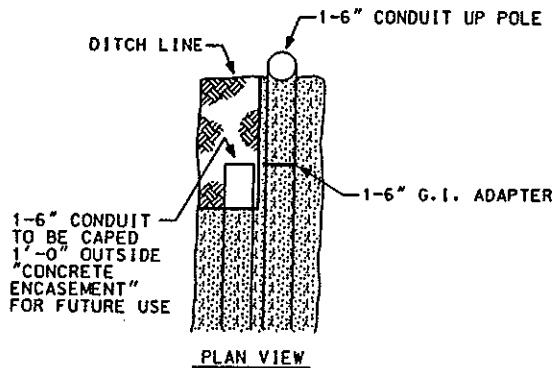


SECTION A-A

TERMINATION OF CONDUIT AT RISER POLE

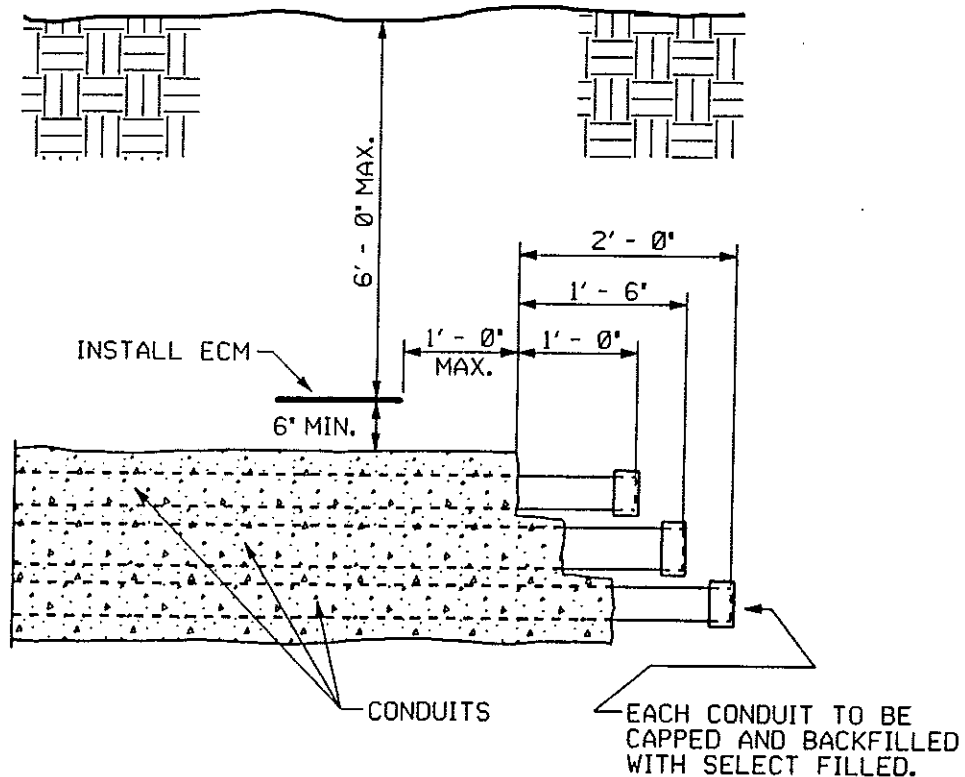


DO NOT BOND CONCRETE TO POLE



TU ELECTRIC TERMINATION OF CONDUIT LINE FOR FUTURE USE

STAIR STEPPED COLD JOINT WITH ELECTRONIC CONDUIT MARKER



ELECTRONIC CONDUIT MARKER (ECM)

1. CONTRACTOR, UNLESS OTHERWISE NOTED, IS RESPONSIBLE FOR OBTAINING AND INSTALLING THE ECM.
2. CONSULT T.U. ELECTRIC REPRESENTATIVE FOR APPROVED ECM.
3. ECM SHALL BE BURIED DIRECTLY OVER AND A MIN. OF 6" ABOVE DUCT INSTALLATION AND NO MORE THAN 6" BELOW FINAL GRADE.
4. ECM SHALL BE INSTALLED FLAT AND LEVEL. SEE PLAN SHEETS FOR LOCATION.
5. ECM SHALL BE COVERED WITH 4" OF FIRM SOIL TO PREVENT MOVEMENT OR DAMAGE DURING BACKFILL.

INCOMPLETE DUCT LINE

1. ON ALL INCOMPLETE DUCT LINES (DUCTS THAT ARE TO BE EXTENDED AT A FUTURE TIME), THE CONDUITS ARE TO BE WATER-TIGHT WITH A CONDUIT CAP SOLVENT CEMENTED INTO PLACE.
2. NO EXPOSED REINFORCING STEEL IS TO PROTRUDE FROM THE END OF AN UNFINISHED DUCT. SEE JOB REQUIREMENT SKETCH FOR LOCATION OF REINFORCING.
3. DOWELLING IS THE METHOD TO BE USED IN ORDER TO JOIN NEW DUCT TO EXISTING UNFINISHED DUCT.