

CITY OF AUSTIN
ELECTRIC UTILITY DEPARTMENT
PURCHASE SPECIFICATION FOR
DESIGN AND FABRICATION OF WELDED CIRCULAR
STEEL UTILITY STRUCTURES

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL PROCESS SUPV. / MATERIALS SUPV.
09/03/02	Mary N. Coleman	Issuance	Peter Soosay
02/23/07	Mike A. Gaub	Revision	Ted Schoenberg
04/27/07	Mike A. Gaub	Revision	Ted Schoenberg

**REASON FOR REVISION****AFFECTED PARAGRAPHS**

Up-date specification
 Revise Pole Step Specification & Remove Self
 Weathering & Powder Coating

3.4.3,4,&5 : 3.5.2,3,&4 : ATTCH #1
 1.4, 3.2.3, 3.3.2, 3.4.3, 3.5.8

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein.
 Retain for future reference.

**CITY OF AUSTIN
ELECTRIC UTILITY DEPARTMENT
PURCHASE SPECIFICATION
FOR
DESIGN AND FABRICATION OF
WELDED CIRCULAR STEEL UTILITY STRUCTURES**

1.0 SCOPE

- 1.1 These specifications set forth the requirements for design, material, fabrication, and finishes of welded circular steel utility structures.
- 1.2 This specification is part of a bid package, which contains a description of the items being purchased, specific structure details, and finish requirements.
- 1.3 The term Engineer refers to the Project Engineer for Austin Energy, the Electric Utility Department of the City of Austin, (hereinafter referred to as Austin Energy or AE) or their designated representative as specified in the Bid Documents.
- 1.4 During the bidding process, any exceptions must be noted in the bid documents and are subject to rejection by the AE Engineer. After award of contract to successful bidder, an AE Engineer from the Distribution Materials Standards Group must approve any modifications in writing.

2.0 APPLICABLE STANDARDS

Reference to standard specifications shall be the latest revision of such specifications with abbreviations as listed below:

AISC	-	American Institute of Steel Construction
ASTM	-	American Society of Testing and Materials
ANSI	-	American National Standards Institute
ASCE	-	American Society of Civil Engineers
NEMA	-	National Electrical Manufacturers Association
AWS	-	American Welding Society
ASME	-	American Society of Mechanical Engineers
NESC	-	National Electrical Safety Code
SSPC	-	Steel Structures Painting Council

3.0 PHYSICAL REQUIREMENTS

- 3.1 Material
 - 3.1.1 All material used in the structure shall have a minimum yield strength equal to or greater than the value used in the design calculations. The bidders shall indicate the material used in each part of the structure and the specification covering the material.

- 3.1.2 Rolled shapes and pole plate shall comply with the following ASTM specifications:
- | | | |
|---------|---|---|
| 3.1.2.1 | Carbon Steel | A-36 |
| 3.1.2.2 | High Strength Carbon Steel | A-440 |
| 3.1.2.3 | High Strength Alloy Steel | A-242
A-441
A-595
A-572
A606
A-36 Modified |
| 3.1.2.4 | Self-Weathering | A-871 |
| 3.1.2.5 | Special steel or bolt material specifications other than the above, if proposed by the Bidder, shall be quoted with specific reference to the appropriate specification | |
- 3.1.3 Structural plate material shall be mill-certified to meet an impact of 15 ft-lb. at -20° F in the longitudinal direction using the Charpy V-Notch Impact Test in accordance with ASTM A673. There shall be an average of three (3) tests with no one test below 10 ft-lb. The location of the test samples shall be in accordance with ASTM A673.
- 3.1.4 Assembly bolts, when required, shall be A-394 or A-325. Bolts and nuts shall have a class 2 tolerance as defined by ANSI No. B1.1 after specified finish has formed.
- 3.2 Fabrication
- 3.2.1 Fabrication shall be in accordance with AISC specifications and shall be equal to the best shop practice of modern steel fabricating shops.
- 3.2.2 Welding
- 3.2.2.1 Design of all joints or seams and all welding procedures shall be in accordance with Structural Welding Code AWS D1.1, including the latest addenda. The bidder shall provide welding procedures and processes to be used in the various joints or seams.
- 3.2.2.2 Welders shall be qualified on all welds used during the fabrication process in accordance with AWS D1.1.
- 3.2.2.3 Upon request by the Engineer, Bidder shall provide weld design calculations for arms, base plates, and other joint details.
- 3.2.2.4 The bidder shall indicate the inspection methods, which will be used to ensure that fabrication welds meet the design requirements.
- 3.2.3 Quality and Finish
- 3.2.3.1 Finish of structures shall be as specified below. Any exceptions must be noted in the bid documents and are subject to rejection by the Engineer.
- a) Hot-dipped galvanized
- Steel shall be hot-dipped galvanized inside and outside after fabrication. The galvanizing shall be in accordance with ASTM Specification A-123. Precautions shall be taken against hydrogen embrittlement in accordance with ASTM Specification A-143. Double dipping is not allowed. Sections using metalizing shall be noted in the bid documents and shall be sealed to prevent internal corrosion.

- 3.2.3.2 Steel surfaces shall be blast cleaned after fabrication in accordance with the Steel Structures Painting Council's Surface Preparation Specification (SSPC) SP6, commercial finish, to ensure rapid and uniform weathering.
- 3.2.3.3 Galvanized structures shall be free and clear of acid drops, tear drop edges, flaking zinc, rough appearance, trapped slag, holes covered with zinc membrane and in general shall be smooth, clean, attractive in appearance and unscarred when received. Pieces having galvanizing which do not meet these requirements, in the sole opinion of the Engineer, shall be rejected.
- 3.2.3.4 All punching and drilling shall conform to the following:
- a) Bolt holes may be punched, drilled or oxygen cut.
 - b) The finished diameter of the bolt hole shall be 1/8 inch larger than the nominal bolt diameter.
 - c) Finished edges shall be clean cut and free from burrs and chips. Roughness of oxygen-cut surfaces shall not be greater than that defined by AWS D1.1.
 - d) All holes shall be cylindrical and perpendicular to the principal surface. Slotting of mispunched holes is **not** permitted.
 - e) Plugging and welding mispunched holes shall be kept to a minimum. Pieces, that, in the opinion of the Engineer, have excessive plugs and welds, will be rejected.
 - f) All holes drilled in the pole wall shall be plugged by an insert capable of remaining in place for the life of the pole.
- 3.2.3.5 Identification Marking
- a) Each piece of structure shall be permanently marked (i.e., metal punch or stamp) with the same designation as shown on the fabrication drawings.
 - b) Each complete structure shall have a three by five inch (3" x 5") steel nameplate, permanently affixed five (5) feet above groundline, see Attachment II. The plate shall be stamped with the following:
 - 1) AE
 - 2) Pole Length in Feet
 - 3) Pole Class
 - 4) Pole Weight
 - 5) Name of Fabricator
 - 6) Date of Fabrication
 - c) All identification markings shall be clearly legible after the specified finish has formed.
- 3.2.3.6 Tolerances
- The finished work shall conform to the tolerances set forth in these specifications and shall be sufficiently accurate to permit field erection without reaming and with only a moderate amount of drifting. Maximum tolerance allowed on finished work shall conform to the following:

- a) Cutting length $\pm 1/16"$
- b) Center to center distance of end holes on a piece $\pm 1/16"$
- c) Variation of gage lines $\pm 1/32"$
- d) Variation of center to center spacing of a group or cluster of holes $\pm 1/32"$
- e) Compression members shall be straight to a tolerance of 1/1000 of the total length $\pm 1/32"$
- f) All material shall be free of permanent deformations, bends, twists, or kinks. Straightening of damaged material shall not be permitted.

3.2.4 Modifications

- 3.2.4.1 Structures are to be fabricated in accordance with detailed drawings furnished by the Vendor for approval by the AE Engineer.
- 3.2.4.2 For fabrication only orders, minor deviations, in member layout to accommodate variations in shop practices, will be permitted, provided that these deviations do not materially alter the configuration of the structures and do not reduce the strength of the structures. When such deviations in member layout are made, drawings showing these deviations shall be submitted to the AE Engineer for approval and the originals of such drawings shall become the property of AE upon completion of the order.

3.3 Pole Shafts

- 3.3.1 Pole shafts, used in the structures, shall be a circular cross section and tapered. Taper shall not exceed 0.4 inches per linear foot.
- 3.3.2 Galvanized shaft sections shall not exceed 50 feet in length.
- 3.3.3 When the pole height requires more than one shaft section, each section shall be pre-fitted for a telescoping type of assembly. The upper section at a joint shall telescope over the lower section by not less than 1 1/2 times the diameter of the lower section. Structure sections shall be numbered to relate to the structure identification in the Bid Sheet and at joints both sections shall be clearly marked so that the related faces can be correctly matched in the field assembly.
- 3.3.4 The pole top deflection shall not be greater than 10% of the total pole height under full loading conditions, including overload factors.

3.4 Embedment

- 3.4.1 Shaft embedment depth is as set forth in Attachment I.
- 3.4.2 The embedded portion of the pole shall not exceed 32 inches in diameter, including the butt/bearing plate.
- 3.4.3 The embedded portion, excluding 24 Inches (24") above the butt plate (Attachment 2), to 24 Inches (24") above ground line (Attachment I) shall be coated with Corrocote II Classic PNT 215A and PNT 215B, or equivalent approved only by Austin Energy Distribution Materials Standards Group.
 - 3.4.3.1 Protective Coating (Corrocote II Classic PNT 215A and PNT 215B) shall be applied with a minimum thickness of twenty (20) mils in accordance with the manufacturers application instructions and comply with the manufacturers technical data.

3.5 Structure Attachments

- 3.5.1 All poles shall have provisions for two (2) bolted ground clamps consisting of 1/2 inch hex-nuts welded over 5/8 inch holes. These holes shall be placed as set forth in Attachment II.
- 3.5.2 Butt/Bearing plate on Galvanized Structures and Powder Coated over Galvanized Structures shall be at least 1/4-inch thick and be a Valmont Sure Ground Combination Bearing Plate & Grounding Electrode or an AE Engineer approved equivalent.
- 3.5.3 Butt/Bearing plate on Galvanized poles shall be detailed to allow adequate drainage during galvanizing.
- 3.5.4 Butt/Bearing plate on Self-Weathering poles shall completely enclose the shaft base.
- 3.5.5 Pole tops shall be supplied with a removable pole cap. The pole cap circumference shall be flush with the circumference of the pole face(s). There shall be no protrusions of the pole cap beyond the circumference of the pole face(s).
- 3.5.6 Each AE Purchase Release will indicate if pre-drilling of 11/16 inch and/or 13/16 inch holes will be required. Typical Bolt Hole Patterns are shown in Attachment IV, otherwise drawings provided by AE will indicate size and location of holes to be drilled prior to shipping of poles.
- 3.5.7 Each AE Purchase Release will indicate if provisions for pole steps will be required. The manufacturer shall furnish pole steps and pole step attachments.
 - 3.5.7.1 Pole steps shall be HUBBELL - T205-0426 Detachable Type for Metal Poles with Bolt, Plate, and Step or equivalent approved only by Austin Energy Distribution Materials Standards Group.
 - 3.5.7.2 The lowest step shall be located ten (10) feet above the ground line and the remaining step attachments shall be located on two (2) faces at 90 degrees (90°) to each other. Step attachments shall be vertically spaced 30 inches on centers on each face (15 inches between consecutive steps). In addition, working step attachments shall be located on four (4) faces of all poles, at four (4) and at six (6) feet below each wire attachment.
- 3.5.8 Each AE Purchase Release will indicate if a hydraulic jacking device will be used in the field assembly of the structure. The manufacturer will furnish eight (8) one (1) inch diameter heavy hex-nuts, welded over holes, per splice joint. Each section shall have two (2) pairs of nuts, each pair located in diametrically opposite walls of the pole shaft. The nuts shall be spaced eight (8) inches from center to center, parallel to the long axis of the pole and located as to be clear of the section overlap and not less than 24 inches apart when the joint is fully telescoped. All nuts must be oriented, so that two (2) flats are perpendicular to the long axis of the pole.
- 3.5.9 All parts bearing the same identification marking shall be interchangeable.

4.0 GENERAL REQUIREMENTS AND INFORMATION

4.1 Design Loading

- 4.1.1 All structures shall be designed to withstand the groundline moments at the embedment depths set forth in Attachment I, without the yielding or failure of any part of the structure.
- 4.1.2 All design calculations and the manufacturer's registered Professional Engineer shall certify drawings.

- 4.1.3 The Vendor shall provide certified engineering data to AE Engineer. This data shall include the following:
 - 4.1.3.1 Data from certified mill test reports on all material
 - 4.1.3.2 Shop drawings of the test structure.
 - 4.1.4 Preliminary drawings shall include structure configuration, dimensions, weights and stress diagrams, and computer printout of maximum loading and loading conditions.
 - 4.1.5 The design details shall also include maximum ground line moments, horizontal shear and vertical loading, uplift or bearing.
- 4.2 Inspection
- The Fabricator's Inspection personnel performing nondestructive examination (other than visual) shall be qualified in accordance with ASNT Practice No. SNT-TC-1A.

ATTACHMENT I
GROUND LINE MOMENT DESIGN DATA
POLE APPLICATION GUIDE

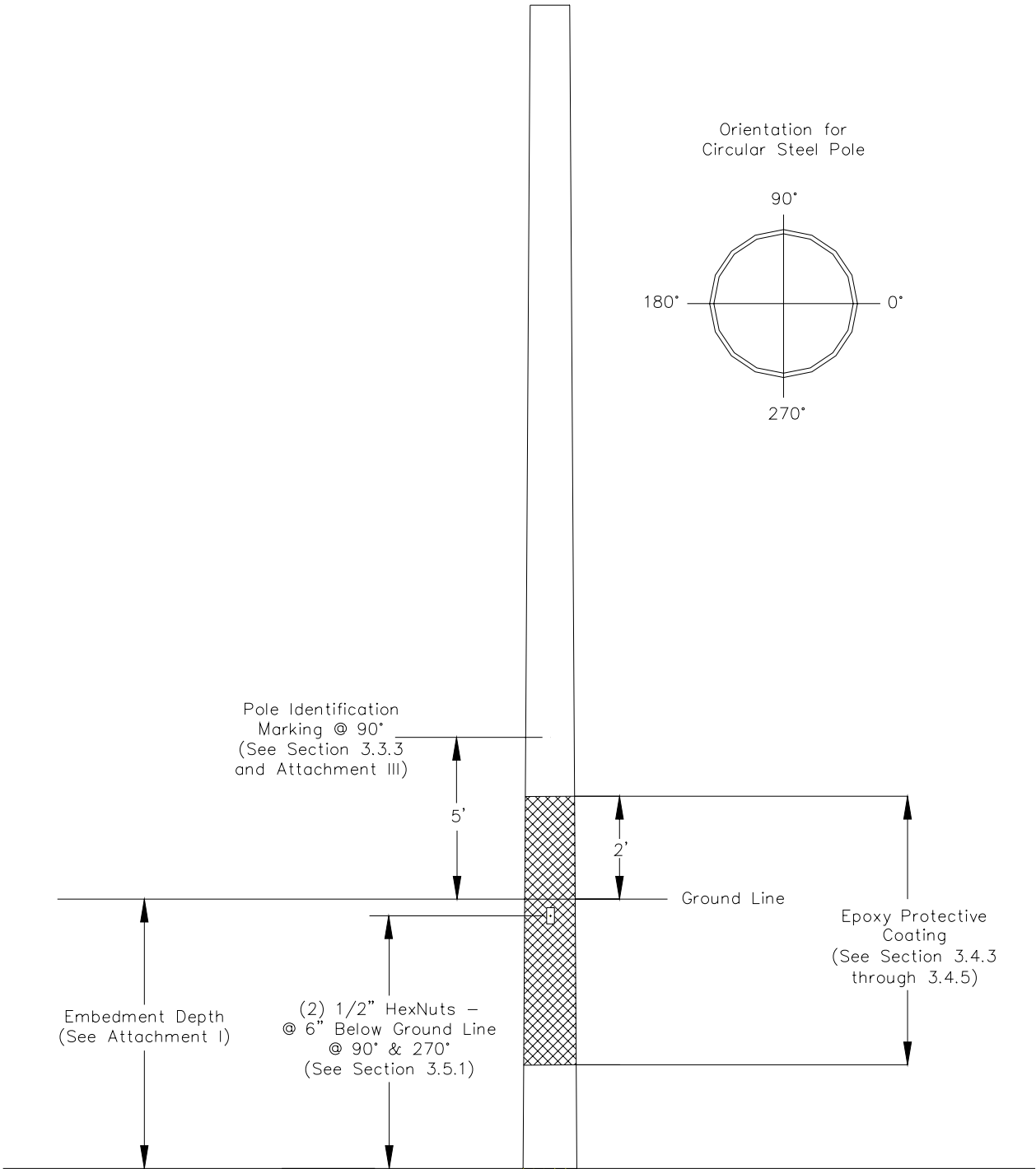
ATTACHMENT I
Ground Line Moment Design Data
Pole Application Guide

Steel Pole Application Information			
Height of Epoxy Protective Coating (Ft)	Pole Length (Ft)	Setting Depth (Ft)	Pole Ground Line Moment Capacity (Ft-Kips)
CLASS 3 or EQUIVALENT			
9.00	40	7.00	58.13
9.50	45	7.50	66.56
10.00	50	8.00	75.00
CLASS 2 or EQUIVALENT			
9.00	40	7.00	71.70
9.50	45	7.50	82.11
10.00	50	8.00	92.52
10.75	55	8.75	102.35
11.25	60	9.25	112.76
CLASS 1 or EQUIVALENT			
9.00	40	7.00	87.20
9.50	45	7.50	99.86
10.00	50	8.00	112.52
10.75	55	8.75	124.48
11.25	60	9.25	137.13
12.00	65	10.00	149.09
12.50	70	10.50	161.75
CLASS 1 or EQUIVALENT			
13.00	75	11.00	174.41
13.75	80	11.75	186.36
14.50	85	12.50	198.32
15.00	90	13.00	210.98
15.50	95	13.50	223.63

ATTACHMENT II

CIRCULAR STEEL POLE

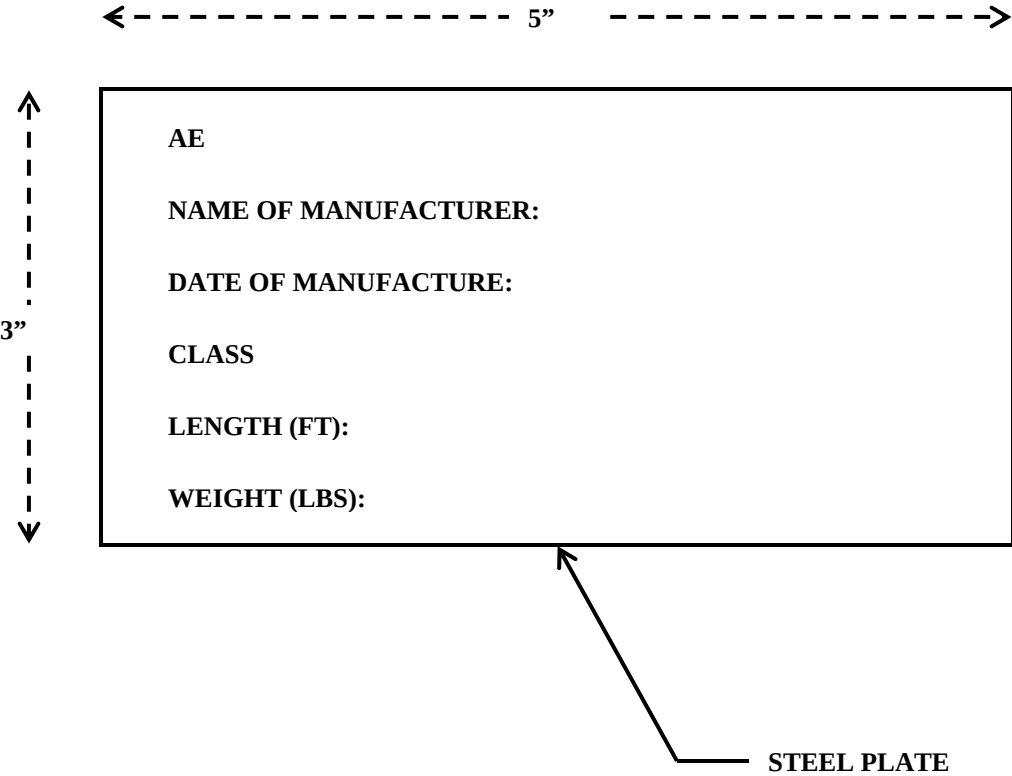
ATTACHMENT II
Circular Steel Pole



ATTACHMENT III

IDENTIFICATION MARKING

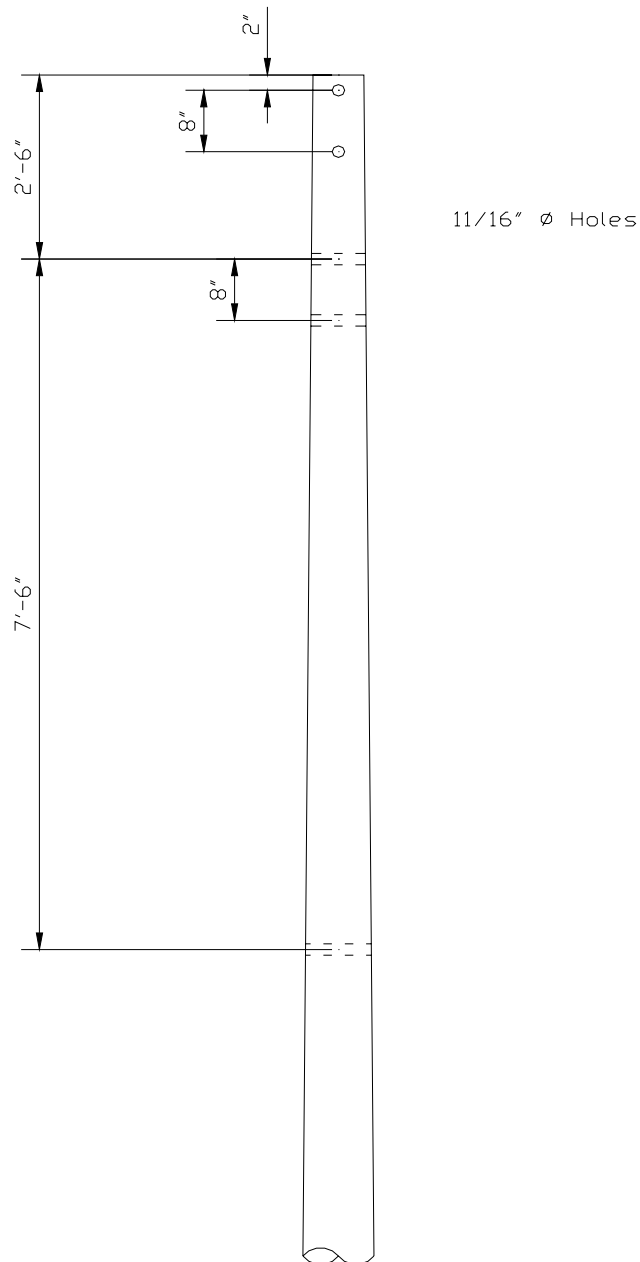
ATTACHMENT III
Identification Marking



ATTACHMENT IV

TYPICAL BOLT HOLE PATTERNS

Attachment IV
Tangent – Bolt Hole Pattern



CITY OF AUSTIN, TEXAS
AUSTIN ENERGY
POWER DELIVERY

TITLE: Bolt Hole Pattern
30 Tangent Structure

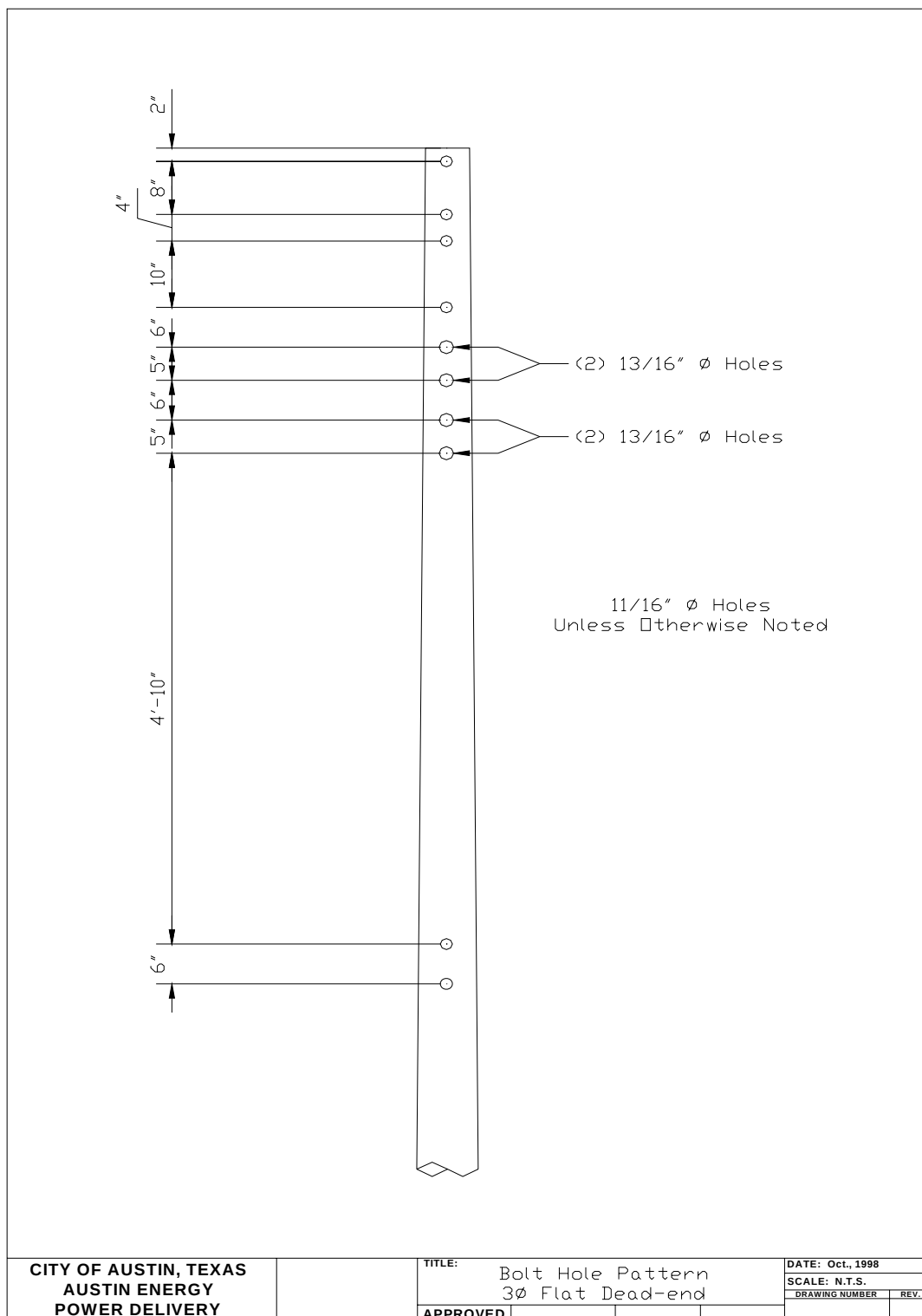
DATE: Oct., 1998

SCALE: N.T.S.

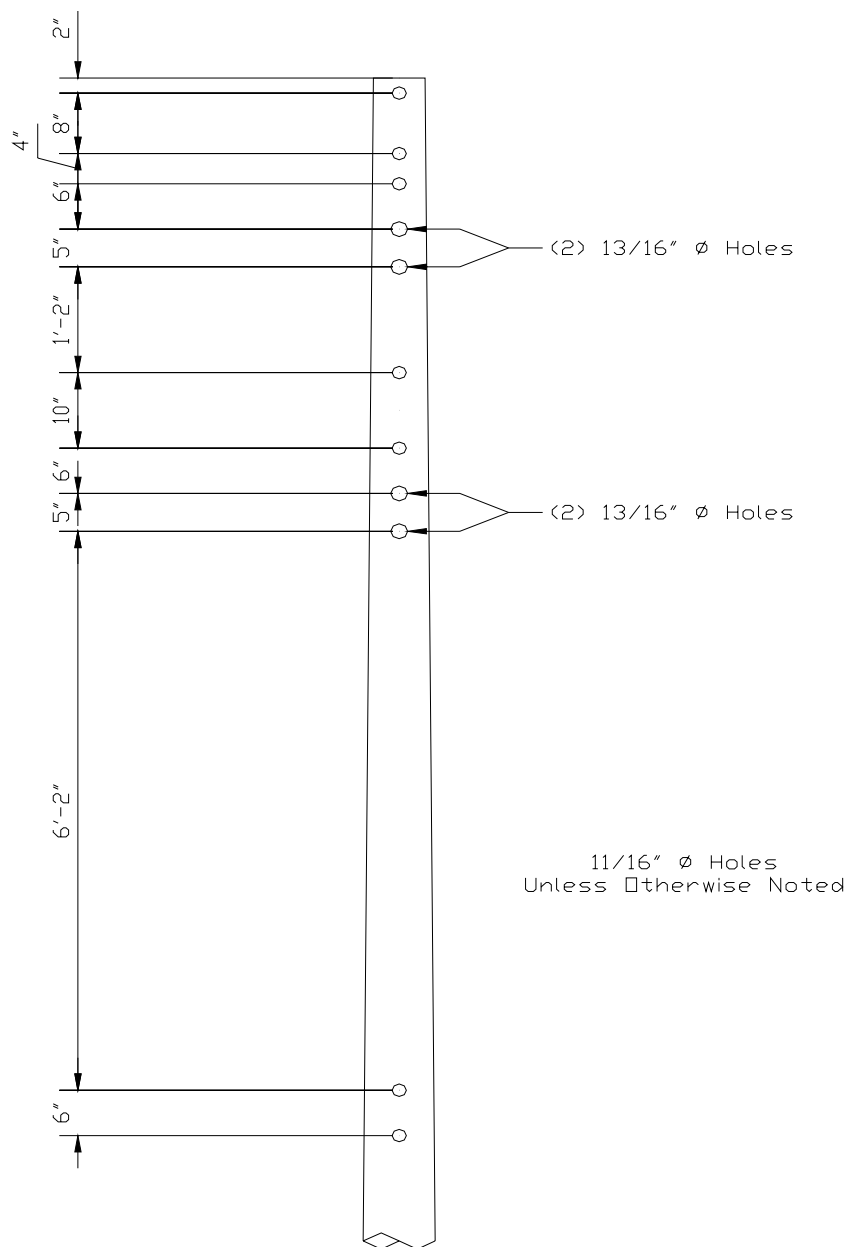
DRAWING NUMBER REV.

APPROVED

Attachment IV
Flat Dead End – Bolt Hole Pattern



Attachment IV
Delta Dead End – Bolt Hole Pattern



CITY OF AUSTIN, TEXAS
AUSTIN ENERGY
POWER DELIVERY

TITLE: Bolt Hole Pattern
3 $\varnothing$ Delta Dead End

APPROVED

DATE: Oct., 1998

SCALE: N.T.S.

DRAWING NUMBER REV.