

CONSTRUCTION PLANS FOR A TRAFFIC SIGNAL AT THE INTERSECTION OF BELT LINE ROAD AND RUNYON ROAD

DeShazo, Starek & Tang, Inc. Project #91224
TYPE: MULTI-PHASE, SOLID STATE, FULL TRAFFIC ACTUATED SIGNALS

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PREPARED BY



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PRINCIPAL-IN-CHARGE

PREPARED FOR

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NOTE:
SPECIFICATIONS ADOPTED BY THE STATE DEPARTMENT OF HIGHWAYS & PUBLIC
TRANSPORTATION OF TEXAS, SEPTEMBER 1, 1982, AND SPECIFICATION ITEMS
LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT :

TOWN OF ADDISON

*NOT FOR YOUR MEASUREMENT. I AM SHOWING ONLY ONE
THAT ARE ADEQUATE. PLEASE LET ME KNOW IF
BLUELINE IS ADEQUATE AND I WILL SEND THE ADDITIONAL*

THIS PLAN HAS BEEN
CHECKED TO CONFORM WITH
CONSTRUCTION STANDARDS
SIGNED: Tom Siney
DATE: 10-28-92

DUNAWAY ASSOCIATES, INC.

91268-01

TRAFFIC Signal
Beltline At Runyon
20-16-1

SI-13

SI-13

SPECIAL PROVISIONS FOR INSTALLATION OF TRAFFIC SIGNALS

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1.0 GENERAL NOTES FOR INSTALLING TRAFFIC SIGNALS

1.1 These Special Provisions and the 1983 North Central Texas Standard Specifications for Public Works Construction with Amendments where applicable, shall govern the materials and installation of traffic control signals, including illumination, at the intersections and, when required, interconnection conduit between signalized intersections. In the event of a conflict, the Special Provisions shall control.

1.2 This project shall consist of installing materials and equipment necessary for the complete signal system at the proposed location. The Contractor shall install and shall activate completed signals and signal systems in the sequence specified by the Engineer. The Engineer will issue the anticipated sequence of intersection work at the time the work order is issued.

1.3 The total installation shall be in accordance with the applicable sections of the National Electrical Code, all governing local ordinance and regulations, the plans, these special provisions and those sections of the Standard Specifications which apply. All workmanship shall be first class and finished work shall present a neat, uncluttered appearance. The Contractor shall schedule his work so as to cause the minimum interference to moving traffic and the operation of the existing signal system. Existing signals may be shut down for modification and/or equipment installation only with 72 hour advanced approval of the Director of Streets. These traffic signal installations consist of the following items:

1. Furnishing and placing all concrete and steel for signal pole foundations.
2. Installation of steel traffic signal poles.
3. Installing necessary conduit and pullboxes.
4. Installing all signal control equipment including controller assemblies signal head assemblies, detector units, AC service, conductors, and all other miscellaneous equipment that is required. The Contractor shall furnish concrete, reinforcing steel, and forms for structure foundations, grouting materials, painting materials, detector loop sawcut and sealing materials, No. 12 T.W. stranded wire for connecting the signal heads to the signal

cable system, and miscellaneous nuts, bolts, and washers under three-quarters inch (3/4") in diameter. The Contractor shall be required to assemble all signal head units.

5. The Contractor shall connect existing and proposed communication cable for interconnect as required by any system where applicable. Communication cable runs shall be continuous from controller to controller. Splicing may be permitted in pullboxes, subject to approval by the Traffic Engineer.
6. The Contractor will be responsible to maintain existing traffic signal operation at all intersections during the installation of new signals.
7. The Contractor will be responsible for removing the existing traffic signal equipment and hardware (controllers, poles, heads, cable, signs, etc.) at a specified location.
8. Project acceptance will be by individual intersection. The Contractor shall guarantee all work performed and materials he has furnished under this project for a period of twelve (12) months following the date of project acceptance.
9. The contractor shall provide a portable upload-download unit as per TEXAS D.O.T. requirements.

NO EXTRA COMPENSATION WILL BE ALLOWED FOR FULFILLING THE REQUIREMENTS STATED ABOVE.

1.4 All materials furnished by the Contractor shall be new undepreciated stock.

1.5 If the Contractor desires to deviate from any of the following procedures or to make substitutions for any materials or equipment, a written approval must be obtained from the Traffic Engineer after a request from the Contractor is made and sample(s) of the substitute materials or equipment is/are furnished to the Traffic Engineer.

2.0 MATERIALS TO BE FURNISHED BY THE CONTRACTOR

2.1 The Contractor shall furnish all materials necessary to complete the project, including materials for the power connection that are not furnished by the Power Company, and shall install the materials in accordance with the plans and specifications.

2.2 The Contractor shall also furnish all labor, tools, equipment, and incidentals necessary to complete the project in an efficient and workmanlike manner.

2.3 Electrical materials and fittings shall conform to the requirements of the National Electrical Code. Electrical fittings shall be approved by the National Electrical Association.

2.4 The Contractor shall furnish painting materials and labor as well as "touch-up" all painted items that are damaged during the installation process (whether previously painted by the contractor or by others). See Section 9.9 Field Painting. The finishing paint appearance will meet the Traffic Engineer's approval before acceptance of the signal installation is made.

3.0 INSTALLATION OF ELECTRICAL SERVICE

3.1 The Contractor shall furnish and install conduit and wire from pullboxes or signal foundations for AC Service as shown on plans and as required by the Power Company for traffic signal controllers and street lighting. The Contractor shall coordinate and verify exact requirements for conduit and wire with the Power Company before any work is started. Installation of conduit and wire to the Power Company vaults shall be per the Power Company specifications.

3.2 Unless otherwise called for in the plans, the power connection shall be made to a 115-125 volt, single-phase, 60 cycle A.C. supply. The wire used for the power connection shall be a minimum size as indicated on plans

and shall be insulated for six hundred (600) volts. The common wire shall be white-coded and the power positive shall be black-coded. The Contractor shall also provide an electrical meter for the signal installation.

4.0 INSTALLATION OF CONDUIT

4.1 (DELETED)

4.2 The Contractor shall provide and install underground cable facilities required to satisfy the requirements of the signal system proposed. Cable routing can be accomplished through existing conduits and conduits to be installed by the Contractor as shown in the plans. The Contractor shall be responsible for detailed coordination of proposed cable routing and actual installation, with utility company before any work is started. Installation of conduit and cable to other utility manholes shall be per utility company Specifications, which includes adequate ventilation to prevent injury to personnel caused by toxic or harmful gases.

4.3 New Conduit

4.3.1 Unless otherwise shown on plans, all conductors shall be in conduit except when in metal poles. All conduit and fittings shall be of the sizes and types shown on the plans. Each section of conduit shall bear evidence of approval by Underwriter's Laboratories.

4.3.2 Conduit terminating in posts or pedestal bases shall not extend vertically more than 3 inches above the concrete foundation. Field bends in rigid metal conduit shall have a minimum radius of 12 diameters of the nominal size of the conduit. Copperclad ground rods in signal bases shall not extend vertically more than 3 inches above the concrete foundation.

4.3.3 Each length of galvanized rigid metal conduit, where used, shall be reamed and threaded on each end and couplings shall be made up tight. White-lead point or equal shall be used on threads of all joints. PVC conduit shall be joined by solvent-weld method in accordance with the conduit manufacturer's recommendations. No reducer couplings shall be used unless specifically indicated on the plans.

4.3.4 All conduit and fittings shall have the burrs and rough places smoothed and shall be clean and free of obstructions before the cable is installed. Field cuts shall be made with a hacksaw only, and shall be square and true so that the ends will butt or come together for the full diameter thereof. In no case shall a cutting torch be used to cut or join conduit. Slip joints or running threads will not be permitted for coupling conduit unless approved by the Traffic Engineer. When a standard coupling cannot be used, an approved union coupling shall be used and shall provide a water-tight coupling between the conduit. All couplings shall be properly installed to bring the ends of connected conduit together to produce a good rigid connection throughout the entire length of the conduit run. Where the coating on a conduit run has been damaged in handling or installation, such damaged parts shall be thoroughly painted with rust preventive paint. Ends of conduits shall be capped or plugged until installation of wire. Upon request by the Traffic Engineer, the Contractor shall draw a full-size metal wirebrush, attached by swivel joint to a pull tape, through the metal conduit to insure that the conduit is clean and free from obstructions. The conduits shall be placed in an open trench at a minimum 24 inches depth below the curb grade in the sidewalk areas, or 24 inches below the finished street grade in the street areas.

4.3.5 Conduit placed for concrete encasement shall be secured and supported in such manner that the alignment will not be disturbed during placement of the concrete. No concrete shall be placed until all of the conduit ends have been capped and all box openings closed.

4.3.6 PVC conduit, which is to be placed under existing pavement, sidewalks, and driveways, shall be placed by first providing a void through which the PVC conduit shall be inserted. The void may be made by either boring or jacking a mandrel. Metal conduit, which is to be placed under existing pavement, sidewalks, and driveways, shall be placed by jacking or boring.

4.3.7 Pits for jacking or boring shall not be closer than 2 feet to the back of the curb or the outside edge of the shoulder unless otherwise directed by the Traffic Engineer. The jacking and boring method used shall not interfere with the operation of street, highway, or other facility, and shall not weaken or damage any embankment structure, or pavement. Heavy jacks are to be used for jacking. Boring is to be done by mechanical means providing a maximum one inch overcut for the conduit to be placed, and use of water or other fluids in connection with the boring operation will be permitted only to the extent to lubricate cuttings. Water jetting will not be permitted.

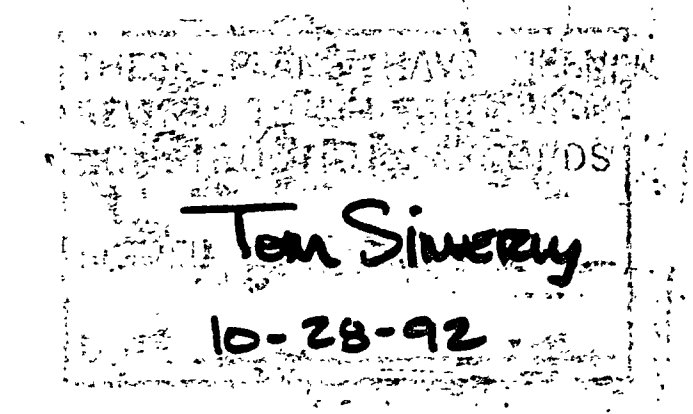
4.3.8 Where conduit is to be placed under existing asphaltic pavement, the jacking method is to be used unless written approval is given by the Traffic Engineer for placement of conduit by boring.

4.3.9 Backfill for all excavations shall be tamped with mechanical tamps in six inch (6") layers to the density of the surrounding ground.

4.4 Existing Conduit


4.4.1 Prior to pulling cable in existing underground conduit to be reused in the system, the conduit shall be cleaned with a mandrel or cylindrical wire brush and blown out with compressed air. The Traffic Engineer shall be notified prior to disconnection or removal of the existing interconnect cable.

4.4.2 Where existing conduit is found to be unuseable (conduit has collapsed or the cable is unable to be pulled from the existing conduit), the Contractor shall, upon approval by the Traffic Engineer, install new rigid metal P.V.C. or conduit.

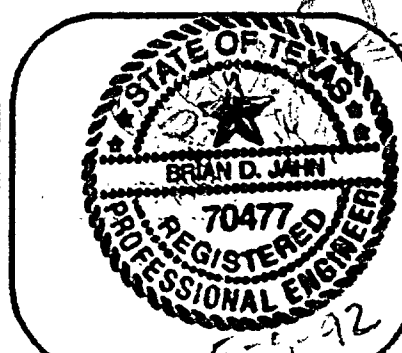

 Tom Simerly
 10-28-92

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GENERAL NOTES

Scale: NONE
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5.0 INSTALLATION OF CABLE

5.1 General

5.1.1 The cables shall be installed in the conduit. The conduit must be continuous, reasonably dry, completely free of debris, and without sharp projections, edges or short bends. If so required by the Traffic Engineer, the Contractor shall demonstrate that the conduit is dry and free of debris by pulling a swab and/or mandrel through the conduit. The conductors shall be installed in such a manner and by such methods so as to insure against harmful stretching of the conductor or damage to the insulation and shall conform to the recommendations of the cable manufacturer. The Contractor shall furnish, at the request of the Traffic Engineer, at least two copies of the manufacturer's recommendations, which includes: methods of attaching pull cable, pulling tension per conductor size and per radius of conduit bend, and the type of lubricant to be used.

5.1.2 All cables in a given conduit run shall be pulled at the same time and the conductors shall be assembled to form one loop in such a manner that the pulling tension is distributed to all the cables. Long, hard pulls will necessitate the use of pulling eyes. For short runs, the cables may be gripped directly by the conductors by forming them into a loop to which the pull wire or rope can be attached. The insulation on each conductor shall be removed before the loop is formed. The method used will depend on the anticipated maximum pulling tension in each case.

5.1.3 In many instances, existing conduits which contain signal cable are to be used for the installation of new cables. In such locations, where new cables are to replace all existing cables, the existing cables may be used to pull in the new cables. At locations where new cables are to be added to existing cable runs, the existing cables shall first be pulled out, then replaced, adding the new cables to the existing cables to form one cable pull. Installation shall be done in such a way as to prevent damage to the existing and/or new cables. In the event of damage, the Contractor shall bear the responsibility of material and labor for replacement of defective cables.

5.1.4 All conduit runs shall be measured accurately and precisely for determining cable lengths to be installed. A measuring device shall be inserted into the conduit, and the length shall be measured (to the nearest foot) from entry point to exit point. All conduit run measurements shall take place in the presence of the Engineer or the Inspector. The Contractor shall record all cable measurements and include the distances in the as-built drawings. In locations where new cables are to replace existing cables, the Contractor may use the removed cables as a measuring device to determine the lengths of the removed cables to be installed, however, this does not relieve the Contractor of his responsibility to record accurate measurements of all cable lengths.

5.1.5 The manufacturer's recommended maximum pulling tensions shall not be exceeded under any circumstances. If so required by the Traffic Engineer, the Contractor shall insert a dynamometer in the pull wire as the cables are being pulled into the conduit to demonstrate that the maximum tensions are not being exceeded. The cable shall be fed freely off the reel into the conduit without making a reverse curve. At the pulling end, the pull wire and cables shall be drawn from the conduit in direct line with the conduit. Sheaves or other suitable devices shall be used as required to reduce any hazards to the cable during installation. The cables shall be adequately lubricated to reduce friction and further minimize possible damage. Such lubricants shall not be the grease or oil type used on lead sheathed cables, but shall be one of several commercially available wire pulling compounds that are suitable for P.V.C. sheathed cables. They shall consist of soap, talc, mica, or similar materials and shall be designed to have no deleterious effect on the cables being used.

5.1.6 The cables shall be neatly trained to their destinations in manholes, cabinets, pole bases, pullboxes, and all other terminations. The cable manufacturer's recommended values for the minimum bending radii to which cables may be bent for permanent training during installation shall be adhered to. These limits do not apply to conduit bends, sheaves or other curved surfaces around which these cables may be pulled under tension while being installed. Larger radius bends are required for such conditions.

5.2 Wire and Cable

5.2.1 All wire and cable shall conform to the requirements shown on the plans, except wire and cable specifically covered by other items of this contract. The minimum size of conductors shall be as indicated on the plans.

5.3 Controller Cabinet Wiring

5.3.1 Wiring for the controller shall consist of connecting to its terminals; (1) wires to signals, (2) wires to detectors, (3) the power wires, (4) the ground wires, (5) the pedestrian push-button wires, and (6) the interconnect wires. At the controller, the signal conductors from the field shall be stripped back and insulated solderless lugs crimped to wire. These "lugs" shall be inserted under the binder head screw and tightened securely. Other wiring for the controller shall be as required by the wiring diagrams and instructions furnished with the controller by the manufacturer.

5.3.2 All field wiring in cabinets shall be neatly done. Incoming cables shall be trained to their destination and neatly laced together. All spare wires shall be trimmed, and neatly coiled with the ends taped. Detector lead-in cables shall have their insulation jackets removed from the terminal strip connection unheated to the bottom of the cabinet, and have the ground wires tied together in the bottom of the cabinet. Communication and detector lead-in cables shall be clearly identified by use of metal or plastic tags. For example: System Detector Eastbound Right Lane.

5.3.3 Pedestrian pushbuttons shall have a common ground wire that is completely isolated and independent from all other ground wires. This wire shall be connected to the designated terminal in the controller cabinet.

5.4 Signal Head Wiring

5.4.1 Wiring for the signal head shall consist of connecting the terminal block in each signal section to the common terminal block in each signal face to the terminal block in the signal-head terminal compartment. All such connecting wires shall be number twelve (12 ga.) stranded American Wire Gauge. All conductors running from any terminal points located in the pole or transformer base to the signal-head terminal shall likewise be number twelve (12 ga.) stranded A.W.G. wire. The Contractor shall furnish the No. 12 ga. stranded A.W.G. wire for this task.

5.5 Terminals

5.5.1 Except for controllers, the ends of all stranded wires which are to be attached to terminal posts shall be provided with solderless terminal lugs that meet the requirements of the National Electrical Code. Terminal lugs on solid wires are prohibited.

5.6 Splices

5.6.1 Splices inside conduit runs and in loop detector T.H.W. wire are absolutely prohibited. Except for detector lead-in cables, all splices shall be made above ground. Splices in pullboxes are prohibited unless specific written permission has been issued by the Traffic Engineer.

5.6.2 Splicing methods shall be in accordance with good electrical practice and the cable manufacturer's recommendations.

All materials used shall be high quality and specifically intended for these purposes. The cables shall be trained to their final position and cut to proper lengths. The jacket and insulation shall be removed as required. In doing this, use proper care to insure against nicking the conductors. The connector shall be installed tightly and all burrs, rough edges, etc. shall be removed. If required in the plans or by the Traffic Engineer, the connection also shall be soldered. Heat shall be applied by use of hot solder. Heating the connection with a direct flame will not be permitted. Care shall be used to protect the insulation when soldering. The entire surface shall be cleaned taking special care in cleaning the outside jacket in order to remove the wax finish. Before the first layer of tape is wrapped, the entire area shall be coated with an electric grade rubber cement. After this solvent has dried, the connection shall be insulated with electrical grade rubber splicing compound tape to proper thickness. This tape requires a pressure and temperature in service to complete its vulcanizing process and thus be stretched to 2/3 width when applied. The completed splice shall be covered with a half-lap layer of vinyl plastic electrical tape. This wrapping shall be smooth but the tape shall not be stretched more than necessary.

5.6.3 Splices in communications cables shall include the shield. Splices between cable pairs shall be made with scotchlock solderless connectors designed for this specific application. The completed splice shall be insulated with a re-enterrable plastic splice case. Splices at points other than those shown on the plans may be made only with the written permission of the Traffic Engineer.

5.6.4 The Traffic Engineer shall select at random at least 5 splices to be thoroughly inspected. The Contractor shall, in the presence of the Traffic Engineer sectionalize the splice to expose the various layers of materials and the connector. The splice shall be thoroughly checked for compliance to these special provisions. The splice shall then be remade by the Contractor. This work shall not require extra payment, but is considered subsidiary to other items in the Contract. All of the splices selected for this inspection shall conform to the requirements of these special provisions. If any splices fail to meet these requirements, ten (10) more splices shall be selected at random by the Traffic Engineer for inspection.

5.7 Enclosed Wiring

5.7.1 All cables and signal conductor wire above the ground surface shall be enclosed in approved metal conduit up to but no closer than one foot of the lowest power conductor. Power-top lines carried down poles shall be placed in metal conduit.

5.8 Identification of Signal Wires

5.8.1 MSA color coded signal cable shall be used for all signal and interconnect systems. Colors shall be continuous from the point of origin to the point of termination. Splices will be permitted only if same colors are spliced.

6.0 GROUNDING

6.1 There shall be a properly installed and connected ground rod for each controller cabinet and power drop to reduce any extraneous voltage to a safe level. The ground rod shall be located so as to minimize the length of the grounding-conductor run. All grounding circuits shall be substantial and permanent and shall be electrically continuous with an ohms-to-ground resistance not to exceed 10 ohms when tested by volt-ohm-meter.

6.2 Grounding Connectors and Electrodes

6.2.1 The grounding conductor shall be a No. 6 AWG standard copper wire. The conductor shall be bonded to ground rods. Ground rod electrodes shall be solid copper-bonded steel being at least 5/8 inch in diameter and shall be driven into the ground to a depth sufficient to provide the required

resistance between electrodes and ground (10 ohms). All ground rods shall be a minimum of six feet long. When the location precludes driving a single ground rod to a depth of six feet or when a multiple ground rod matrix is used to obtain the required resistance to ground, ground rods shall be spaced at least six feet apart and bonded by a minimum No. 6 AWG copper wire. Connections to underground metallic conduit shall be considered sufficient for grounding requirements. Connection of grounding circuits to grounding electrodes shall be by devices which will ensure a positive, fail-safe grip between the conductor and the electrode (such as lugs or pressure connectors). No splice joint will be permitted in the grounding conductor.

7.0 LOOP VEHICLE DETECTOR INSTALLATION

7.1 This section specifies the Contractor's responsibility for the loop and lead-in installation for vehicle loop detectors. It is required that all work related to the installation of a particular loop, with the exception of the layout task, shall be completed in the same work day. Loop installation work shall be performed during off-peak traffic hours. Loop installation shall not be made during any type of precipitation or when pavement is wet from landscape irrigation systems.

7.2 The installation of loop detectors shall occur as shown in the Plans. The lead-in saw cuts from the street to the pullbox shall maintain a minimum separation from other loops of 12 inches and a minimum separation of 6 inches from other lead-in saw cuts. The saw cut depth, as specified in the plans, shall be consistent, including the entry point into the curb. The maximum number of wires placed in a single saw slot shall be four (4) wires. All wires in saw slots shall be a minimum of one inch (1") below the street level grade. The maximum number of wires placed in any lead-in saw cut from the street to curb side shall be two (2).

7.3 The Contractor shall furnish the sealing compound for the loop detectors at his expense. Samples of the sealant and methods for sealant installation shall be submitted to the Engineer for his approval before any detector installation may begin. If a hot sealant is used, the temperature of the sealant shall be in a range that will not cause damage to the detector wires. Loop sealant shall completely fill the saw cut, but shall not be more than three inches (3") in width on the street surface. The Contractor shall be required, at his expense, to remove all excess sealant, otherwise the loop will not be considered as a completed item.

7.4 Detector lead-in cables shall be run continuously without splices from the curbside pullbox to the controller where possible. If splices must be made, they shall be made in a signal base. Splices shall be solder connected (including the ground wire) and the splice connection shall be insulated and waterproofed with scotchcoat materials. Splices at the curb side pullboxes shall also be made in the same manner. See Section 5.6 Splices. The Traffic Engineer shall approve any splice in detector cables.

7.5 Each detector loop shall penetrate the curb in a separate conduit.

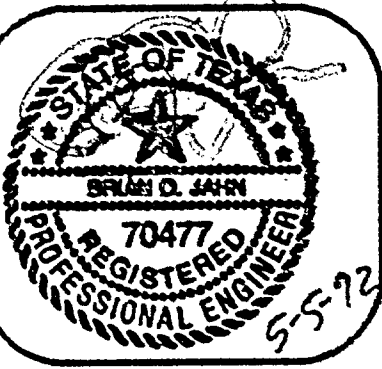
THESE PLANS HAVE BEEN
 REUSED TO CONFORM WITH
 THE LATEST FRONT RECORDS
 PREPARED BY
Tan Simezy
 DATE: 10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

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GENERAL NOTES
 Scale: NONE
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8.0 CONCRETE FOUNDATIONS FOR SIGNAL STRUCTURES

8.1 Concrete foundations for signal structures shall be located so that the closest structure leg is a minimum of six (6) feet from the face of vertical curbs. The Contractor shall probe before excavating foundations to determine the location of utilities and structures. Foundations shall be paid for once, regardless of extra work caused by obstructions. The Contractor shall furnish all supplementary items necessary for its proper installation.

8.2 Excavation for all required foundations shall be done in accordance with lines and depths indicated on the plans. All loose material shall be removed from the excavation before the concrete is placed. Any water shall be removed by pumping or bailing. The use of explosives will not be permitted.

8.3 Foundations shall be constructed to the dimensions shown on the plans or as directed by the Traffic Engineer. The Contractor shall be required to insure that the top of the finished foundation is exactly level and formed. Anchor bolts and conduits shall be held rigidly in place by a template until the concrete is set. A mechanical vibrator shall be used for compacting and working the concrete. After the concrete has been placed and the top struck off, it shall be covered with wet cotton or burlap mats, for not less than ninety-six hours. All bracing and templates for anchor bolts shall remain in place for ninety-six (96) hours after the concrete is poured. During that time, the anchor bolts and conduit shall not be subjected to any applied strain. The Contractor shall furnish the Traffic Engineer a level for the purpose of inspecting the foundation. Signal pole shall not be installed on any foundations until approval has been given by the Traffic Engineer.

8.4 Backfill shall be tamped with mechanical tamps in 6-inch layers to the density of the surrounding ground. Where excavation is made in the surfaced shoulder, the shoulder shall be replaced with material equal to the original composition.

8.5 All excavated material not required for backfill shall be promptly removed and disposed of by the Contractor outside the limits of the project. The work site shall be kept clean and neat at all times.

8.6 No concrete shall be placed when the atmospheric temperature is at or below 40 degrees F. (taken in shade away from artificial heat) unless permission to do so is given by the Traffic Engineer.

9.0 INSTALLATION OF TRAFFIC SIGNAL STRUCTURE

9.1 The Contractor shall provide a complete traffic signal structure location plan/or schedule showing all pertinent details for each standard. This plan shall be approved by the Traffic Engineer before any structure is installed.

9.2 The Contractor shall examine foundations, which are to receive traffic signal standards, to assure proper anchorage alignment. Report any discrepancies to the Traffic Engineer.

9.3 Signal poles shall be leveled and tightly secured to the foundation before the structure is placed on the base. If shims are required for leveling, total shim height shall not exceed 1/2 inch. Foundation anchor bolts shall extend a minimum of three (3) threads through each nut in the base.

9.4 Except as modified herein, erection shall be in accordance with the applicable Specifications and Standards of the AISC Manual of Steel Construction. Erecting equipment shall be suitable for the work and shall be in first class condition. Where parts cannot be assembled or fitted properly as a result of errors in fabrication or deformation due to handling or transportation, such condition shall be reported immediately to the Traffic Engineer for approval of the method of correction obtained. The straightening of plates and angles or other shapes shall be approved methods. Bent or damaged heat-treated parts will be rejected. Steel work shall be drained properly. Pockets in structures exposed to the weather shall be filled with an approved waterproof material. The erector will be responsible for shrinkage and distortion of all butt welds. Moment connections in the field on beams and girders shall have a minimum of 3/16 inch root opening for all flange preparations prior to

welding. Loose joints shall be corrected by cutting with a hand guided torch if necessary.

9.5 The steel structure frame shall be carried up true as shown and all match marking shall be followed. Temporary bracing shall be used wherever necessary to support all loads to which the structure may be subjected, including equipment, operation, load material loading. Such bracing shall be left in place as long as may be required for safety. The various members, after being assembled, shall be aligned and adjusted accurately before being fastened. Fastening of splices on compression members shall be done after the abutting surfaces have been brought completely into contact. No welding or bolting shall be done until as much of the structure as will be stiffened thereby has been aligned properly.

9.6 Bearing surfaces and surfaces which will be in permanent shall be cleaned before the members are assembled. Bearing plates shall be set in exact position and shall have a full and even bearing upon the concrete. As erection progresses, the work shall be bolted to take care of all dead load, wind and erection stresses. Splices will be permitted only where indicated. All erection bolts used in welded construction may be tightened securely and left in place. If removed, the holes shall be filled with plug welds.

9.7 Field bolting shall be in accordance with the requirements specified for shop fabrication. Unfair holes shall be corrected by reaming. Where the surface of a bolted part has a slope of more than 1:20 a beveled washer shall be used to compensate for the lack of parallelism. Bolt heads and nuts shall be drawn tight against the work with a suitable wrench not less than 15 inches long. Bolt heads shall be tapped with a hammer while the nut is being tightened.

9.8 Field welding shall be as specified for shop fabrication of welded construction. Any shop point on surfaces adjacent to joints to be field welded shall be wire brushed to reduce the paint film to a minimum.

9.9 Field Painting: Surfaces where the shop coat of paint has been damaged shall be retouched using the same system as the original shop painting. The cleaning, pretreatment, and priming of welds and the areas adjacent thereto shall be done promptly after the acceptance of the weld as specified under the shop painting. If required, Contractor cabinets shall be painted. Cabinets must be cleaned and treated with a bonding agent before finish coat is applied. Bonding agent shall be of the type conducive for adherence of paint to aluminum surfaces, and shall be approved by the Traffic Engineer before use is permitted.

9.10 Contractor shall furnish bonding agent at his expense. Contractor shall be required to follow manufacturer's specifications and directions for use of all materials used in the painting process.

9.11 High Strength Steel Bolts: The allowable working stresses for A325 bolts shall be given in Table 2 of the Specifications for Structural Joints using ASTM A325-N or A490-N bolts.

9.12 Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible material. When assembled, all joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of scale, except tight mill scale, and shall also be free of burrs, dirt and other foreign material that would prevent solid seating of the parts. Each fastener shall be tightened to provide, when all fasteners in the joint are tight, at least the minimum bolt tension shown in Table 3 in the Specifications for Structural Joints using ASTM A325 or A490 bolts for the size of fastener used. Threaded bolts shall be tightened with properly calibrated wrenches or by the "turn-of-nut" method. Bolts may be installed without hardened washers when tightening is by the "turn-of-bolt" method. Any bolt tightened by the calibrated wrench method (or by torque control) shall have a hardened washer under the element (nut or bolt head) turned in to a point not closer than 7/8 of the bolt diameter from the center of the washer. Calibrated wrench tightening and "turn-of-out" tightening shall conform to the Specifications for Structural Joints using ASTM A325 or A490 bolts.

9.13 Grouting: The Contractor shall perform all work required to complete the grout work associated with installing the signal structure and furnish all supplementary items necessary for its proper installation. A waterproof sealer shall be required between the controller cabinet and the controller foundation.

10.0 INSTALLATION OF SIGNAL HEADS

10.1 The Contractor shall be required to assemble all signal head units as specified in the plans or as directed by the Engineer. The Contractor shall mount the signal heads within standards level and plumb. The Contractor shall position and secure the signal heads so they are visible at a minimum of 200 feet from the stop bar.

10.2 No Alternate signal head mounting hardware will be acceptable by the Traffic Engineer.

10.3 All signal heads or parts of heads not in operation shall be covered with burlap until placed into operation. When the signal heads become operational, all existing heads no longer required shall be removed immediately.

10.4 All mast arm heads installed shall require ASTRO-BRAC mounting. The Contractor shall be required to drill the mast arm at the point where the wire enters the mast arm.

10.5 All pipework in each signal head assembly shall be completely tight. Signal and pedestrian heads shall be securely tightened immediately after signal head assembly has been installed. If any signal head assembly is found to be loose or asymmetrical in any manner, the Contractor shall be required to remove and rebuild the signal head assembly to the satisfaction of the Engineer.

10.6 All signal cables from the heads to the pole base shall be totally enclosed within the signal mounting hardware.

11.0 INSTALLATION OF GRAPHICS/SIGNS

11.1 Perform all work required to complete the identifying graphics/signs indicated by the plan details and furnish all supplementary items necessary for their proper installations.

11.2 Installation: The Contractor shall clean all surfaces to which graphics are to be applied according to manufacturer's written instructions. Level grid lines of tape shall be incorporated for graphic application. All copy shall be set in normal letter spacing and standard inter-work spacing shall be made as required by the Traffic Engineer.

12.0 PAINT AND PAINTING

12.1 All poles and bases shall be painted with two coats of Town of Addison "Brushing Brown" paint at the time of installation. The metal-pipe conduit and exposed conduit fittings which are not galvanized shall be given one coat of No. 802 Aluminum paint after they are in place.

12.2 No painting will be required for the signal heads black in color except those parts on which the paint has been scratched or marred, and such parts shall be given two coats of high-grade enamel or paint of the same color as the factory paint.

13.0 PRESERVATION OF LANDSCAPING, SPRINKLER SYSTEMS, AND OTHER PRIVATE PROPERTY / PUBLIC PROPERTY

13.1 The Contractor shall assume full responsibility for the preservation of the existing landscaping (sod,

private property at the site during the installation of items in this Contract Document. Damaged landscaping, sprinkler systems and other private property shall be replaced by the Contractor at his own expense, to the satisfaction of the Traffic Engineer.

14.0 REMOVAL AND REPLACEMENT OF CURBS AND WALKS

14.1 The Contractor shall secure permission from the proper authority and the approval of the Traffic Engineer before cutting into or removing any walks or curbs which might be required in making the installation.

14.2 After the work is completed, the Contractor shall restore any curbs or walks which have been removed to the equivalent of, or better than, their original condition and to the satisfaction of the Traffic Engineer.

15.0 SAMPLING AND TESTING

15.1 Initial testing of all materials, construction items, or products incorporated in the work will be performed at the direction and expense of the authority including initial compaction and density tests deemed necessary in connection with the construction of embankment, backfill of structures, excavation.

15.2 In the event a material, construction item, product incorporated in the work, embankment, backfill, excavation or any other item tested fails to satisfy the minimum requirements of the initial test described above, appropriate prove-out tests shall be made as directed by the Traffic Engineer to determine the extent of the failure and to verify that the corrective measures have brought the item up to specification requirements. The cost of all testing necessary to determine the extent of the failure and the adequacy of the corrective measures shall be the responsibility of the Contractor.

15.3 The failure of the proper authority to make any tests of materials shall in no way relieve the Contractor of his responsibility of furnishing materials conforming to the specifications.

THESE PLANS HAVE BEEN
 REVIEWED TO CONFORM WITH
 CONSTRUCTION RECORDS
 Tom Simms
 10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

**DUNAWAY ASSOCIATES,
 INC.**

DeShazo, Starek, & Tang, Inc.
 ENGINEERS • PLANNERS
 330 Union Station
 Dallas, Texas 75202-4802
 (214) 748-6740
 Fax: (214) 748-7037

DESIGN BY: BDJ DATE: 2-14-92
 DRAWN BY: SAM DATE: 2-14-92
 CHECKED BY: BDJ DATE: 2-14-92
 APPROVED BY: _____ DATE: _____



GENERAL NOTES
 Scale: NONE
 Page 3 of 4

SHEET
 4
 OF
 19
 91268-04

15.4 Tests, unless otherwise specified, shall be made in accordance with the latest methods of the American Society for Testing and Materials. The Contractor shall provide such facilities, as the Traffic Engineer may require, for the collecting and forwarding of samples and shall not use the materials represented by the samples until tests have been made. The Contractor shall furnish adequate samples without charge.

15.5 Concrete

15.5.1 All concrete materials, reinforcing steel, and preparation shall be in accordance with the requirements of the Standard Specifications for Public Works Construction, North Central Texas.

15.6 Vehicle Loop Detectors

15.6.1 Prior to termination of the shielded, twisted pair loop lead-in cables at the controller cabinet, insulation tests shall be made with an insulation test set applying not less than 500 volts D.C. to the completed loop detector. A minimum resistance of 1 megohm shall be obtained.

15.6.2 After the above insulation tests are completed and the lead-in cable has been terminated in the cabinet, the Contractor shall assist the Traffic Engineer in determining the loop inductance of each loop detector installation. The Contractor shall furnish a loop detector analyzer which shall determine the total inductance of the loop in the pavement and the associated lead-in cable and shall also be used in determining the percentage shift in loop inductance for various size vehicles that may be actuating the detector.

15.7 Signal Cables

15.7.1 All cables shall be checked for insulation resistance upon installation and prior to termination. The tests shall be made with a test set operating at a minimum of 500 volts D.C. applied to the conductors.

15.7.2 Each conductor in the multiconductor signal cables shall be tested for insulation resistance relative to each other and to the outer covering of the cable. The following minimum acceptance values for insulation resistance shall be obtained:

No. 8 AWG, Type THW	592 Megohms/1000 Ft.
No. 12 AWG, Type THW	668 Megohms/1000 Ft.
12, NO. 12 AWG Conductors	1018 Megohms/1000 Ft.
15, No. 12 AWG Conductors	1018 Megohms/1000 Ft.
20, No. 12 AWG Conductors	1141 Megohms/1000 Ft.
25, No. 12 AWG Conductors	1141 Megohms/1000 Ft.

16.0 WARRANTIES/GUARANTEES

16.1 The Contractor guarantees all work performed and materials furnished under this project for a period of twelve (12) months following the date of acceptance. In addition, he shall furnish any normal manufacturer warranties with effective beginning dates the same as the date of final project acceptance.

17.0 TRAFFIC SIGNAL MAINTENANCE DURING CONSTRUCTION

17.1 While performing work under this contract, Contractor bears the sole risk of loss for damage to or destruction of any traffic signal equipment, appurtenances, or operations that were not to be replaced or installed under this contract but which are damaged or destroyed through the fault or negligent act of Contractor, and Contractor shall replace such damaged or destroyed equipment, etc., at no cost to the authority, regardless of whether or not the damaged or destroyed equipment, etc., was a part of this contract or any warranties under this contract. Upon written acceptance by the authority of a particular intersection of work, Contractor's responsibility for the intersection under this paragraph shall cease.

17.2 The Contractor shall provide, at his expense, temporary signal cable systems and signals mounted on the span wires, most arms, portable bases, or other locations as necessary during the project to insure that signal head displays are always in operation. All such temporary signals shall be finished in appearance, meet the requirements of the Texas Manual on Uniform Traffic Control Devices (TMUTCD), and be approved by the Traffic Engineer.

17.3 The Contractor's responsibility for full operation and maintenance of all traffic signal equipment shall begin when he starts any type of work which affects active intersection control at the first intersection and shall extend through the period of project final acceptance of each intersection. This maintenance responsibility includes existing controllers/masters, existing interconnect and cabling system, existing signal hardware installed, new cabling controllers/masters, new signal hardware installed, new cabling system, and other hardware elements which are considered part of either the existing or new traffic signal system.

17.4 The Contractor shall utilize qualified personnel to respond to all trouble calls and to repair any malfunctions. A local telephone number (not subject to frequent changes) where trouble calls are to be received on a 24-hour basis shall be provided to the Traffic Engineer by the Contractor. The Contractor's response to reported trouble calls shall be within a reasonable travel time from an Addison address, but not more than two (2) hours maximum. Appropriate repairs shall be made within 12 hours.

17.5 It is recognized that the City may continue to make a first response to any trouble call. Action on such response will, however, be limited to placing the intersection on flash, replacing load switches or detector amplifiers, erecting temporary control devices, requesting immediate traffic control by uniformed police officer, or other such action deemed necessary to provide a safe operation. Such action will in no way relieve the Contractor of his operation and maintenance responsibility.

17.6 The Contractor shall be required to provide adequate police traffic control assistance for planned controller change-outs or any other operational procedures, when requested by the Engineer. Police assistance shall be arranged by the Contractor directly, at least twenty-four (24) hours in advance. If the Engineer discovers that the Contractor has failed to provide adequate police assistance, the Engineer may order additional assistance. Police traffic control assistance, for any purpose, shall be the financial responsibility of the Contractor, regardless of who obtains the assistance.

18.0 BARRICADES

18.1 The Contractor shall comply with all the requirements of the TMUTCD.

18.2 The Contractor shall have the responsibility to provide and maintain all warning devices and take all precautionary measures by law to protect persons and property while said persons or property are approaching, leaving, or within the work site of any area adjacent to said work site. No separate compensation will be paid to the Contractor for the installation or maintenance of any warning devices, barricades, lights, signs, or any other precautionary measure required by law for the protection of persons or property, including off duty police officers.

18.3 The Contractor shall assume all duties owed by the authority to the general public in connection with the general public's immediate approach to and travel through the work site and the area adjacent to said work site.

18.4 Where the work is carried on, in, or adjacent to, any street, alley, sidewalk, public right-of-way or public place, the Contractor shall at his own cost and expense provide flagmen and watchmen and shall furnish, erect, and maintain such warning devices, barricades, lights, signs, and other precautionary measures which shall not cease until the project has been accepted by the governing Authority.

19.0 AS-BUILT DRAWINGS

19.1 The City shall furnish two (2) sets of Construction Drawings to the Contractor at the time construction is commenced. These prints shall be marked-up by the Contractor throughout the construction period, indicating all changes, revisions, and additions to the work, including field relocations of work concealed from view and conductor cable lengths. Upon completion of the work at each intersection, the Engineer shall deliver the As-Built drawings to the Traffic Engineer within ten (10) working days after the turn-on/cut-over date.

20.0 MEASUREMENT AND PAYMENT

20.1 The traffic signal installation as indicated on the Plans and as described herein, when installed, will be measured as a completed installation and payment will be made at the contract unit bid price for "Traffic Signal(s)", which price shall be full compensation for furnishing, placing, and testing all materials and equipment and for all tools, labor, equipment, and incidentals necessary to complete the work. Portions of the work that have not been approved by Engineer will not be considered complete, and payment shall be withheld until the Contractor has corrected the work to the satisfaction of the Engineer.

21.0 EXPERIENCE AND QUALIFICATIONS

21.1 The low bidder shall be required to furnish the Engineer a written assessment of previous experience in the installation of traffic signal systems. The response shall include the name and population of the city or area served, Contract name and/or number, date of installed, date of Contract completion, Contract delays and discrepancies, liquidated damages and the name, address, and phone number of a specific individual representing the client who is in a position to verify such experience. The response shall be delivered to the Engineer within ten (10) working days after bid opening.

21.2 The Bidder shall also furnish information as required above for each major subcontractor (i.e., manufacturer or fabrication of traffic signal structures) that could be active in the project.

22.0 MISCELLANEOUS NOTES

22.1 THE LOCATIONS OF DRIVEWAYS, SIDEWALKS, DRAIN GUTTERS, ETC., AS SHOWN ON THESE PLANS ARE APPROXIMATE. ACCURATE LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR AT THE TIME OF CONSTRUCTION.

22.2 THE LOCATIONS OF TRAFFIC SIGNAL FOUNDATIONS, BASES, CONDUIT DETECTORS, ETC., SHOWN ON THE PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL GIVE THE GOVERNING TRAFFIC AUTHORITY 48 HOURS NOTICE OF HIS INTENTION TO ESTABLISH THE FINAL LOCATION OF ANY FOUNDATIONS, BASES, CONDUIT, DETECTORS, ETC., AND HAVE THE LOCATIONS APPROVED ON THE GROUND BY THE TRAFFIC ENGINEER OR HIS DULY AUTHORIZED REPRESENTATIVE.

22.3 NO TREES SHALL BE CUT EXCEPT UPON THE SPECIFIC AUTHORITY OF THE ENGINEER.

22.4 WHERE POSSIBLE, DIG UNDER SIDEWALKS. IF THE CONTRACTOR CHOOSES TO REMOVE OR CUT THE SIDEWALK THE CONCRETE MUST BE SAWED AND BROKEN OUT AND THEN RESTORED TO AN EQUAL OR BETTER CONDITION THEN THE ORIGINAL.

22.5 REMOVAL OF MAIL BOXES IN THE WAY OF CONSTRUCTION REQUIRES 48 HOURS ADVANCE NOTICE TO THE POST OFFICE.

22.6 PIPELINES, STORM SEWERS, POWER CABLES, STRUCTURES, AND OTHER UNDERGROUND ITEMS BOTH PUBLICLY AND PRIVATELY OWNED EXIST ADJACENT TO THE CONSTRUCTION LIMITS OF THIS PROJECT. THE CONTRACTOR SHALL MAKE HIS OWN INVESTIGATION AS TO THE LOCATION OF THESE UNDERGROUND ITEMS AND SHALL HOLD THE AUTHORITY EXEMPT FROM ANY SUITS OR CLAIMS RESULTING FROM DAMAGE BY THE CONTRACTOR'S OPERATIONS TO ANY UNDERGROUND INSTALLATION. THE CONTRACTOR SHALL COMPLY WITH ALL UTILITY CLEARANCES.

22.7 ALL CONDUIT RUNS SHALL BE CONTINUOUS OF THE SAME MATERIAL (METAL ONLY OR PVC ONLY). WHERE TYING INTO EXISTING CONDUIT, THE CONTRACTOR MUST CONTINUE WITH THE SAME MATERIAL (METAL TO METAL OR PVC TO PVC).

22.8 ON ALL INTERCONNECT CONDUIT RUNS, THE CONTRACTOR SHALL INSTALL PULLBOXES AT INTERVALS OF 250 FEET TO PREVENT DAMAGE OR BREAKAGE TO THE CABLE BEING INSTALLED. ANY INCREASE OR DECREASE IN DISTANCE BETWEEN PULLBOXES, UNLESS SHOWN ON THE PLANS, MUST BE APPROVED BY THE TRAFFIC ENGINEER OR HIS DULY AUTHORIZED REPRESENTATIVE.

23.0 ACCEPTANCE NOTES

23.1 PRIOR TO FINAL ACCEPTANCE BY THE TOWN OF ADDISON: 1. A TEXAS REGISTERED PROFESSIONAL ENGINEER SHALL CERTIFY THAT THE PROJECT WAS CONSTRUCTED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS APPROVED BY THE TOWN OF ADDISON.

2. THE OWNER SHALL PROVIDE 1 REPRODUCIBLE SET OF AS-BUILTS (SEALED AND CERTIFIED BY A TEXAS REGISTERED ENGINEER) AND 2 BLUE LINE SETS.

23.2 PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR SHALL CONTACT THE UTILITY COMPANIES TO LOCATE EXISTING FACILITIES. THESE INCLUDE BUT MAY NOT BE LIMITED TO THE FOLLOWING:

1. TOWN OF ADDISON
2. LONE STAR GAS
3. SOUTHWESTERN BELL
4. STORER CABLE
5. PLANNED CABLE SYSTEMS
6. TU ELECTRIC

23.3 PRIOR TO BEGINNING CONSTRUCTION, THE OWNER OR HIS AUTHORIZED REPRESENTATIVE SHALL CONVENE A PRE-CONSTRUCTION CONFERENCE BETWEEN THE TOWN OF ADDISON, CONSULTING ENGINEER, CONTRACTORS, UTILITY COMPANIES AND ANY OTHER AFFECTED PARTIES, NOTIFY BRUCE ELLIS 450-2847 AT LEAST 48 HOURS PRIOR TO THE TIME OF CONFERENCE AND 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.

23.4 ANY EXISTING PAVEMENT, CURBS, AND/OR SIDEWALKS DAMAGED OR REMOVED WILL BE REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE.

23.5 AT INTERSECTIONS THAT HAVE VALLEY DRAINAGE, THE CROWN OF THE INTERSECTING STREETS WILL CULMINATE IN A DISTANCE OF 40 FEET FROM THE INTERSECTING CURB LINE UNLESS OTHERWISE NOTED.

23.6 CONTRACTOR SHALL OBTAIN A RIGHT-OF-WAY PERMIT BY THE TOWN OF ADDISON FOR WORKING WITHIN THE PUBLIC RIGHT-OF-WAY.

23.7 DURING CONSTRUCTION, THE OWNER SHALL PROVIDE A QUALIFIED GEOTECHNICAL LAB TO PERFORM MATERIALS TESTING DURING THE CONSTRUCTION, AT THE REQUEST OF THE TOWN OF ADDISON.

23.8 THE CONTRACTOR SHALL SUBMIT MATERIAL SHEETS TO THE TOWN OF ADDISON FOR APPROVAL PRIOR TO INCORPORATING MATERIALS INTO THE JOB.

23.9 THE CONTRACTOR SHALL PROVIDE INTEGRATION OF THE NEW CONTROLLER DATA BASE AND INTERSECTION / SUB-SYSTEM GRAPHICS INTO THE TOWN OF ADDISON'S ON STREET MASTER SIGNAL SYSTEM.

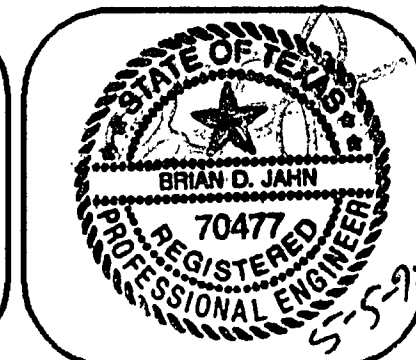
THESE PLANS HAVE BEEN REVISIONED TO CONFORM WITH CONSTRUCTION RECORDS
 SIGNED: *Tom Simsky*
 DATE: 10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES, INC.

DeShazo, Starek, & Tang, Inc.
 ENGINEERS • PLANNERS
 330 Union Station
 Dallas, Texas 75202-4802
 (214) 748-6740
 Fax: (214) 748-7037

DESIGN BY: BDJ DATE: 2-14-92
 DRAWN BY: SAM DATE: 2-14-92
 CHECKED BY: BDJ DATE: 2-14-92
 APPROVED BY: _____ DATE: _____

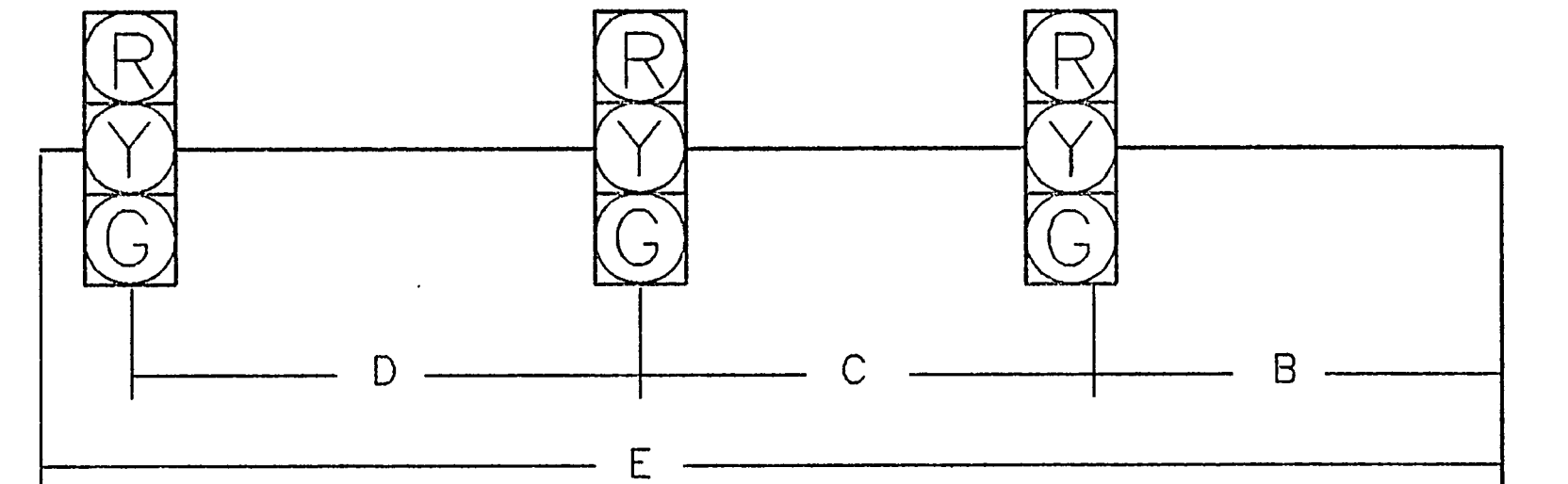
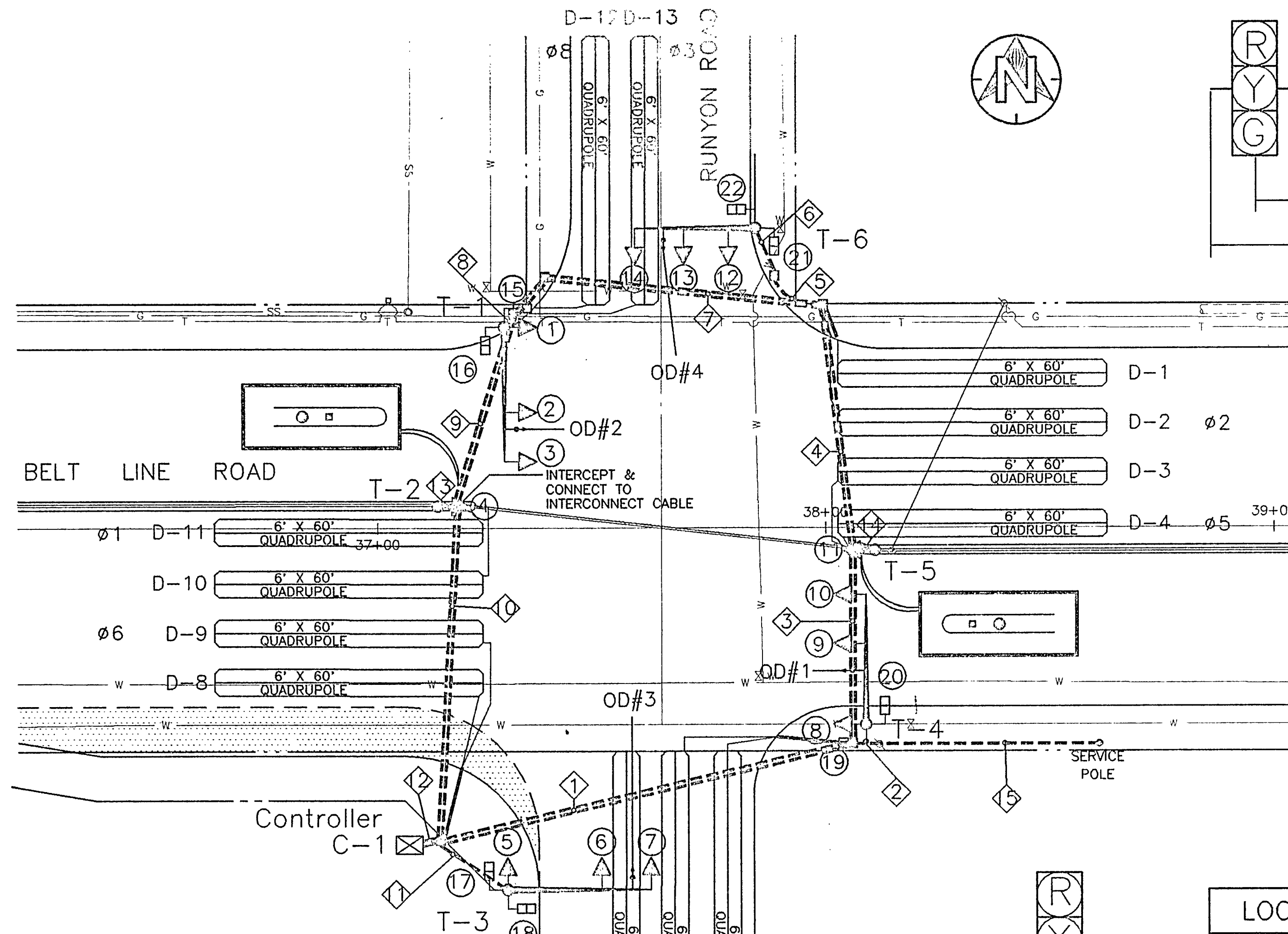


GENERAL NOTES
 Scale: NONE
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 91268-05

CONDUIT DETAILS

RUN NO.	CONDUIT		NO. OF CABLES							
	SIZE/TYPE	LENGTH	16C#12AWG	2C#18 SHIELDED	3C#18 SHIELDED (OPTICON)	1C#6X44W	1C#6AWG BARE	12FR#12 INTERCON.		
1	2X3" PVC	90'	3	6	2	0	1	0		
2	3" PVC	10'	1	0	0	0	1	0		
3	2X3" PVC	45'	1	0	1	0	2	0		
4	2X3" PVC	45'	1	2	1	0	1	0		
5	3" PVC	30'	1	0	1	0	1	0		
6	3" PVC	10'	1	0	1	0	1	0		
7	2X3" PVC	90'	0	0	0	0	0	0		
8	3" PVC	10'	1	0	1	0	1	0		
9	2X3" PVC	45'	1	2	1	0	1	0		
10	2X3" PVC	65'	2	4	1	0	1	1		
11	3" PVC	20'	1	0	1	0	1	0		
12	2X3" PVC	10'	6	13	4	0	1	1		
13	3" PVC	10'	1	0	0	0	1	0		
14	3" PVC	10'	1	0	0	0	1	0		
15	2" RM	65'	0	0	0	3	0	0		



POLE NUMBER	A	B	C	D	E
T-1	5'	0	18'	11'	30'
T-3	7'	0	20'	11'	32'
T-4	4'	0	17'	11'	29'
T-6	1'	6'	10'	11'	28'

SIGNAL HEAD & POLE PLACEMENT DETAILS

THESE PLANS HAVE BEEN REVISED TO CONFORM WITH CONSTRUCTION RECORDS

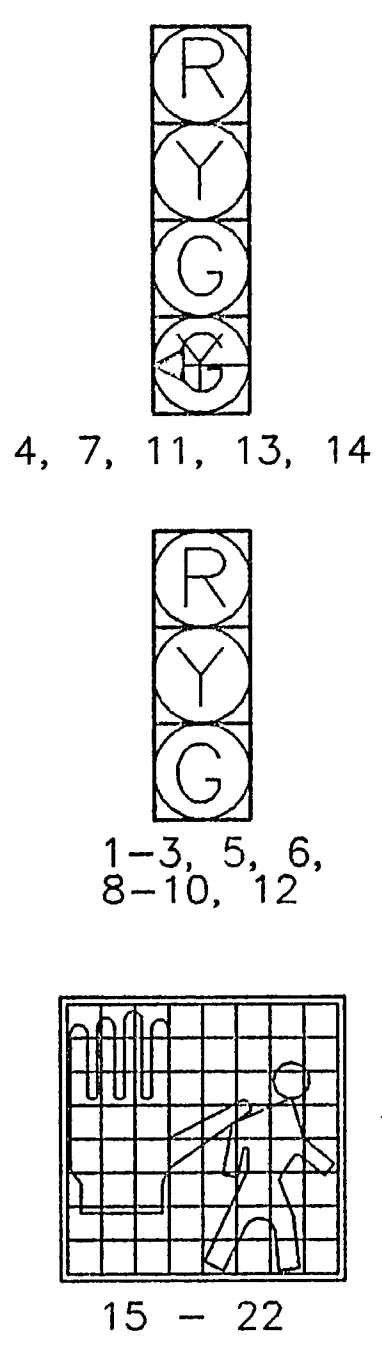
SIGNED *Tom Simerly*

DATE 10-28-92

CABLE TERMINATION CHART

CONDUCTOR COLOR	CABLE 1 FROM T-1 TO C-1	CABLE 2 FROM T-2 TO C-1	CABLE 3 FROM T-3 TO C-1	CABLE 4 FROM T-4 TO C-1	CABLE 5 FROM T-5 TO C-1	CABLE 6 FROM T-6 TO C-1	CABLE 7 FROM T-3 TO C-1	CABLE 8 FROM T-6 TO C-1
WHITE/BLK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
WHITE	SIGNAL COMMON	SIGNAL COMMON	SIGNAL COMMON	SIGNAL COMMON	SIGNAL COMMON	SIGNAL COMMON	SIGNAL COMMON	SIGNAL COMMON
RED	SH 1,2,3 R	SH 4 R	SH 5,6 R	SH 8,9,10 R	SH 11 R	SH 12,13 R	SH 7 R	SH 14 R
GREEN	SH 1,2,3 G	SH 4 G	SH 5,6 G	SH 8,9,10 G	SH 11 G	SH 12,13 G	SH 7 G	SH 14 G
ORANGE	SH 1,2,3 Y	SH 4 Y	SH 5,6 Y	SH 8,9,10 Y	SH 11 Y	SH 12,13 Y	SH 7 Y	SH 14 Y
BLACK	SPARE	SH 4 ✕	SPARE	SPARE	SH 11 ✕	SPARE	SH 7 ✕	SH 14 ✕
BLUE	SPARE	SH 4 ⚡	SPARE	SPARE	SH 11 ⚡	SPARE	SH 7 ⚡	SH 14 ⚡
RED/BLK	SPARE		SPARE	SPARE		SPARE		
GREEN/BLK	SPARE		SPARE	SPARE		SPARE		
ORANGE/BLK	PB COMMON		PB COMMON	PB COMMON		PB COMMON		
BLUE/BLK	ø2 PED CALL		ø6 PED CALL	ø6 PED CALL		ø2 PED CALL		
BLACK/WHT	SH 15 W		SH 18 W	SH 19 W		SH 22 W		
RED/WHT	SH 15 DW		SH 18 DW	SH 19 DW		SH 22 DW		
GREEN/WHT	ø8 PED CALL		ø8 PED CALL	ø4 PED CALL		ø4 PED CALL		
ORANGE/WHT	SH 16 W		SH 17 W	SH 20 W		SH 21 W		
BLUE/WHT	SH 16 DW		SH 17 DW	SH 20 DW		SH 21 DW		

NO.	TYPE
1	V3
2	V3
3	V3
4	V4LT
5	V3
6	V3
7	V4LT
8	V3
9	V3
10	V3
11	V4LT
12	V3
13	V3
14	V4LT
15	V3
16	V3
17	152 A
18	152 A
19	152 A
20	152 A
21	152 A
22	152 A



SIGNAL HEAD DETAILS

LOOP DETECTOR DETAILS

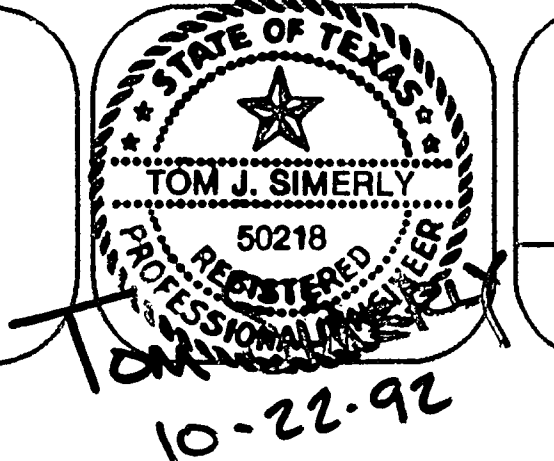
LOOP	DIMEN.	TURNS	AMPL.	PIN J	DELAY
D-1	6' X 60'	1 - 2 - 1	ø2-1	ø2G	10.0
D-2	6' X 60'	1 - 2 - 1	ø2-2	ø2G	-NA-
D-3	6' X 60'	1 - 2 - 1	ø2-3	ø2G	-NA-
D-4	6' X 60'	1 - 2 - 1	ø5	ø5G	10.0
D-5	6' X 60'	1 - 2 - 1	ø4-1	ø4G	10.0
D-6	6' X 60'	1 - 2 - 1	ø7-2	ø7G	-NA-
D-7	6' X 60'	1 - 2 - 1	ø7-1	ø7G	-NA-
D-8	6' X 60'	1 - 2 - 1	ø6-1	ø6G	10.0
D-9	6' X 60'	1 - 2 - 1	ø6-2	ø6G	-NA-
D-10	6' X 60'	1 - 2 - 1	ø6-3	ø6G	-NA-
D-11	6' X 60'	1 - 2 - 1	øT	ø1G	10.0
D-12	6' X 60'	1 - 2 - 1	ø8	ø8G	10.0
D-13	6' X 60'	1 - 2 - 1	ø3	ø3G	-NA-

NO.	DESCRIPTION	DATE	BY
1	FREE RIGHT TURN REVISION	8-6-92	T.J.S.
2	FIELD CHECKED REVISION	10-21-92	T.J.S.
3	MODIFIED FIELD CHECKED REVISION	10-22-92	T.J.S.

DUNAWAY ASSOCIATES, INC.

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(214) 748-6740
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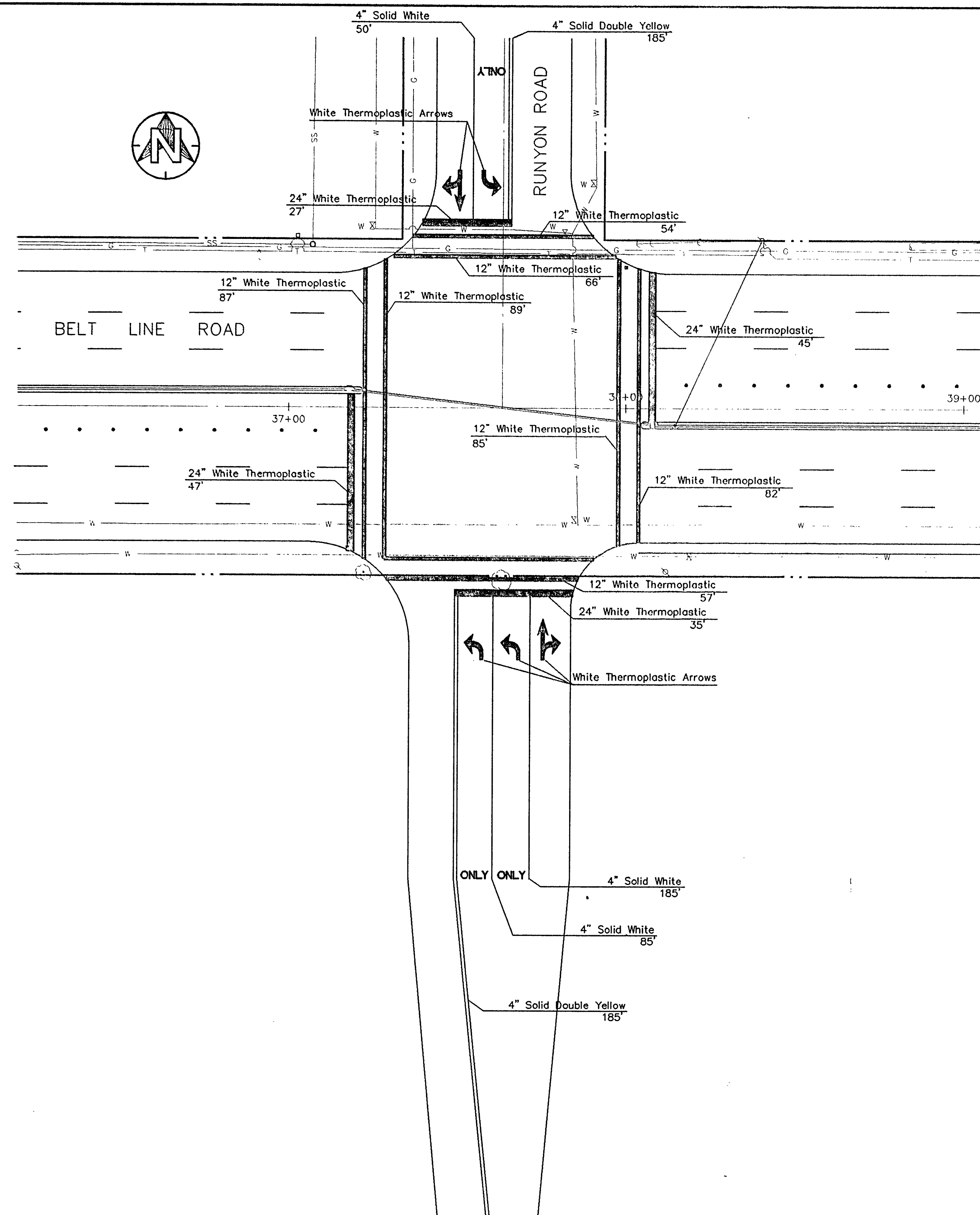
DESIGN BY: BDJ DATE: 2-14-92
DRAWN BY: SAM DATE: 2-14-92
CHECKED BY: BDJ DATE: 2-14-92
APPROVED BY: _____ DATE: _____



FIELD CHECKED SIGNAL LAYOUT
Scale: 1" = 20'

SHEET 6 OF 19
91268-06

10-22-92




10/28/92
 10:28:92
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 10:28:92

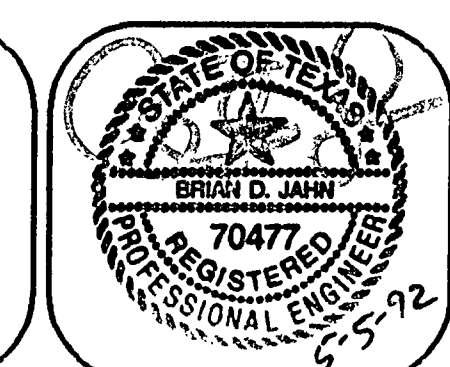
THESE PLANS HAVE BEEN
 REVISED TO CONFORM WITH
 CONSTRUCTION RECORDS
 BY **Tom Sinerly**
 DATE **10:28:92**

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES,
INC.

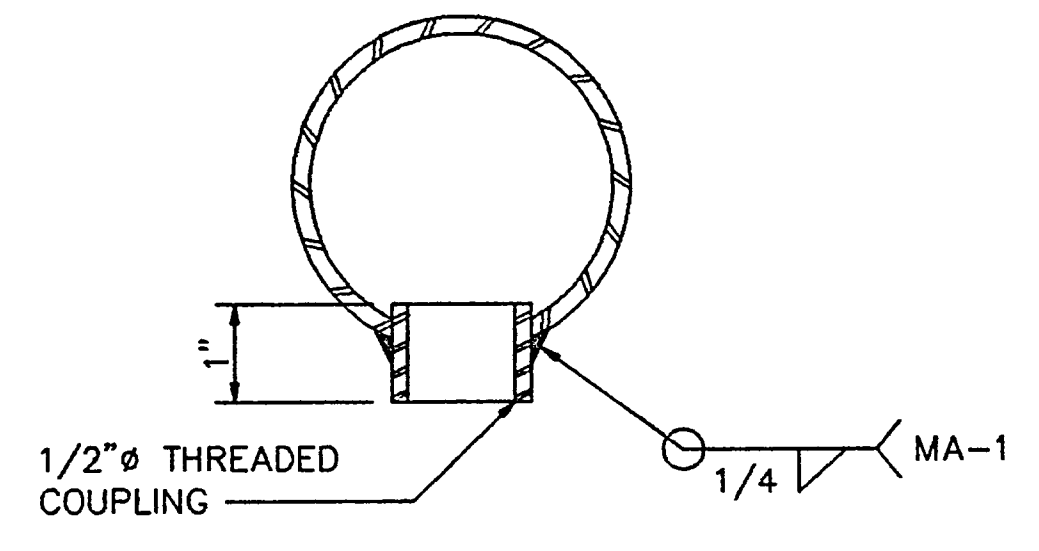

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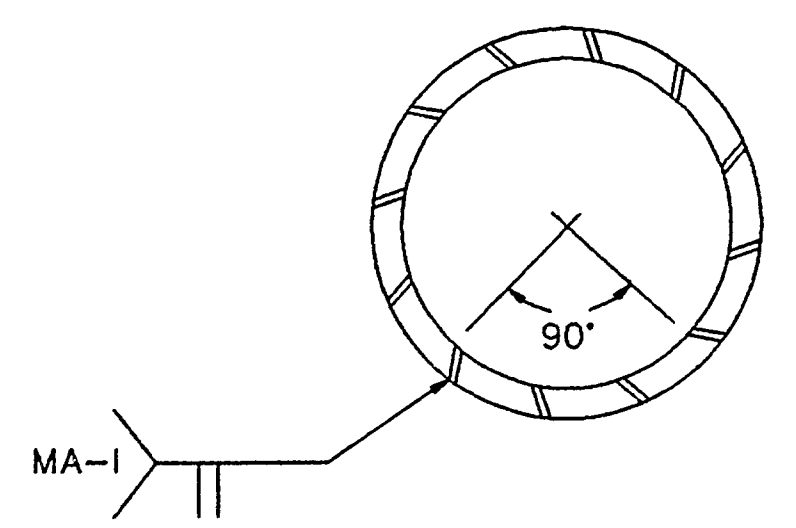


PAVEMENT MARKINGS
 Scale: 1" = 20'

SHEET
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 OF
 19
 91268-07

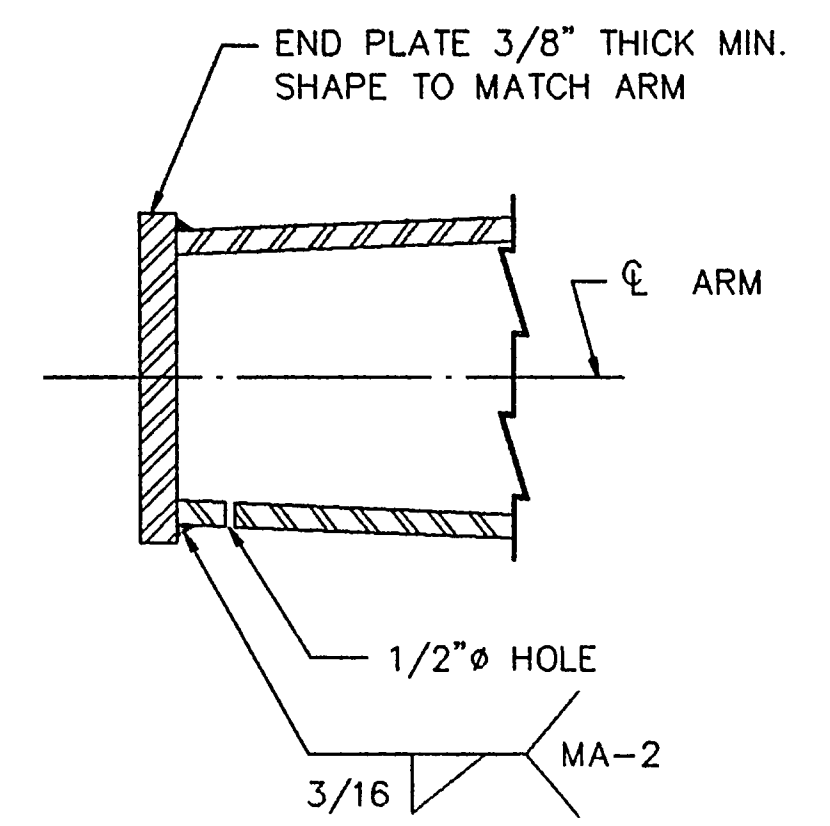


COUPLING DETAILS



LONGITUDINAL SEAM WELD MUST BE ORIENTED WITHIN THE LOWER 90° OF THE SIGNAL ARM.

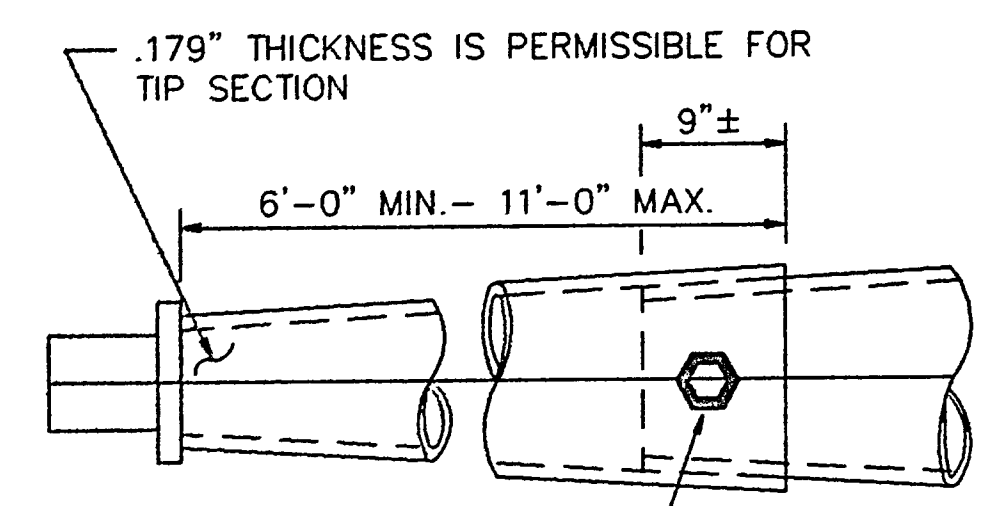
ARM WELD DETAIL



NOTE :

"POLE MANUFACTURER SHALL DRILL 1/2" HOLE IN BOTTOM OF MAST ARM AT END PLATE" (FOR HOT-DIP GALVANIZING)

PLATE WELD DETAIL



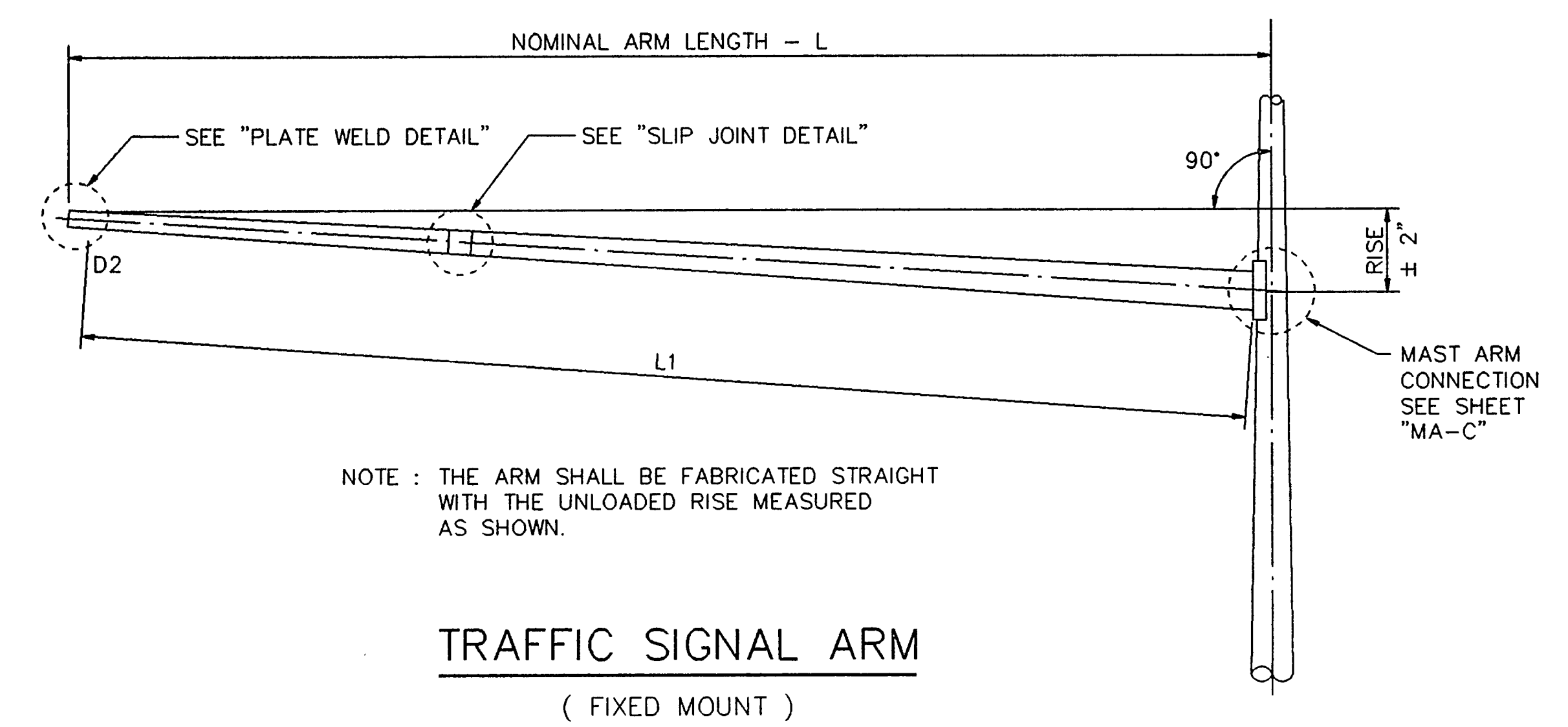
MIN. LAP EQUALS 1.5 TIMES FEMALE I.D.

NOTE :

A SLIP JOINT IS PERMISSIBLE FOR ARMS 40' AND GREATER IN LENGTH. THE SLIP JOINT SHALL BE MADE IN THE SHOP, BUT MAY BE MATCH MARKED AND SHIPPED DISASSEMBLED.

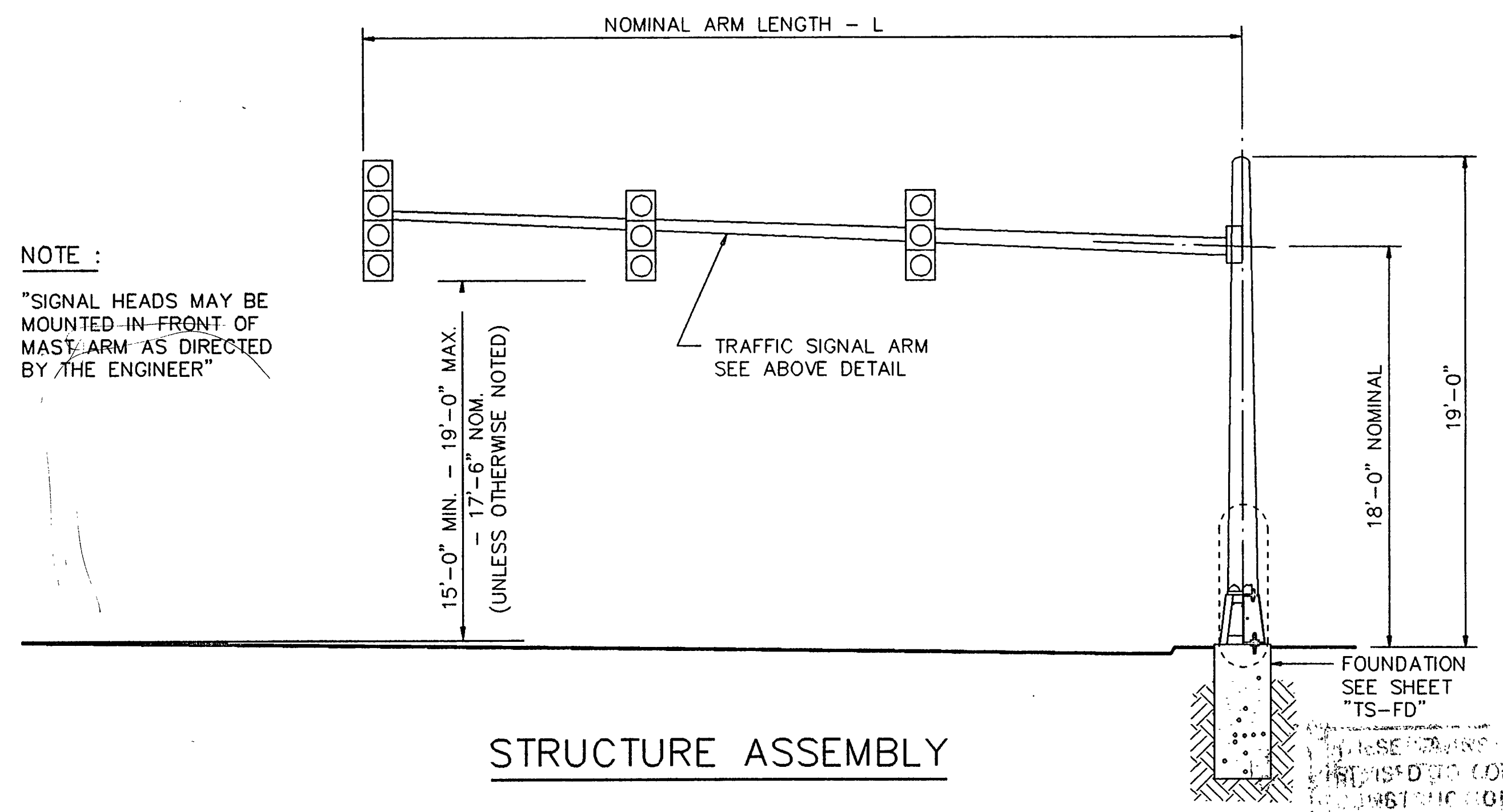
4-3/4" Ø HOLES AND 1-5/8" Ø GALV. A307 BOLT. TACK WELD NUT TO THREAD PROJECTION AFTER MAKING JOINT. REPAIR DAMAGED GALVANIZING IN ACCORDANCE WITH THE SPECIFICATIONS.

SLIP JOINT DETAILS



NOTE : THE ARM SHALL BE FABRICATED STRAIGHT WITH THE UNLOADED RISE MEASURED AS SHOWN.

TRAFFIC SIGNAL ARM (FIXED MOUNT)



NOTE :

"SIGNAL HEADS MAY BE MOUNTED IN FRONT OF MAST ARM AS DIRECTED BY THE ENGINEER"

STRUCTURE ASSEMBLY

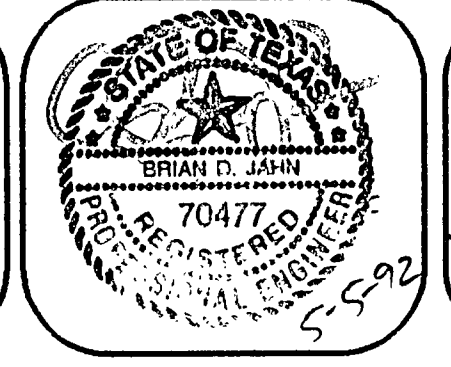
THESE DRAWINGS HAVE BEEN PREPARED TO CONFORM WITH THE LATEST EDITIONS OF THE AIAA ENGINEERING RECORD.
Tom Simony
 10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES, INC.

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DESIGN BY: BDJ DATE: 2-14-92
 DRAWN BY: SAM DATE: 2-14-92
 CHECKED BY: BDJ DATE: 2-14-92
 APPROVED BY: DATE:



SINGLE MAST ARM ASSEMBLIES
 (80 MPH WIND ZONE)
 Scale : NONE
 Page 1 of 2

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 19
 91268-09

ARM LENGTH	ROUND POLES			FOUNDATION TYPE
	D8	D19	# THK.	
FT.	IN.	IN.	IN.	
20	10.0	7.5	.179	30-A
24	11.0	8.5	.179	30-A
28	11.5	9.0	.179	30-A
32	12.0	9.5	.179	30-A
36	12.5	10.0	.179	30-A
40	12.0	9.5	.239	30-B
44	12.5	10.0	.239	30-B
48	13.0	10.5	.239	30-B

ARM LENGTH	ROUND ARMS				
	L1	D1	D2	# THK.	RISE
FT.	FT.	IN.	IN.	IN.	
20	19.1	6.5	3.8	.179	1'-9"
24	23.1	7.5	4.3	.179	1'-10"
28	27.1	8.0	4.2	.179	1'-11"
32	31.0	9.0	4.7	.179	2'-1"
36	35.0	9.5	4.6	.179	2'-4"
40	39.0	9.5	4.1	.239	2'-8"
44	43.0	10.0	4.1	.239	2'-11"
48	47.0	10.5	4.1	.239	3'-4"

D8 = POLE BASE O.D.
D19= POLE TOP O.D. W/OUT LUMINAIRE
D1 = ARM BASE O.D.
D2 = ARM END O.D.
L1 = SHAFT LENGTH
L = NOMINAL ARM LENGTH
THICKNESS SHOWN ARE MINIMUMS, THICKER MATERIALS MAY BE USED.

SHIPPING PARTS LIST

SHIPPING PARTS LIST						
POLES						
NOMINAL ARM LENGTH	19' POLES WITHOUT LUMINAIRE					
	SHIP EACH POLE WITH THE FOLLOWING HARDWARE ATTACHED : ENLARGED HAND HOLE, POLE CAP, FIXED ARM CONNECTION BOLTS AND WASHERS.					
FT.	DESIGNATION	QUANTITY	DESIGNATION	QUANTITY	DESIGNATION	QUANTITY
20	20-80					
24	24-80					
28	28-80					
32	32-80					
36	36-80					
40	40-80					
44	44-80					
48	48-80					
TRAFFIC SIGNAL ARMS 1 PER POLE						
NOMINAL ARM LENGTH	TYPE I ARM (1 SIGNAL)		TYPE II ARM (2 SIGNAL)		TYPE III ARM (3 SIGNAL)	
	SHIP EACH TYPE I ARM WITH THE FOLLOWING HARDWARE ATTACHED : 1 CGB CONNECTOR		SHIP EACH TYPE II ARM WITH THE FOLLOWING HARDWARE ATTACHED : 1 BRACKET ASSEMBLY AND 2 CGB CONNECTOR		SHIP EACH TYPE III ARM WITH THE FOLLOWING HARDWARE ATTACHED : 2 BRACKET ASSEMBLY AND 3 CGB CONNECTOR	
FT.	DESIGNATION	QUANTITY	DESIGNATION	QUANTITY	DESIGNATION	QUANTITY
20	20 I -80		20 II -80			
24	24 I -80		24 II -80			
28	28 I -80		28 II -80		28 III -80	
32			32 II -80		32 III -80	
36			36 II -80		36 III -80	
40					40 III -80	
44					44 III -80	
48					48 III -80	
ANCHOR BOLT ASSEMBLIES 1 PER POLE						
ANCHOR BOLT DIAMETER	ANCHOR BOLT LENGTH	EACH ANCHOR BOLT ASSEMBLY CONSISTS OF THE FOLLOWING: TOP AND BOTTOM TEMPLATES, 4 ANCHOR BOLTS, 8 NUTS, 8 FLAT WASHERS, 4 LOCK WASHERS AND 4 NUT ANCHOR DEVICES (TYPE 2) PER STANDARD DRAWING 10.				
		QUANTITY	TEMPLATES MAY BE REMOVED FOR SHIPMENT.			
1-1/2"	3'-4"					
1-3/4"	3'-10"					

* SUPPLY "OPTION A" UNLESS OTHERWISE NOTED.

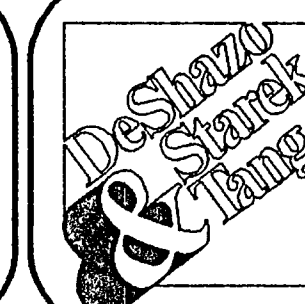
GENERAL NOTES :

DESIGN CONFORMS TO 1975 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS AND INTERIM SPECIFICATIONS THERETO. DESIGN WIND SPEED EQUALS 80 MPH PLUS A 1.3 GUST FACTOR.
THE SPECIFIED LUMINAIRE LOAD APPLIED AT THE END OF THE LUMINAIRE ARM EQUALS 75 LBS. VERTICAL DEAD LOAD PLUS THE HORIZONTAL WIND LOAD ON AN EFFECTIVE PROJECTED AREA OF 1.5 SQ.FT. THE SPECIFIED SIGNAL LOAD APPLIED AT THE END OF THE TRAFFIC SIGNAL ARM EQUALS 180 LBS. VERTICAL DEAD LOAD PLUS THE HORIZONTAL WIND LOAD ON AN EFFECTIVE PROJECTED AREA OF 32.4 SQ.FT. (ACTUAL AREA TIMES DRAG COEFFICIENT).
FABRICATION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND WITH THE DETAILS, DIMENSIONS, AND WELD PROCEDURES SHOWN HEREIN. WELD REFERENCES CALL FOR PREAPPROVED WELD PROCEDURES WHICH THE FABRICATOR MUST OBTAIN PRIOR TO FABRICATION. MISCELLANEOUS WELDS WHICH DO NOT CALL FOR PREAPPROVED WELD PROCEDURES ARE NEVERTHELESS SUBJECT TO REJECTION FOR POOR WORKMANSHIP, MATERIALS, FABRICATION TOLERANCES, AND SHIPPING PRACTICES SHALL MEET THE REQUIREMENTS OF THIS SHEET AND THE SPECIFICATIONS.
UNLESS OTHERWISE NOTED, ALL PARTS SHALL BE GALVANIZED IN ACCORDANCE WITH THE SPECIFICATIONS.
SPECIAL DESIGNS REQUIRE SUBMISSION OF SHOP DRAWINGS IN ACCORDANCE WITH THE ITEM "STEEL STRUCTURES".
ALL MAST ARMS 35' AND GREATER IN LENGTH SHALL HAVE DAMPENING PLATES INSTALLED.

THESE PLANS HAVE BEEN REVISION TO CONFORM WITH THE RECORDS
Tom Simery
DATE 10-28-92

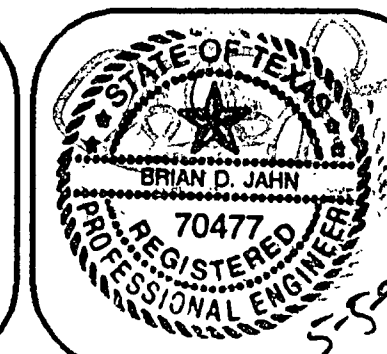
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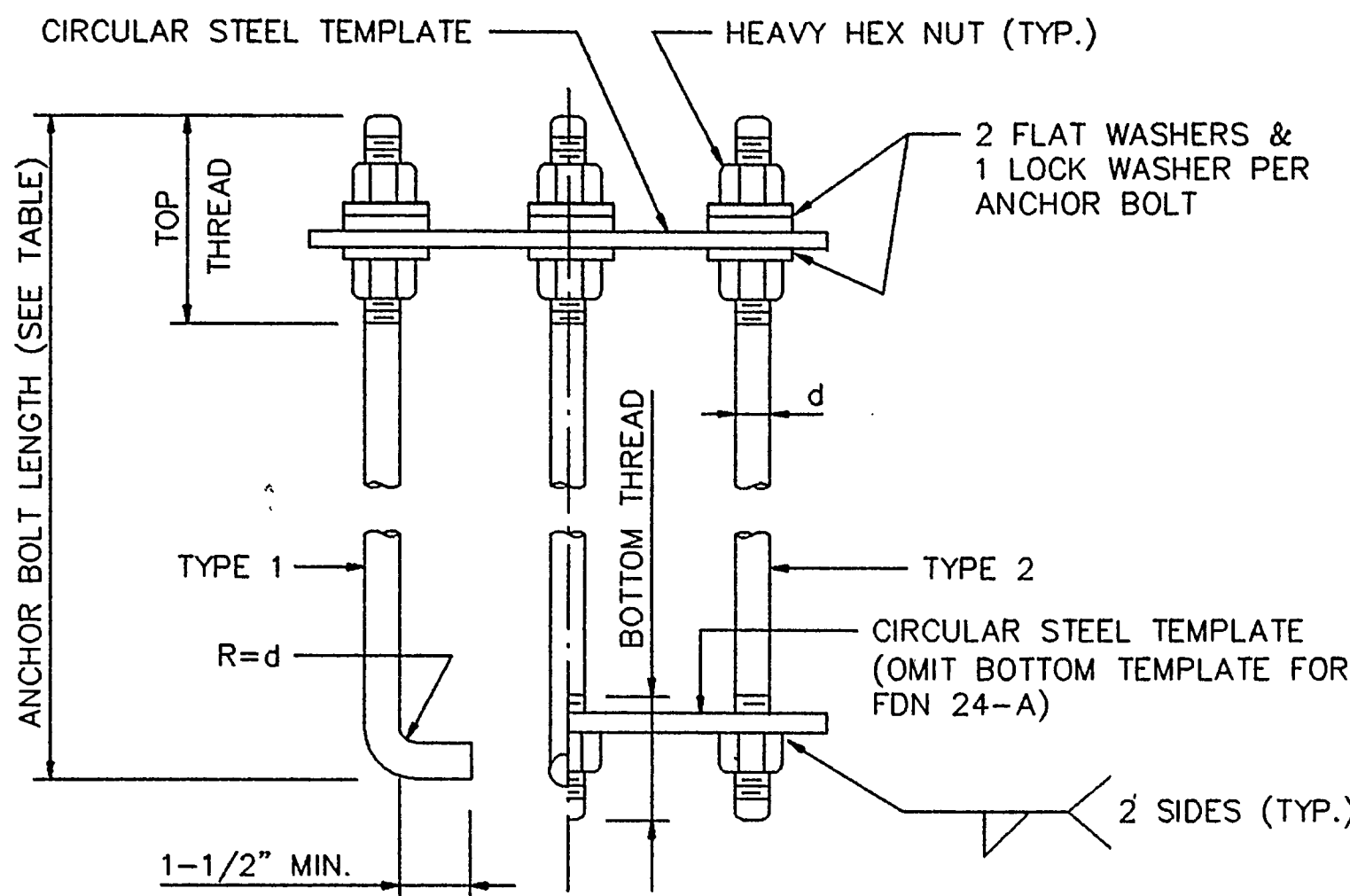
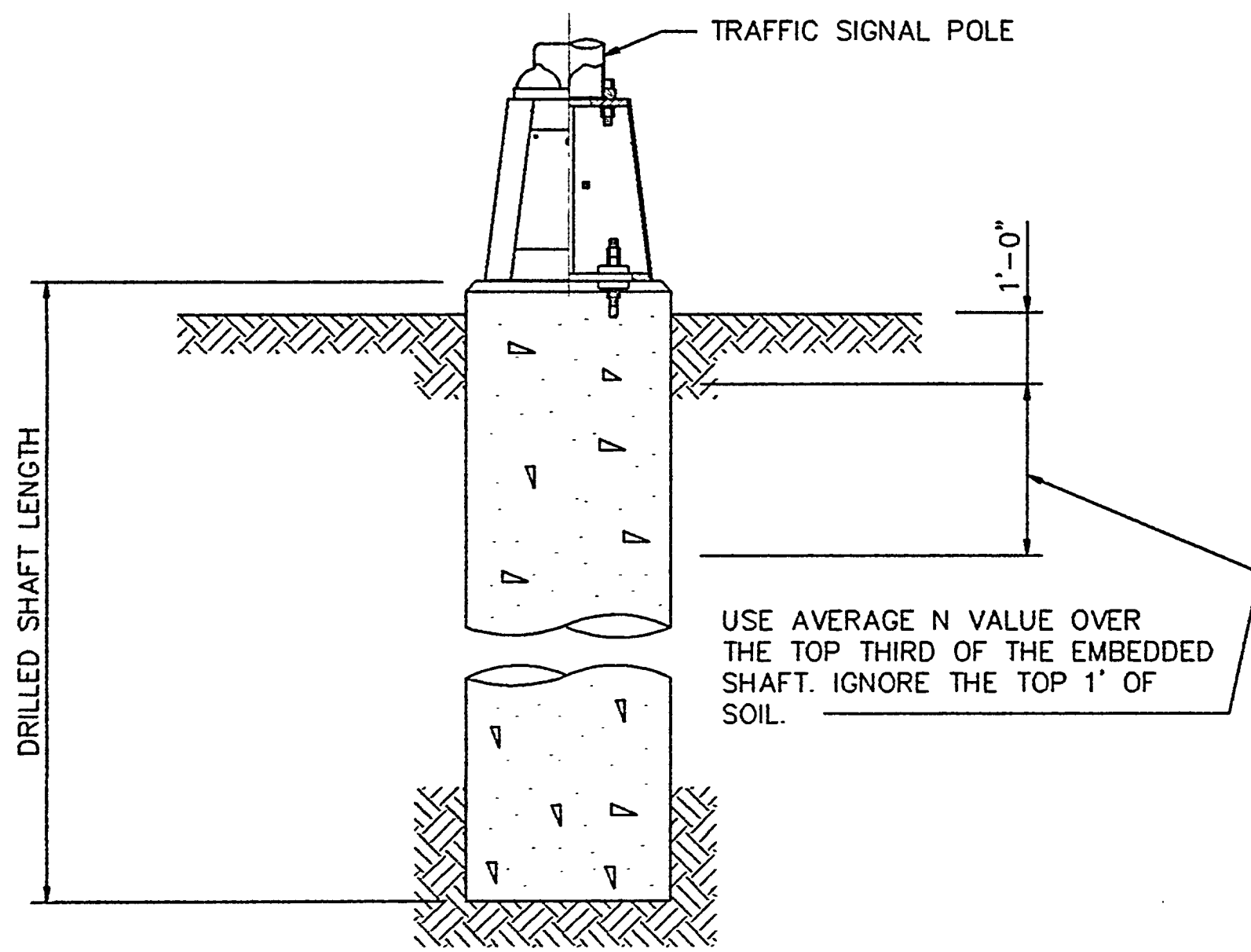
DESIGN BY: BDJ DATE: 2-14-92
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SINGLE MAST ARM ASSEMBLIES
(80 MPH WIND ZONE)

Scale : NONE
Page 2 of 2

SHEET
10
OF
19
91268-10



HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

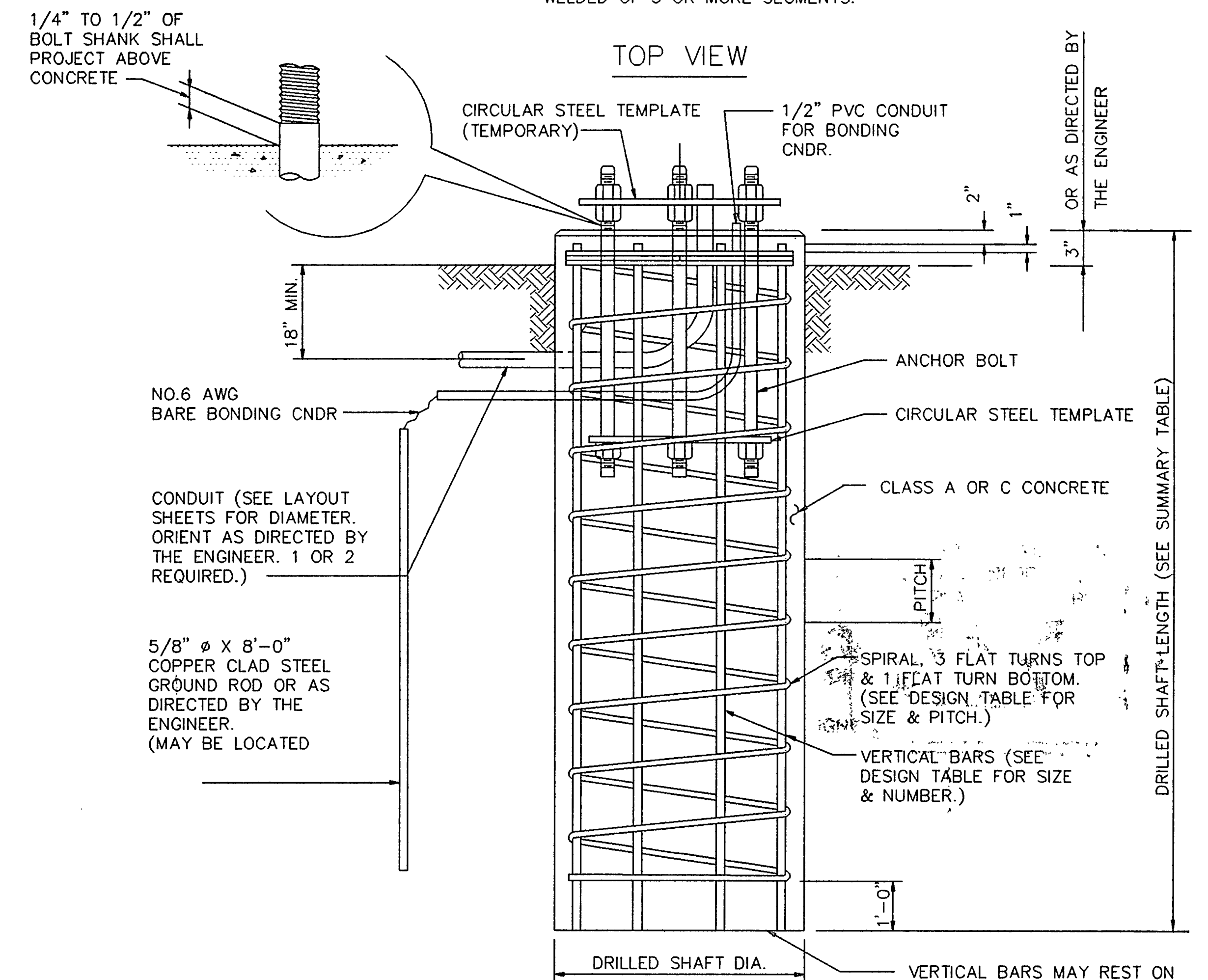
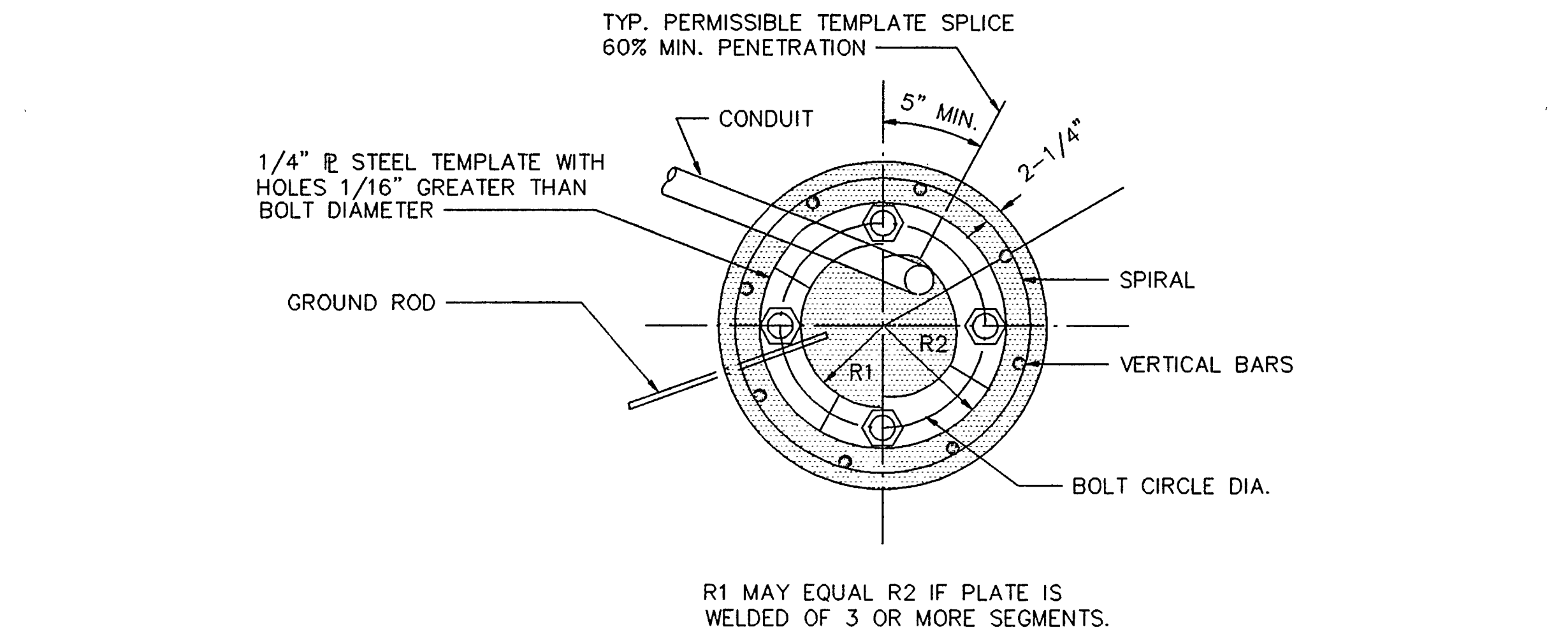
ANCHOR BOLT ASSEMBLY

INSTALLATION PROCEDURE :

THREADS OF ANCHOR BOLTS SHALL BE COATED WITH PIPE JOINT COMPOUND PRIOR TO INSTALLATION OF UPPER NUTS WHEN ERECTING POLE. AFTER POLE IS PLUMBED AND IN PERMANENT ALIGNMENT, THE EXPOSED THREADS OF PAINTED BOLTS SHALL BE CLEANED AND AN ADDITIONAL COATING OF ZINC-RICH PAINT APPLIED TO SEAL THE BOLT THREAD-NUT JOINT.

NOTES :

- (1) ANCHOR BOLT DESIGN DEVELOPS THE FOUNDATION CAPACITY GIVEN UNDER FOUNDATION DESIGN LOADS.
- (2) FOUNDATION DESIGN LOADS ARE THE ALLOWABLE MOMENTS AND SHEARS AT THE BASE OF THE STRUCTURE.
- (3) FOUNDATIONS MAY BE LISTED SEPARATELY OR GROUPED ACCORDING TO SIMILARITY OF LOCATION AND TYPE. QUANTITIES ARE FOR THE CONTRACTOR'S INFORMATION ONLY.
- (4) FIELD PENETROMETER READINGS AT A DEPTH OF APPROXIMATELY 3 TO 5 FEET MAY BE USED TO ADJUST SHAFT LENGTHS.
- (5) IF ROCK IS ENCOUNTERED, THE DRILLED SHAFT SHALL EXTEND A MINIMUM OF TWO DIAMETERS INTO SOLID ROCK.
- (6) DECIMAL LENGTHS IN DESIGN TABLE ARE TO ALLOW INTERPOLATION FOR OTHER PENETROMETER VALUES. ROUND TO NEAREST FOOT FOR ENTRY INTO SUMMARY TABLE.



ELEVATION FOUNDATION DETAILS

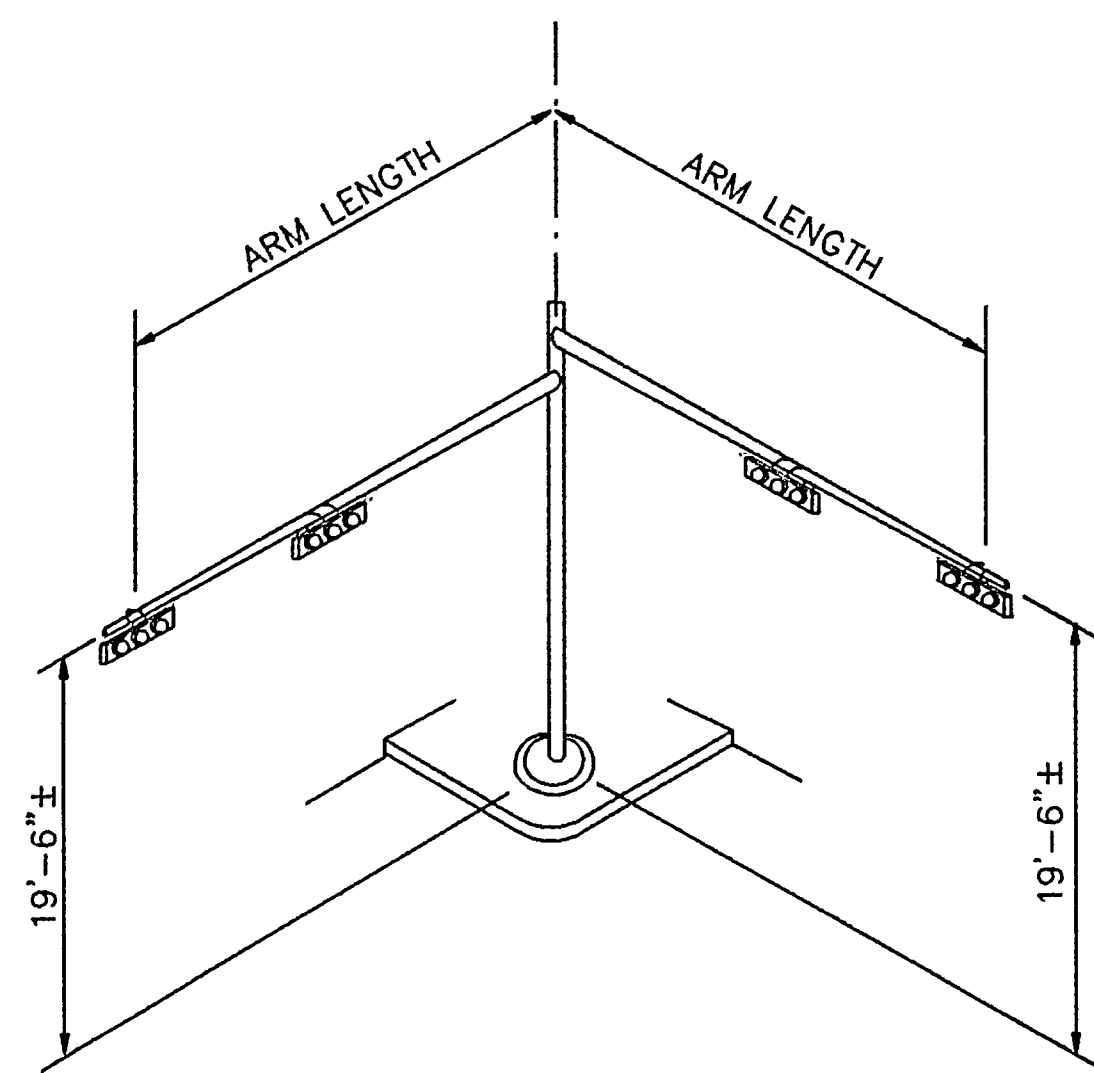
THESE PLANS HAVE BEEN REVIEWED TO CONFORM WITH CONSTRUCTION RECORDS

SIGNED *Tom Summey*

DATE 10-28-92

ANCHOR BOLT & TEMPLATE SIZES						
BOLT DIAMETER	BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
3/4"	1'-6"	3"	-	12-3/4"	7-1/8"	5-5/8"
1-1/2"	3'-4"	6"	2"	17"	10"	7"
1-3/4"	3'-10"	7"	2-1/4"	19"	11-1/8"	7-3/4"
2"	4'-3"	8"	2-1/2"	21"	12-1/2"	8-1/2"

* MINIMUM DIMENSIONS GIVEN, LONGER BOLTS ARE ACCEPTABLE.



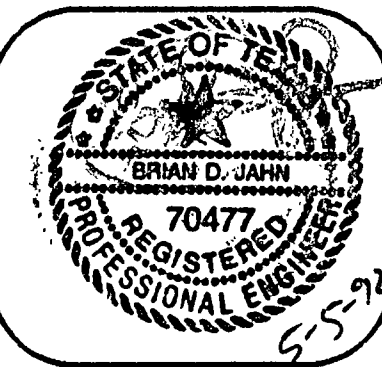
TYPICAL MAST ARM ASSEMBLY

REVISIONS			
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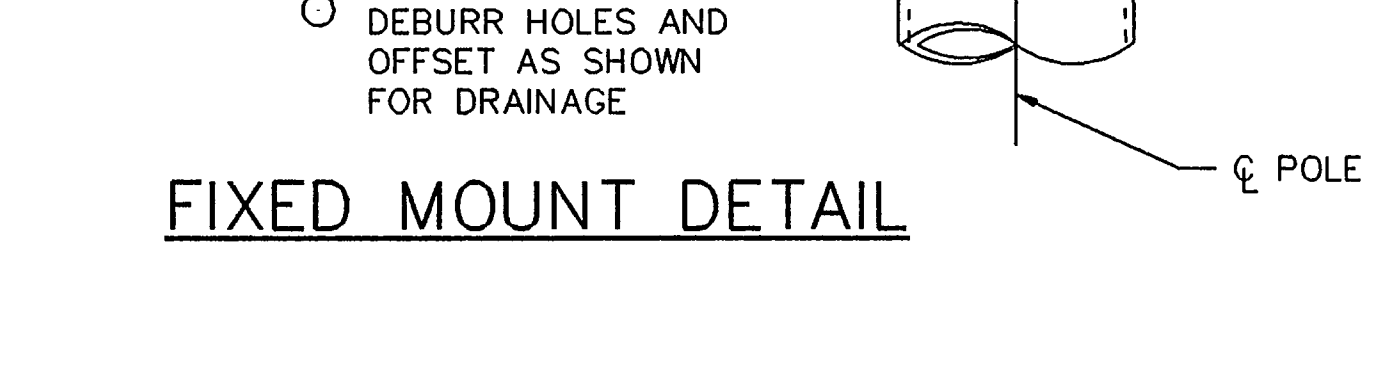
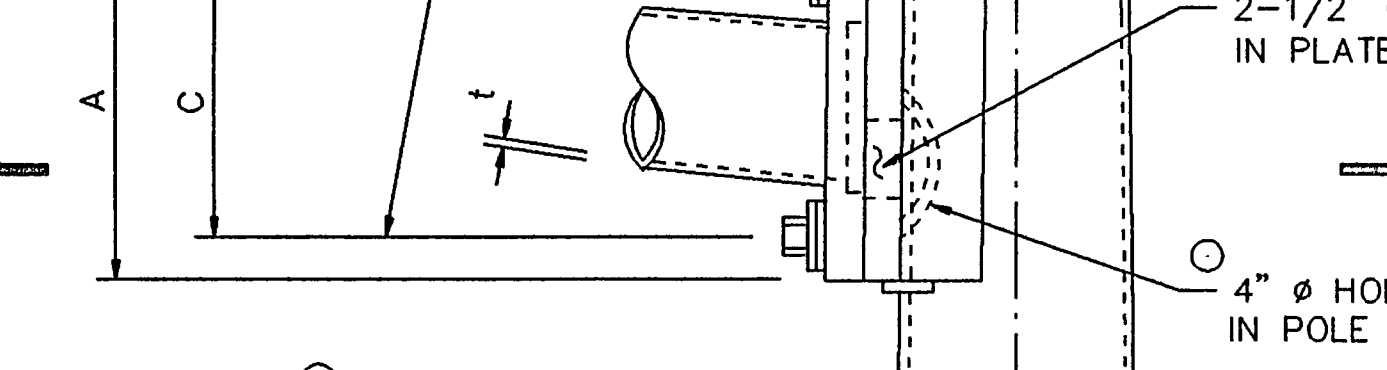
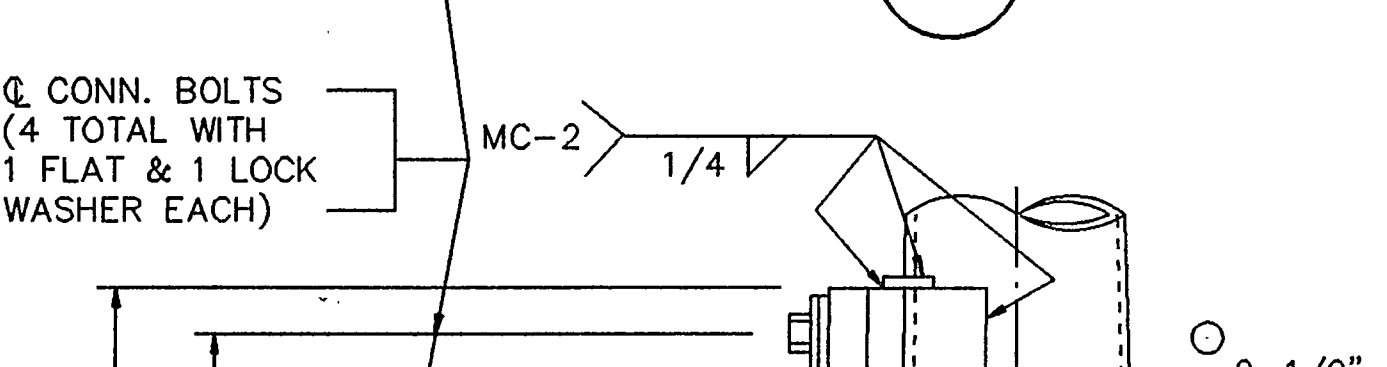
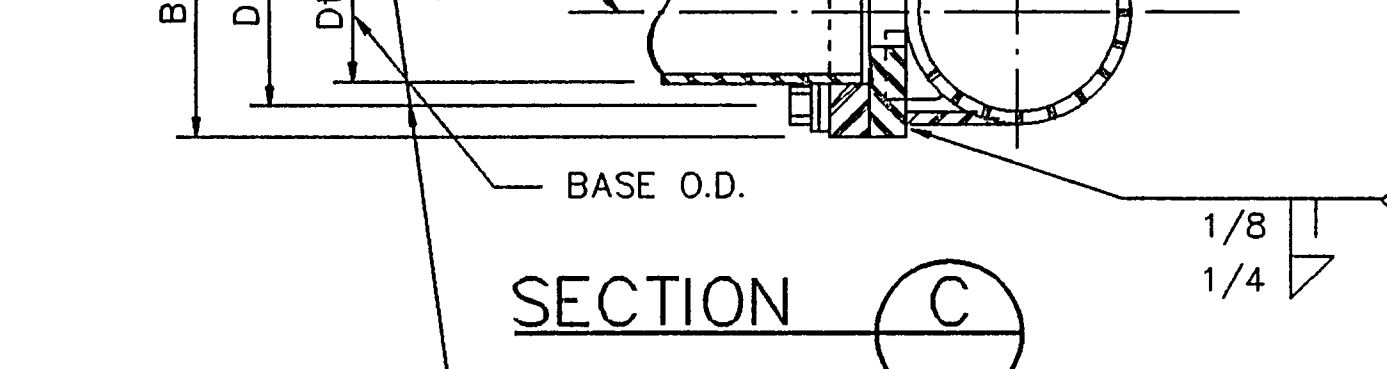
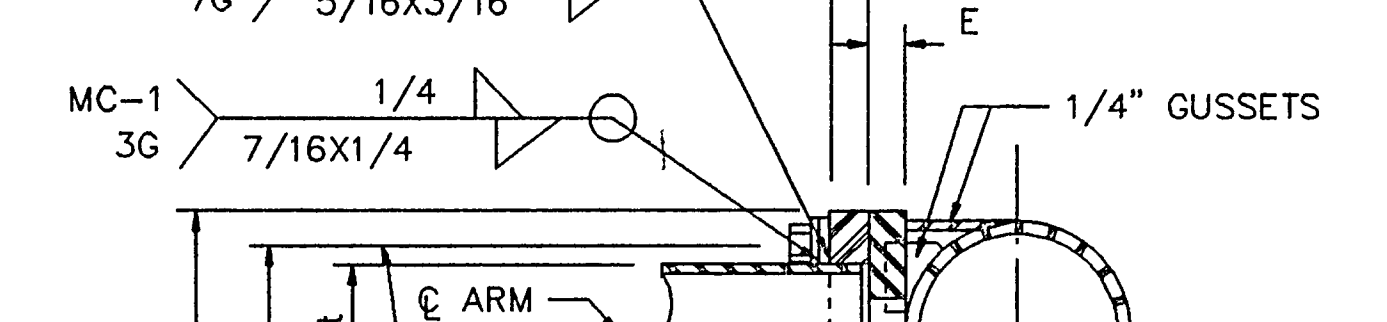
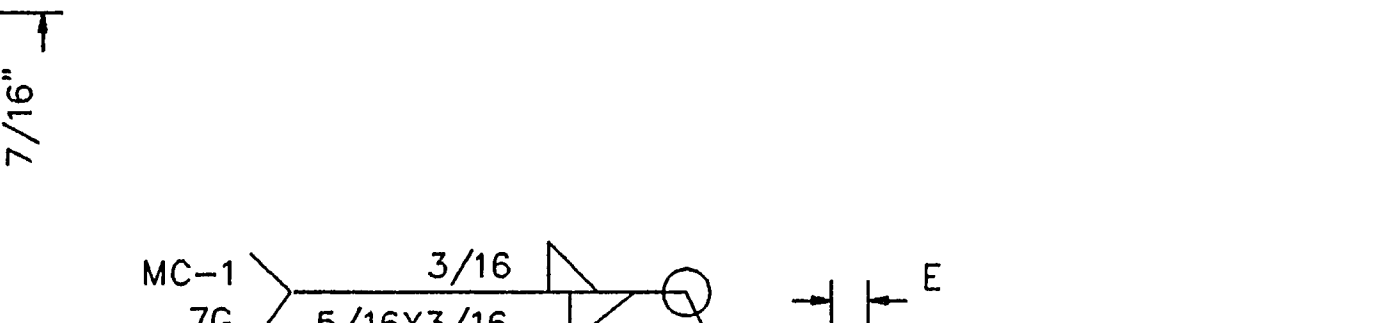
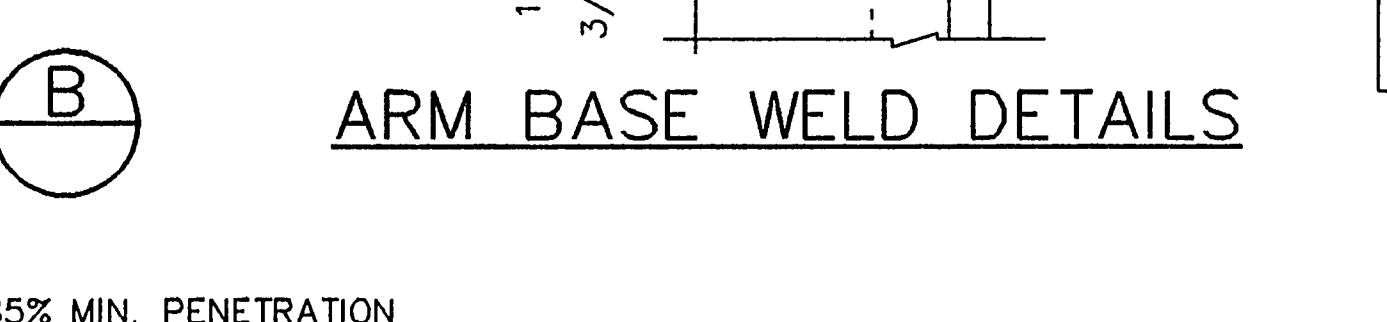
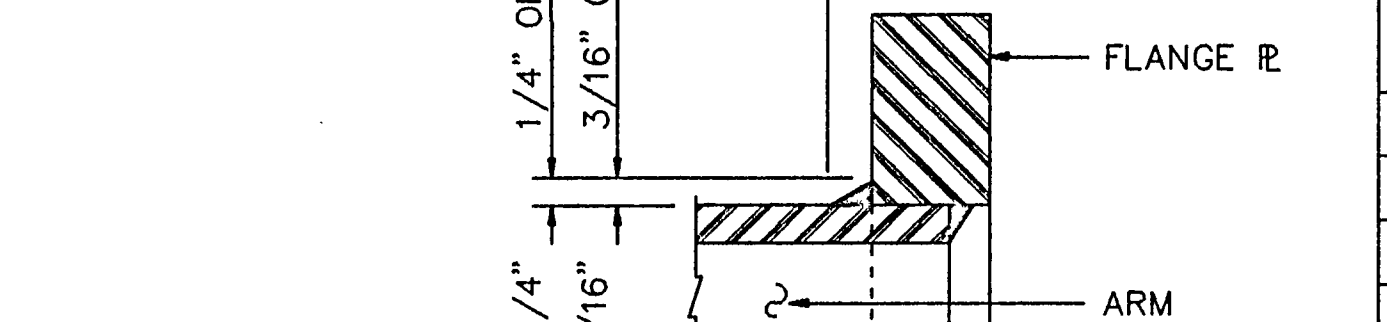
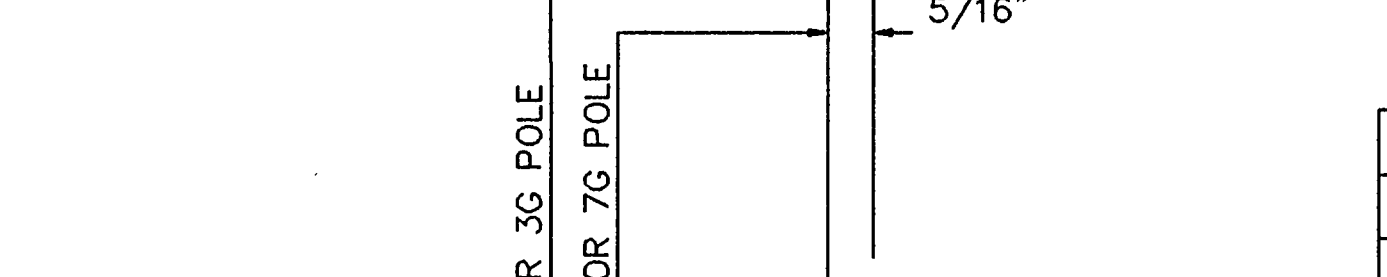
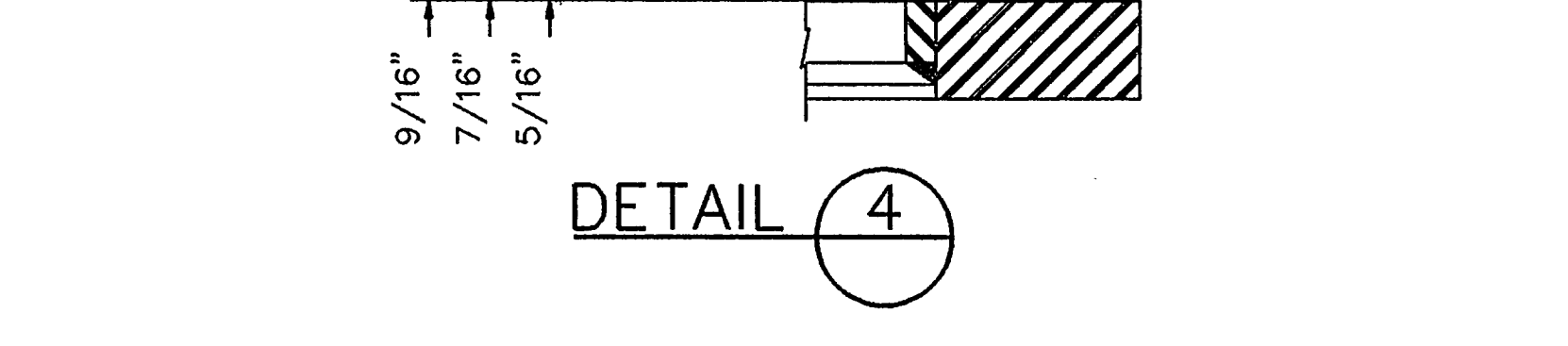
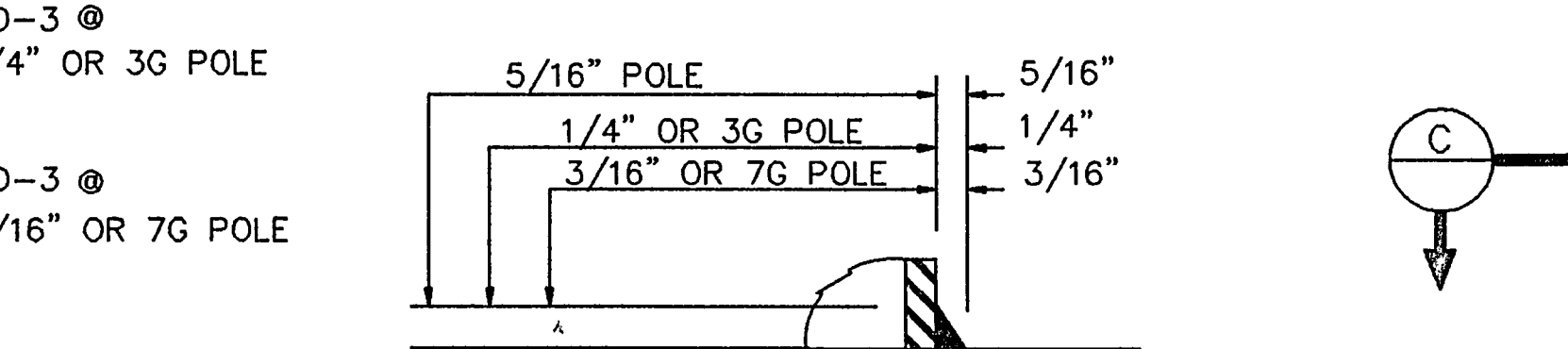
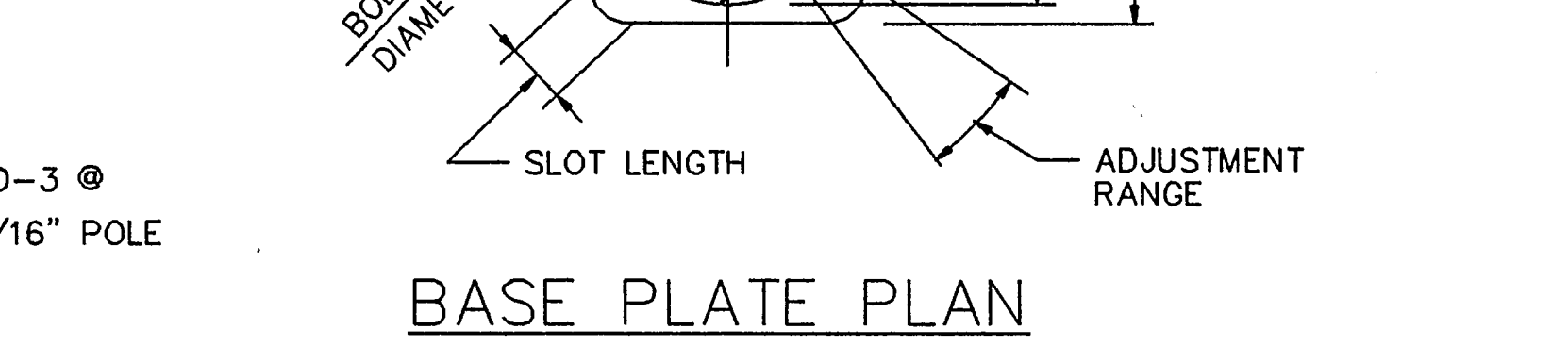
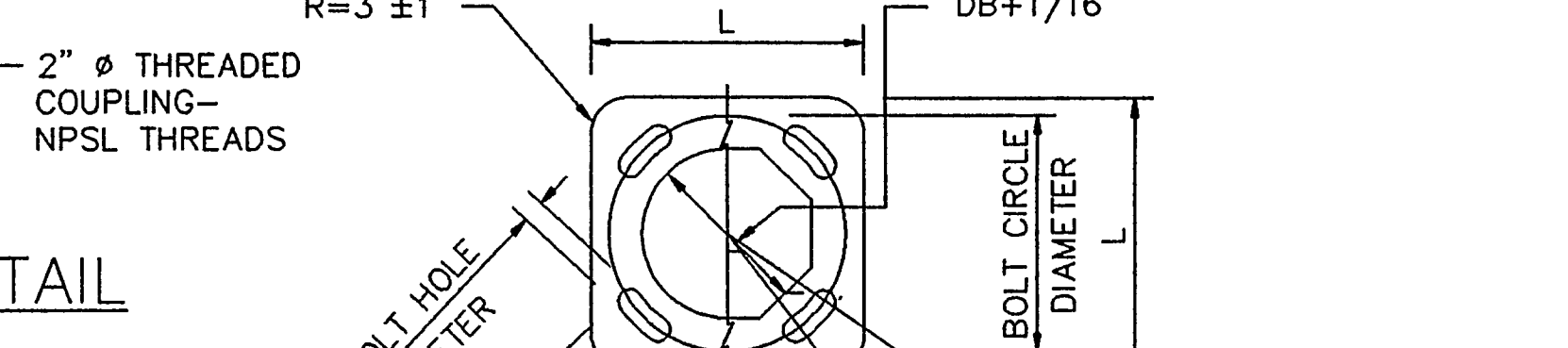
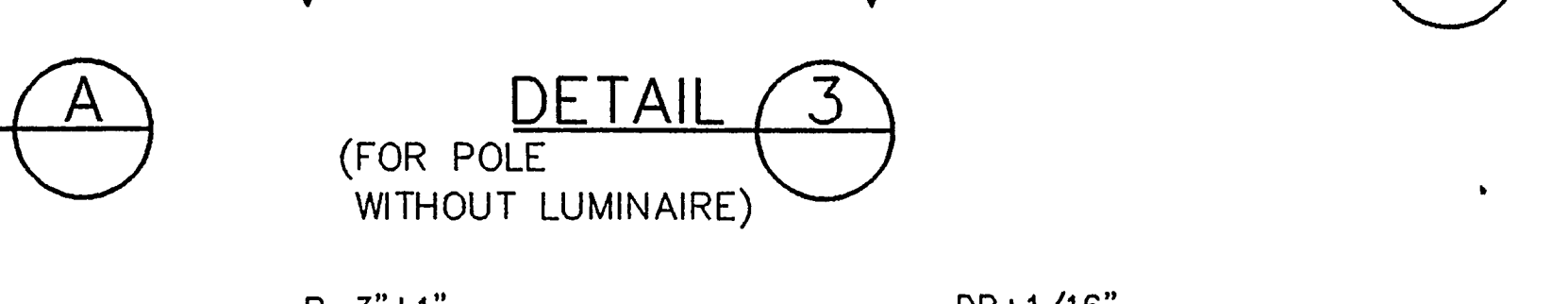
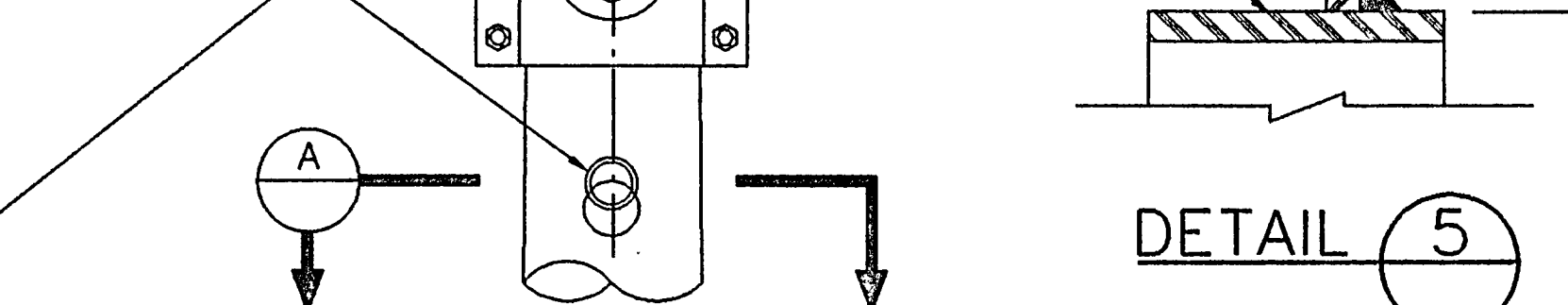
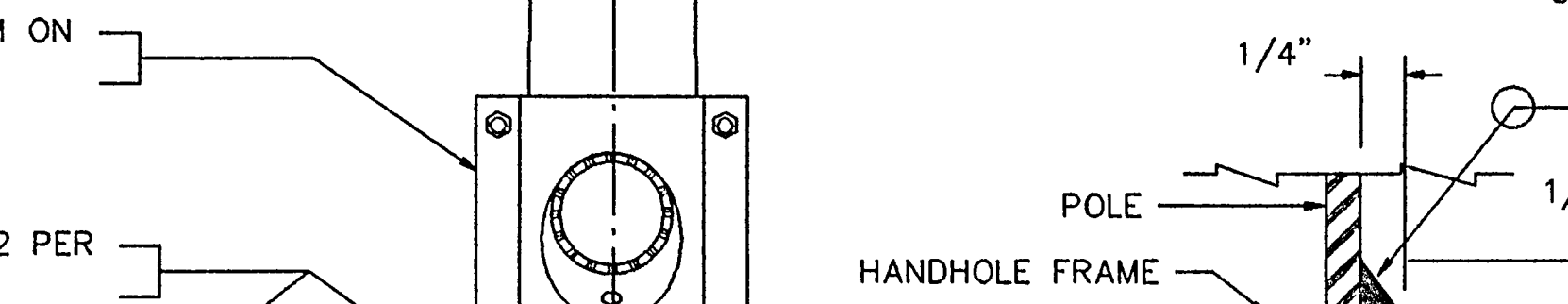
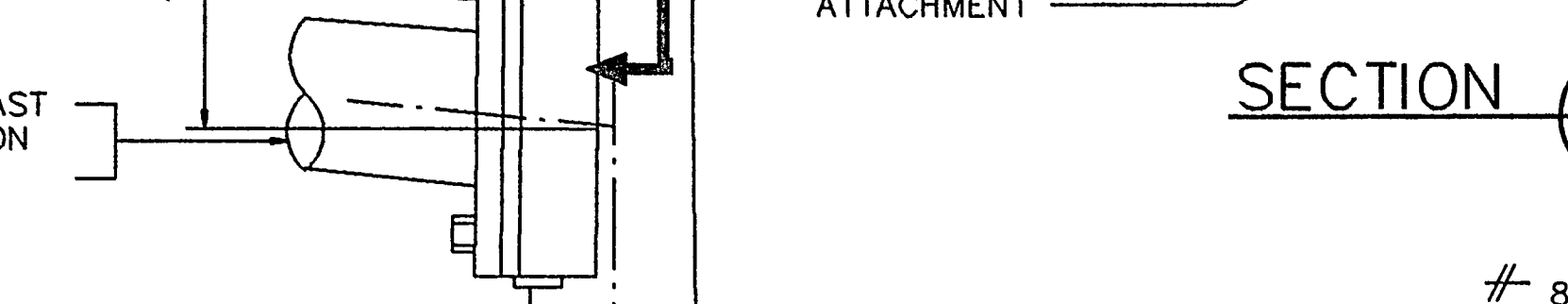
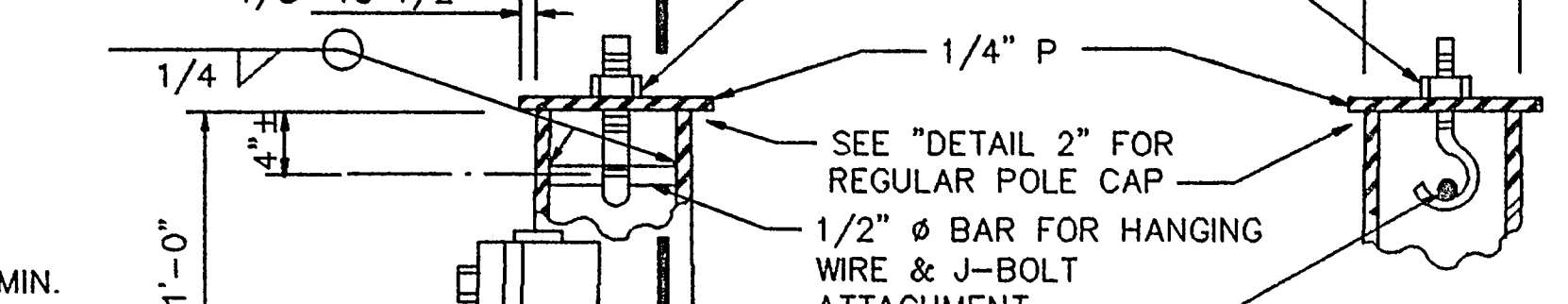
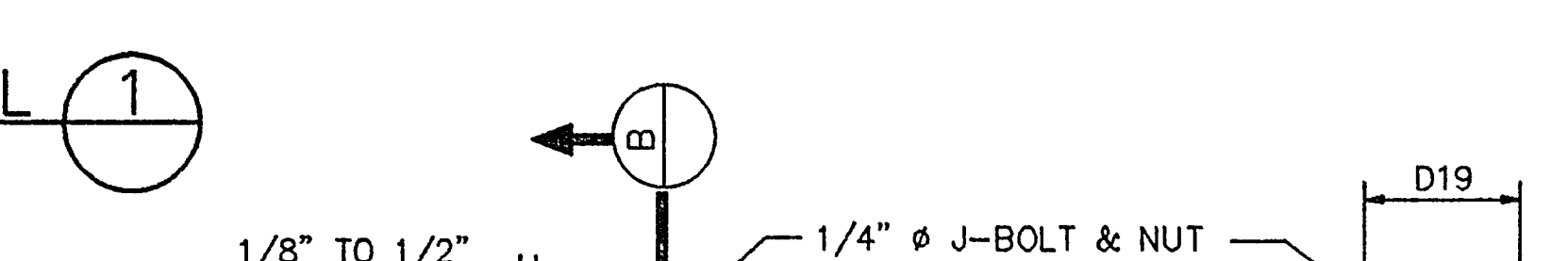
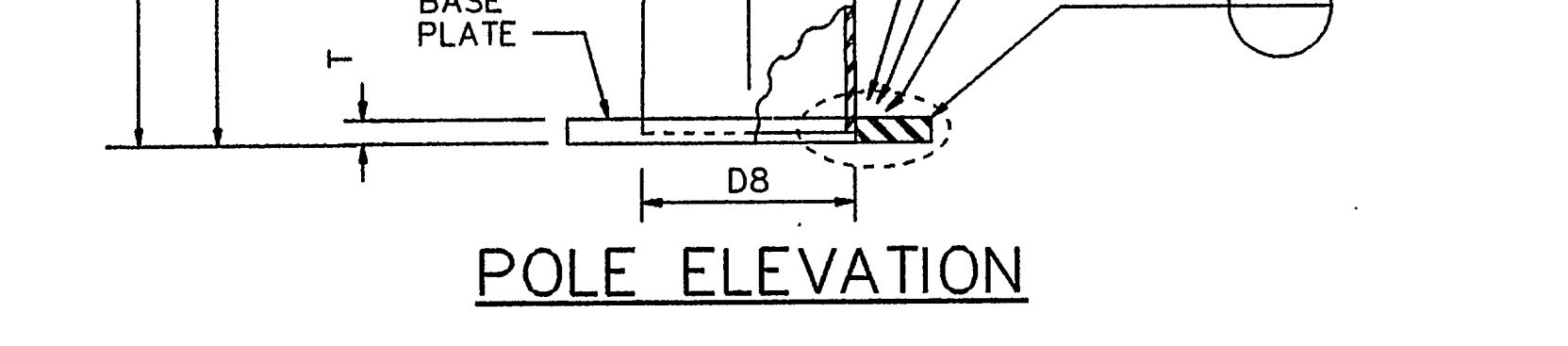
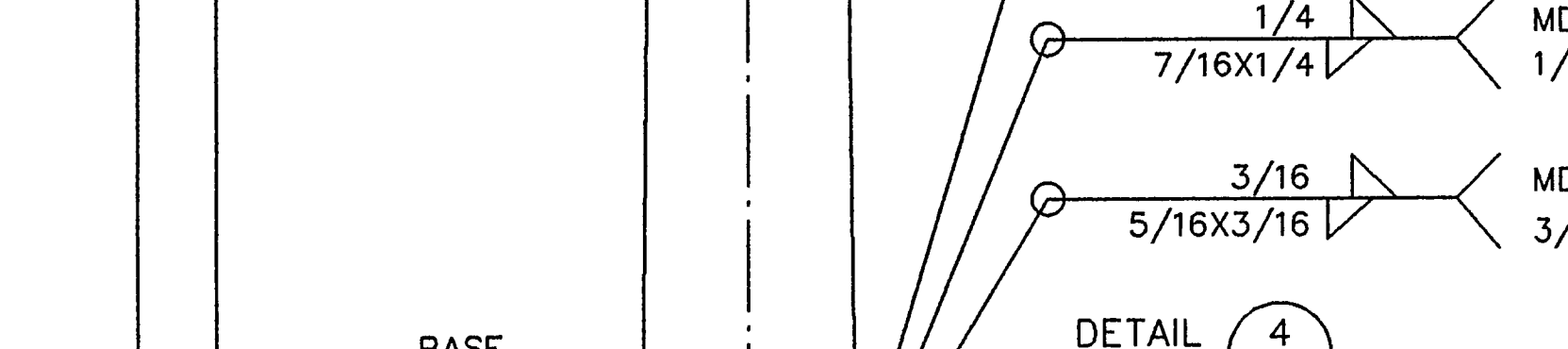
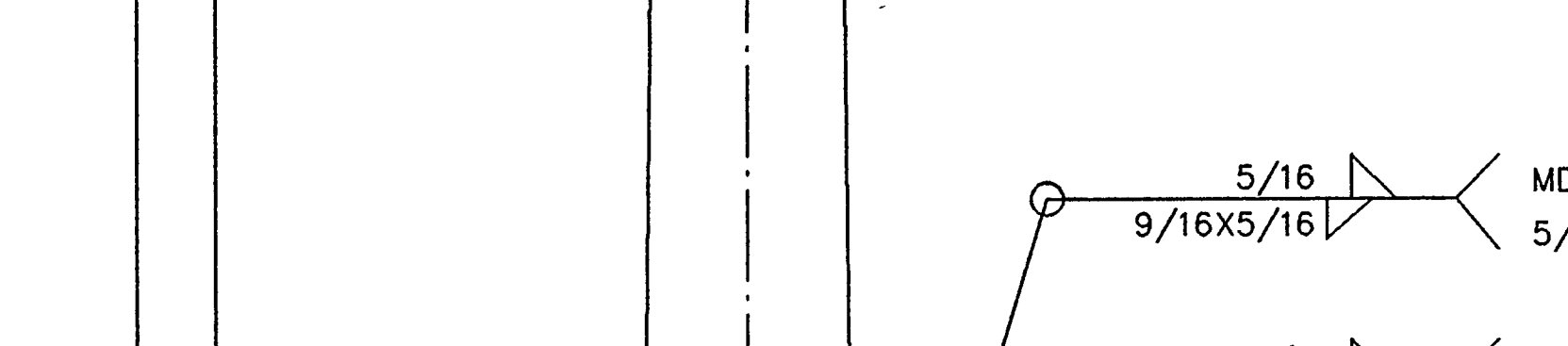
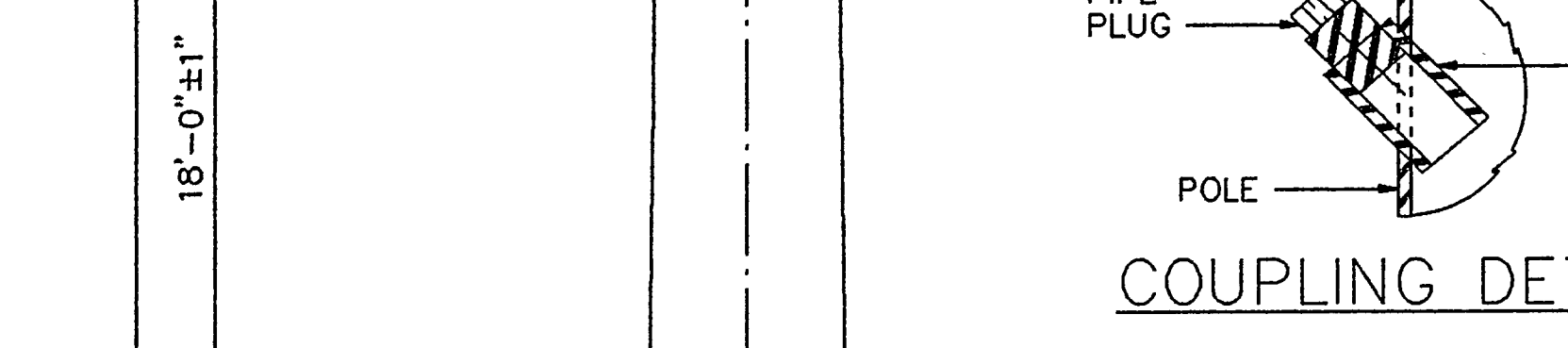
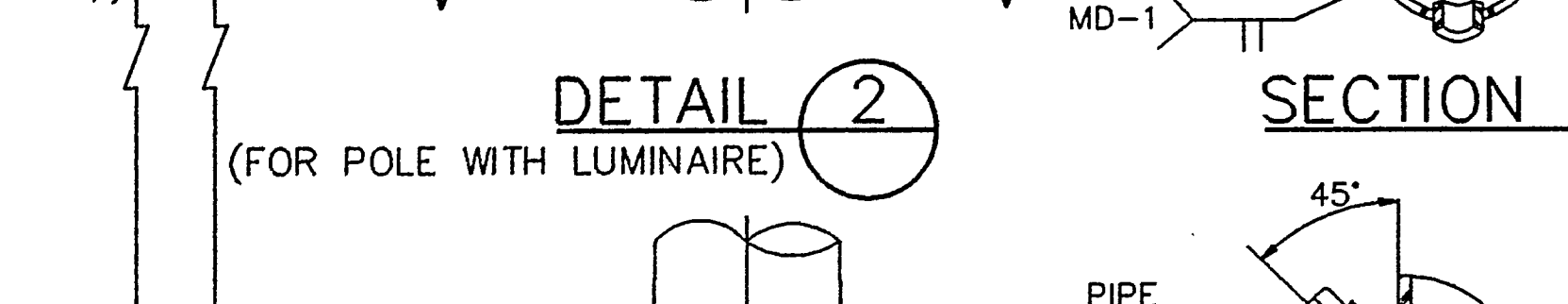
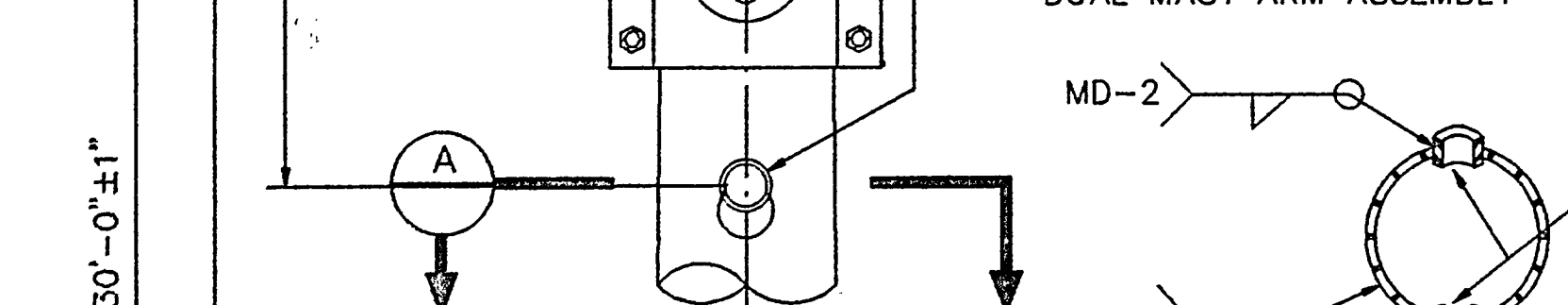
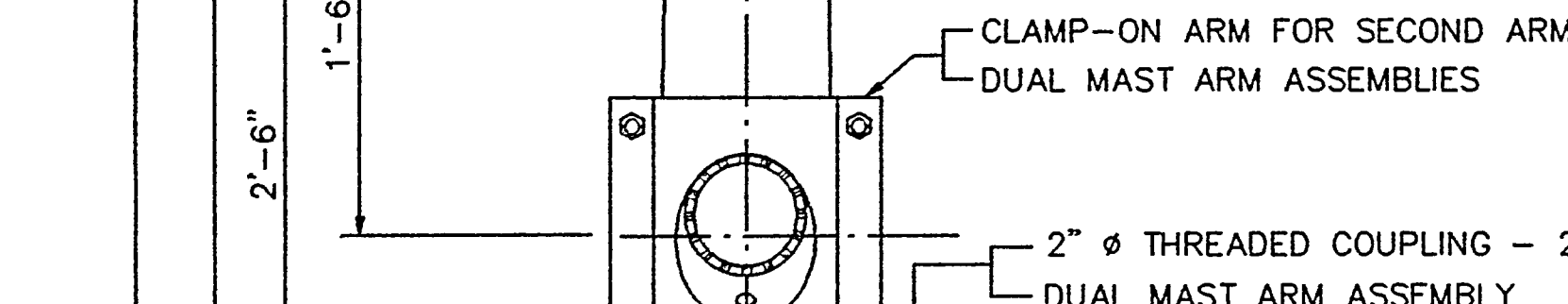
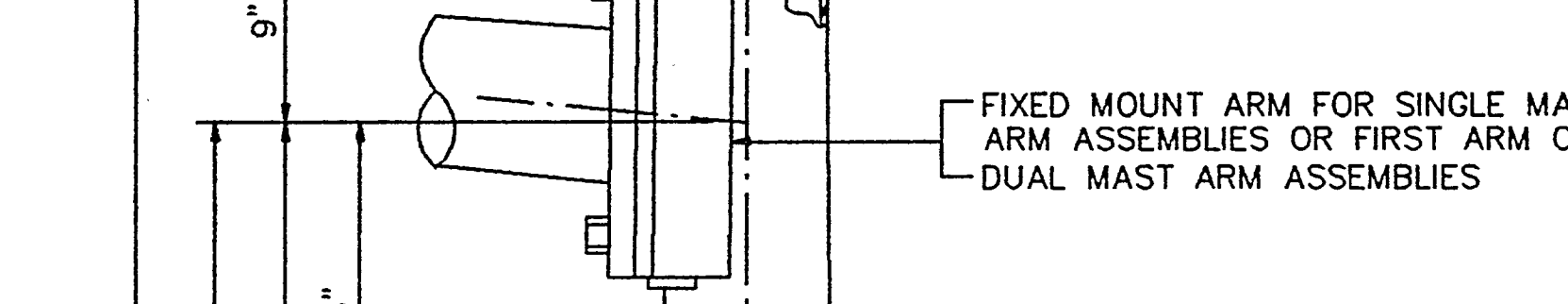
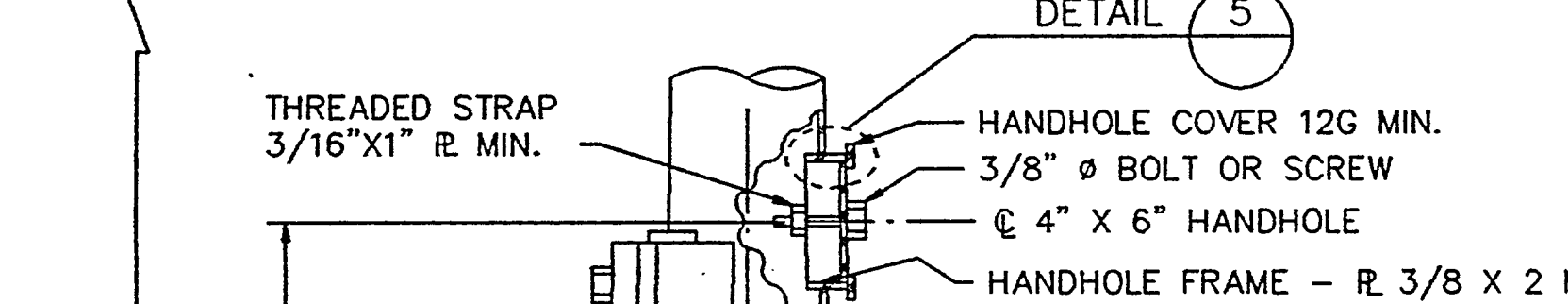
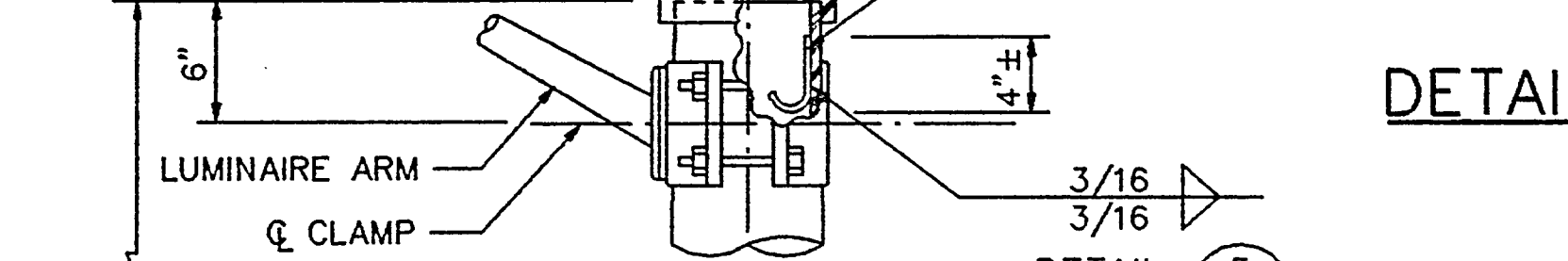


TRAFFIC SIGNAL POLE FOUNDATIONS

Scale: NONE

SHEET 11 OF 19
 91268-11

ZINC DIE CAST OR ALUM. OR GALV. METAL CAP WITH MIN. OF 3 SET SCREWS



MATERIALS	
ROUND SHAFTS	ASTM A595 GRA, ASTM A570 GR50
PLATES (1)	ASTM A36 OR A572 GR50 OR A595 (2) OR A36M50
CONNECTION BOLTS	ASTM A325 EXCEPT WHERE NOTED
PIN BOLTS	ASTM A325
PIPE	ASTM A53 GR A OR B, OR A501
MISC. HARDWARE	GALVANIZED STEEL OR STAINLESS OR AS NOTED

(1) ANY OF THE MATERIALS LISTED FOR PLATES MAY BE USED WHERE THE DRAWINGS DO NOT SPECIFY A PARTICULAR GRADE DESIGNATION.
 (2) IF A595 MATERIAL IS USED, IT NEED NOT BE COLD WORKED TO A595 REQUIREMENTS, BUT MATERIALS MUST HAVE 40 KSI MINIMUM YIELD PRIOR TO FABRICATION.

ARM SIZE	A	B	C	D	E	CONN. BOLT DIAM.
Dt	t	in	in	in	in	in
6.5	.179	12	9	9	6	1
7.5	.179	13	9	10	6	1
8.0	.179	14	10	11	7	1-1/4
9.0	.179	16	11	13	8	1-1/4
9.5	.179	17	12	14	9	1-1/4
9.5	.239	18	12	15	9	1-1/4
10.0	.239	18	12	15	9	1-1/4
10.5	.239	18	13	15	10	1-1/2
11.0	.239	18	13	15	10	1-1/2

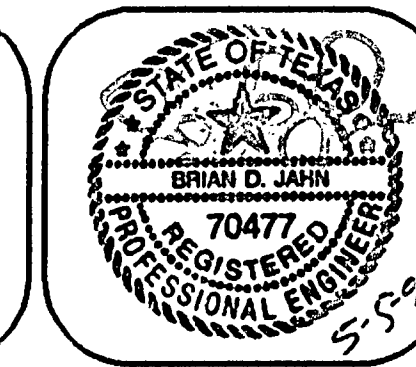
GENERAL NOTES:
 CLAMP-ON DETAILS ARE USED FOR THE SECOND ARM ON DUAL MAST ARM ASSEMBLIES. A MAXIMUM 1-1/2" WIDE VERTICAL SLOTTED HOLE MAY BE CUT IN THE FRONT CLAMP PLATE TO FACILITATE DRAINAGE DURING GALVANIZING. THE SLOT SHALL BE CENTERED BEHIND THE ARM AND SHALL BE NO LONGER THAN THE ARM DIAMETER MINUS 1".
 FIXED MOUNT DETAILS ARE USED FOR SINGLE MAST ARM ASSEMBLIES AND FOR THE FIRST ARM ON DUAL MAST ARM ASSEMBLIES.
 WHERE DUPLICATE PARTS OCCUR ON DETAIL, WELDS SHOWN FOR ONE PART SHALL APPLY TO ALL SIMILAR PARTS ON THE DETAIL.
 PIN BOLTS ARE REQUIRED TO PREVENT ROTATION OF CLAMP-ON ARMS UNDER DESIGN WIND FORCES.
 ALL POLES ARMS & METAL HARDWARE TO BE PAINTED "BRUSHING BROWN".

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES, INC.

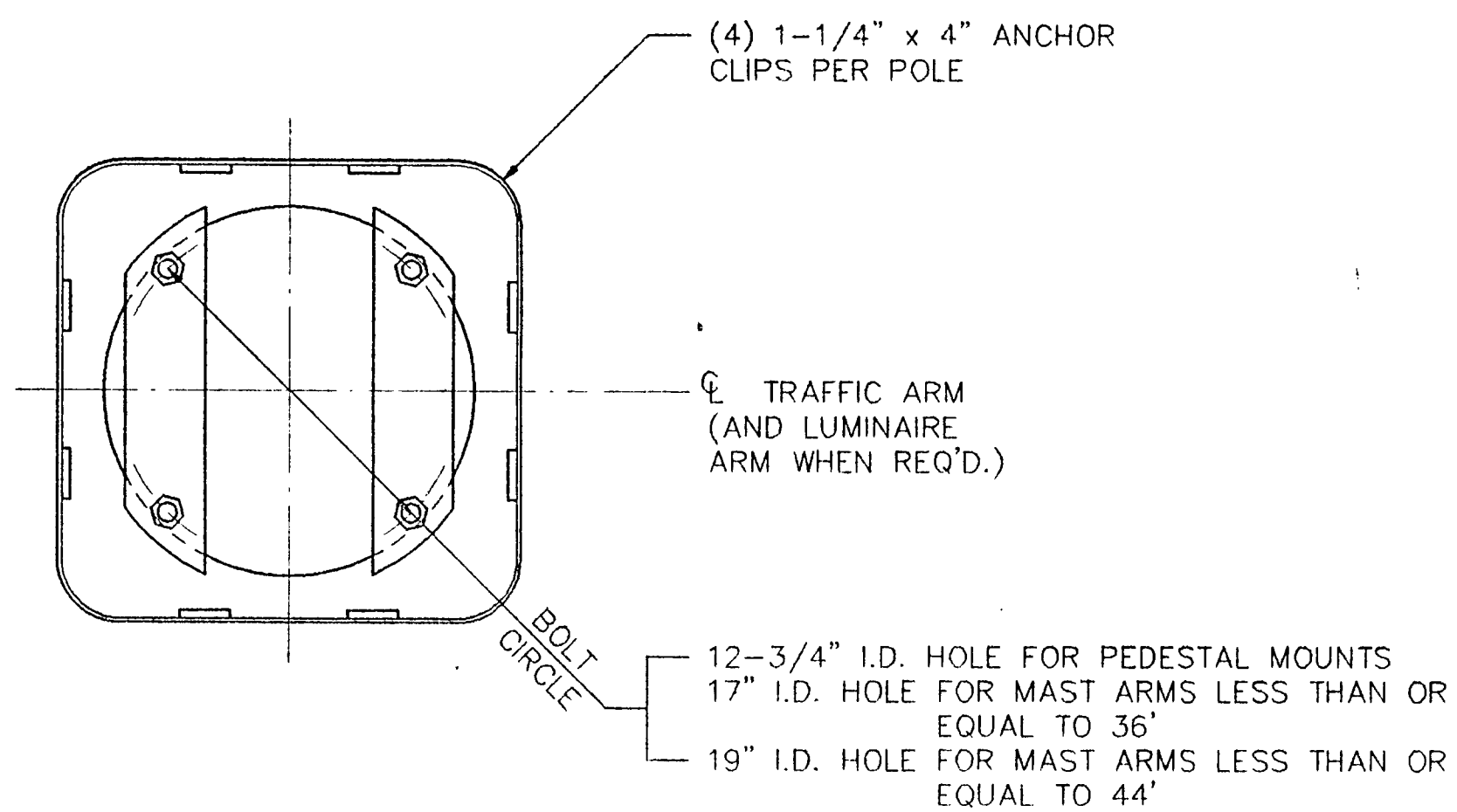
DeShazo, Starek, & Tang, Inc.
 ENGINEERS • PLANNERS
 330 Union Station
 Dallas, Texas 75202-4802
 (214) 748-6740
 Fax: (214) 748-7037

DESIGN BY: BDJ DATE: 2-14-92
 DRAWN BY: SAM DATE: 2-14-92
 CHECKED BY: BDJ DATE: 2-14-92
 APPROVED BY: _____ DATE: _____

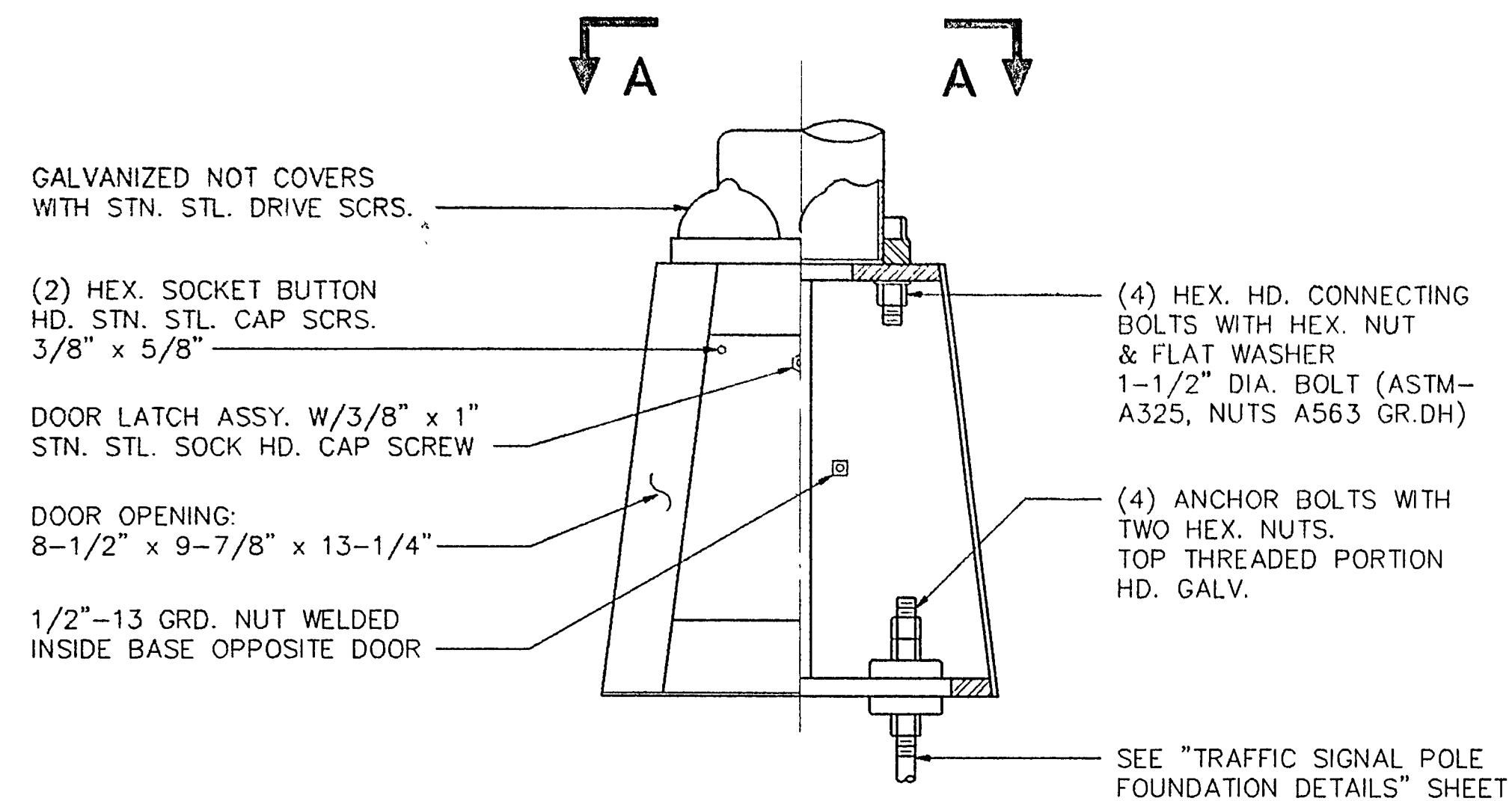


MAST ARM CONNECTIONS

SHEET 13 OF 19
 Scale: NONE
 91268-13



SECTION A



TRANSFORMER BASE MOUNTING DETAILS

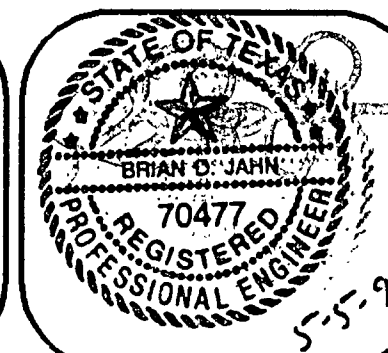
DESIGNED BY: _____
 DRAWN BY: _____
 CHECKED BY: _____
 APPROVED BY: _____
 DATE: 10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES, INC.

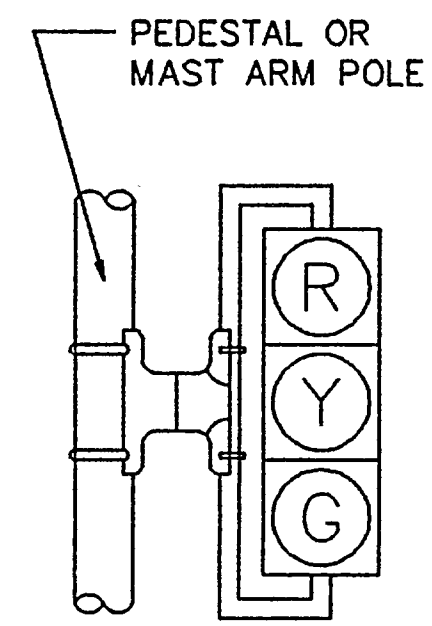
DeShazo, Starek, & Tang, Inc.
 ENGINEERS • PLANNERS
 330 Union Station
 Dallas, Texas 75202-4802
 (214) 748-6740
 Fax: (214) 748-7037

DESIGN BY: BDJ DATE: 3-11-92
 DRAWN BY: BBP DATE: 3-11-92
 CHECKED BY: BDJ DATE: 3-11-92
 APPROVED BY: _____ DATE: _____

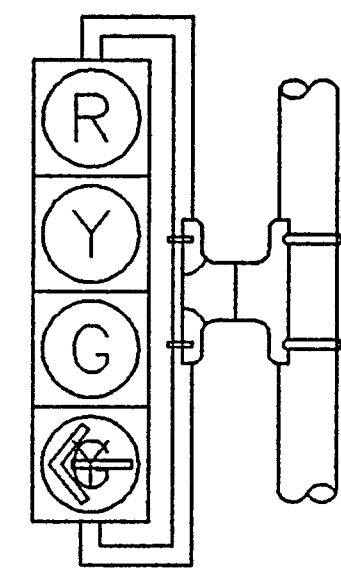


MAST ARM POLE DETAILS
 Scale: NONE

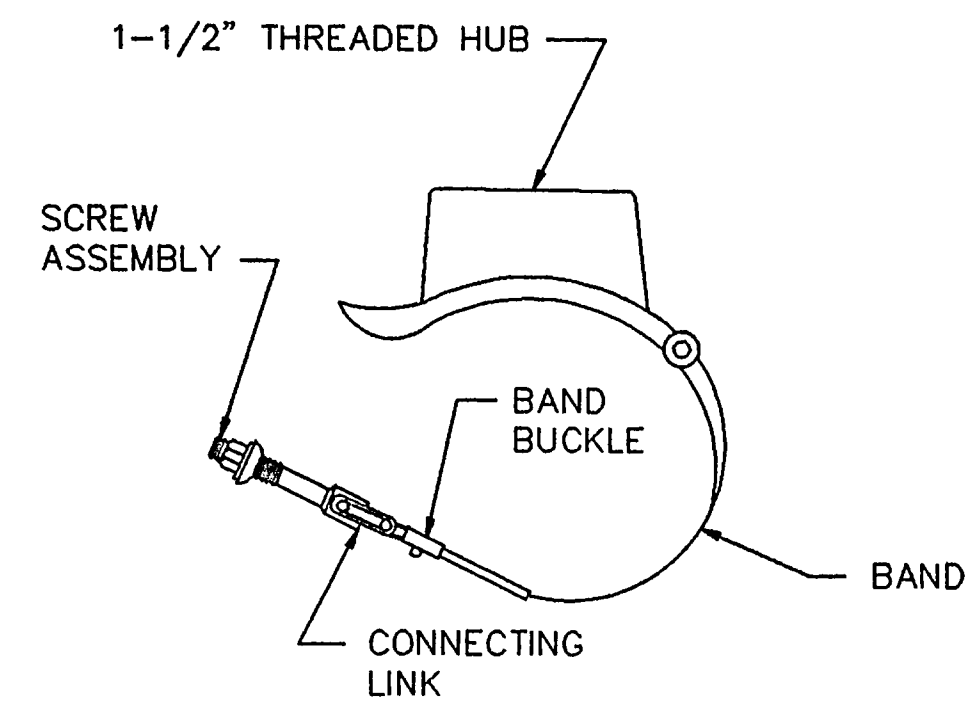
SHEET 14 OF 19
 91268-14



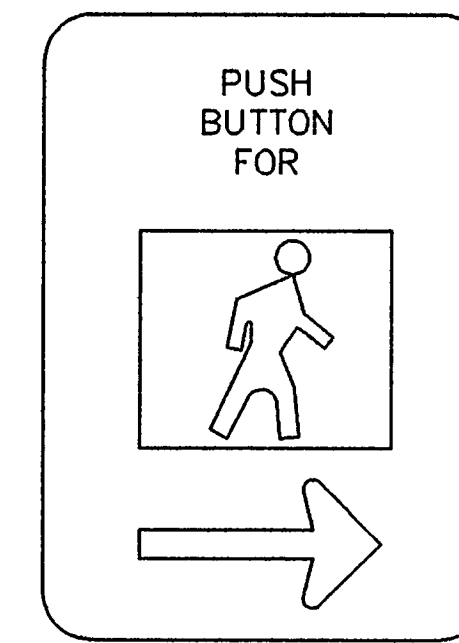
V3



V4LT



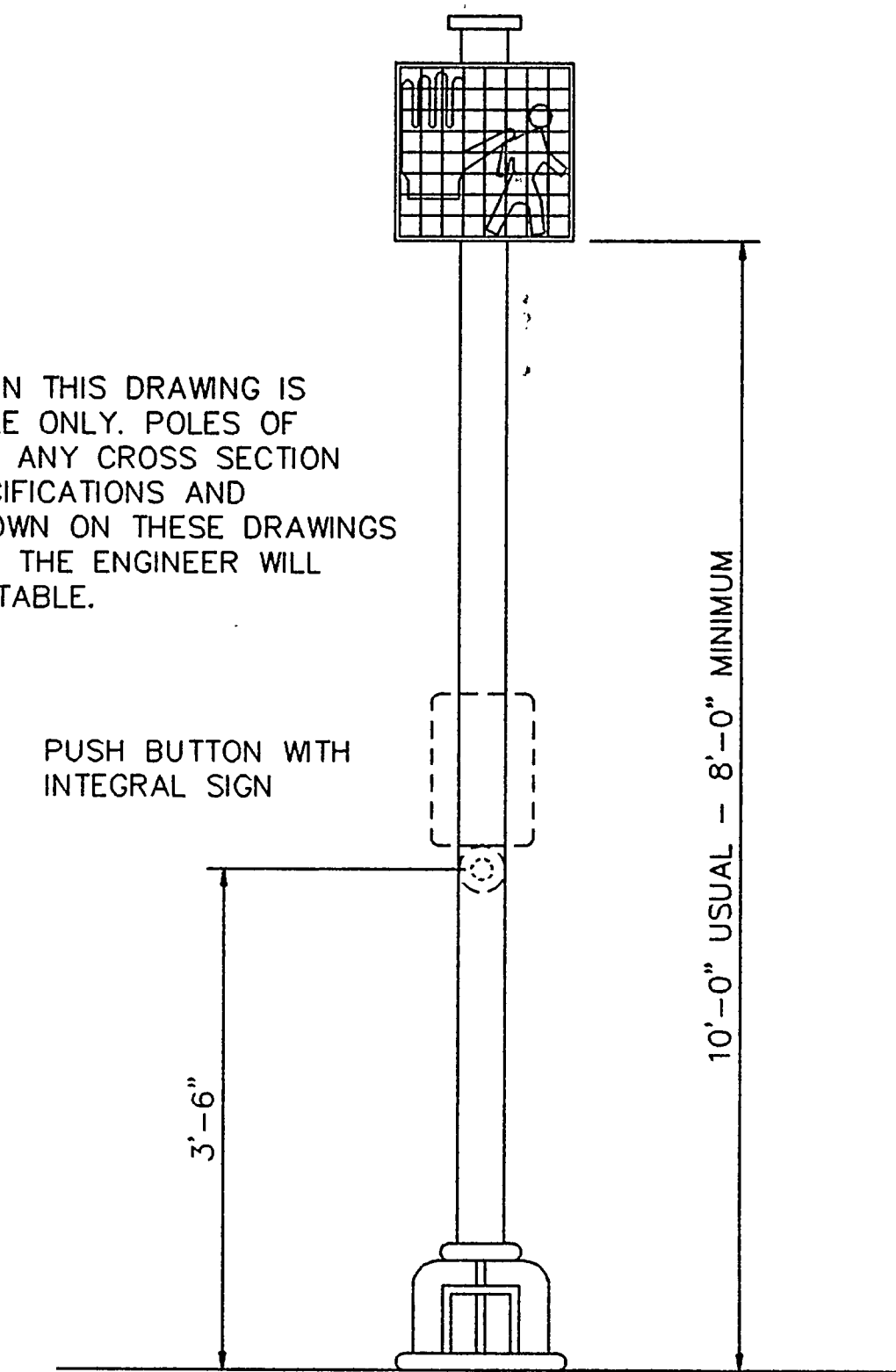
ASTRO MINI-BRAC



SIGN R10-4b
9" x 12"

PEDESTRIAN PUSH BUTTON
SIGN DETAILS

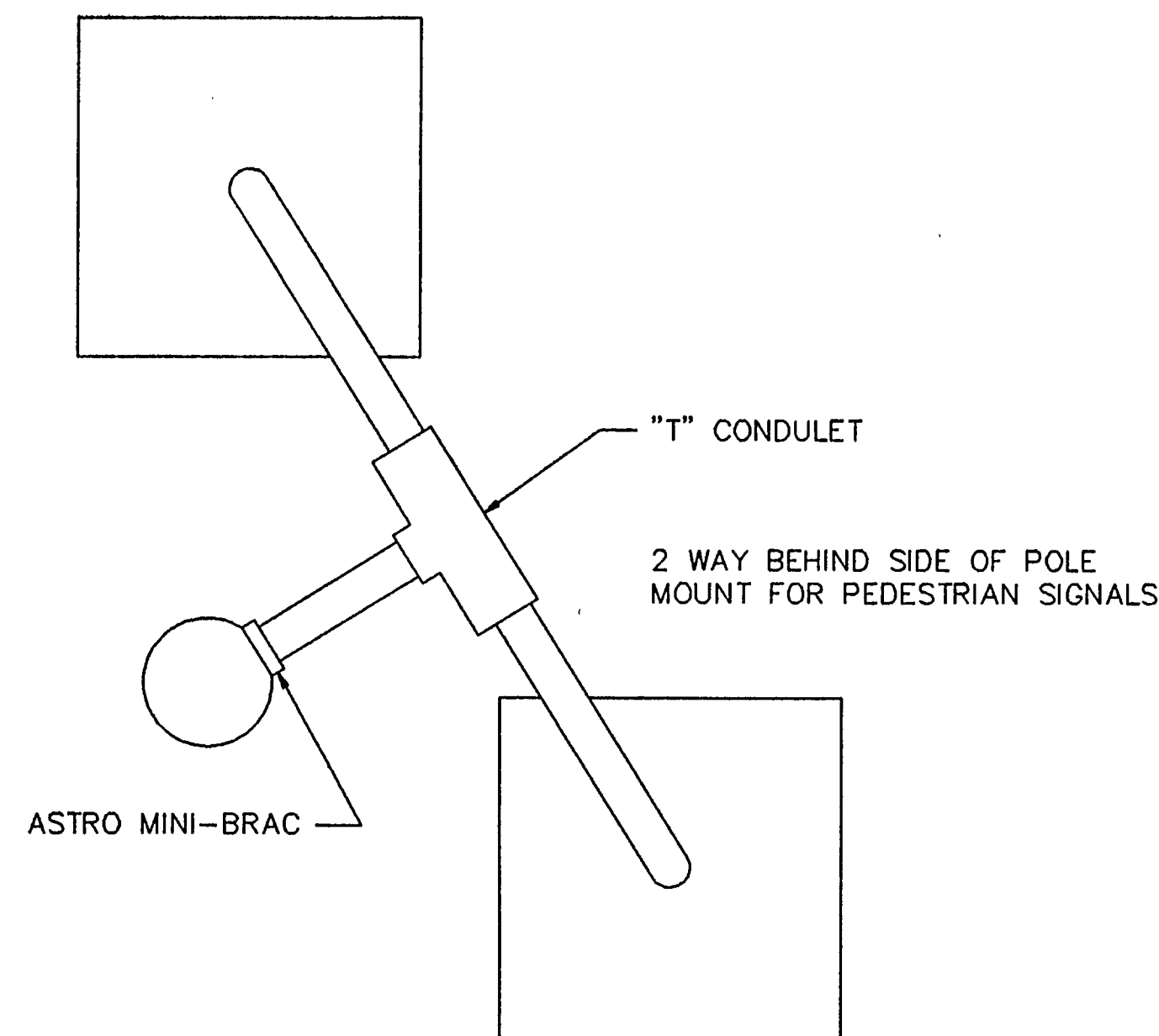
NOTE :
THE POLE SHOWN IN THIS DRAWING IS SHOWN AS EXAMPLE ONLY. POLES OF SIMILAR DESIGN OF ANY CROSS SECTION AND MEETING SPECIFICATIONS AND REQUIREMENTS SHOWN ON THESE DRAWINGS AND APPROVED BY THE ENGINEER WILL BE DEEMED ACCEPTABLE.



POST DETAIL

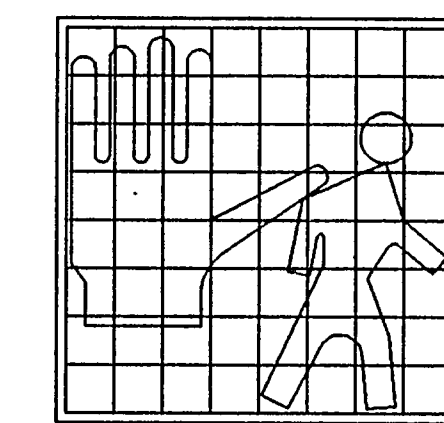
NOTES :

1. ALL SIGNAL HEAD LENSES SHALL BE 12" IN DIAMETER.
2. VEHICLE AND PEDESTRIAN SIGNAL HEADS SHALL BE MOUNTED WITH "ASTRO-BRACS" AND APPROPRIATE TUBING, PAINTED BLACK. ALL SIGNALS TO BE BLACK, ALL LENSES TO BE GLASS.
3. ALL VISORS SHALL BE TUNNEL VISORS.
4. ALL POLE MOUNTED VEHICLE AND PEDESTRIAN SIGNAL HEADS SHALL BE INSTALLED ON THE AWAY-FROM-TRAFFIC SIDE OF THE PEDESTAL OR MAST ARM POLE.
5. ALL SIGNAL HEADS WILL BE PROVIDED WITH BLACK 5" POLYCARBONATE VACUUM FORMED BACKPLATES.
6. ALL WIRING FOR VEHICLE AND PEDESTRIAN SIGNALS SHALL BE TOTALLY ENCLOSED WITHIN THE SIGNAL MOUNTING HARDWARE.
7. ALL DAMPING DEVICES SHALL BE 18" TO 2' WIDE BY 4' IN LENGTH.
8. ALL PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON SIGNS SHALL DISPLAY THE SYMBOLIZED MESSAGES SHOWN ON THIS SHEET.
9. SYMBOLIZED MESSAGE HIGHT SHALL BE 10 INCHES MINIMUM.
10. PROVIDE DURO TEST 135 WATT SAVER LAMPS IN VEHICLE SIGNALS.
11. PROVIDE DURO TEST 60 WATT SAVER LAMPS IN PEDESTRIAN SIGNALS.



UPPER & LOWER ARMS
IDENTICAL

PEDESTRIAN SIGNAL HEAD MOUNTING
FOR TWO PEDESTRIAN SIGNAL HEADS



152A

PEDESTRIAN SIGNAL HEAD IDENTIFICATION

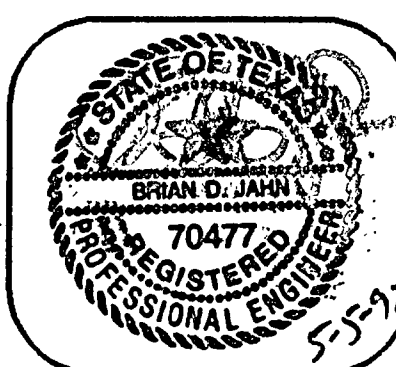
THESE BRASS HAVE BEEN REVISID TO CONFORM WITH CONSTRUCTION RECORDS
 Tom Simmy
 DATE: 10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES,
INC.

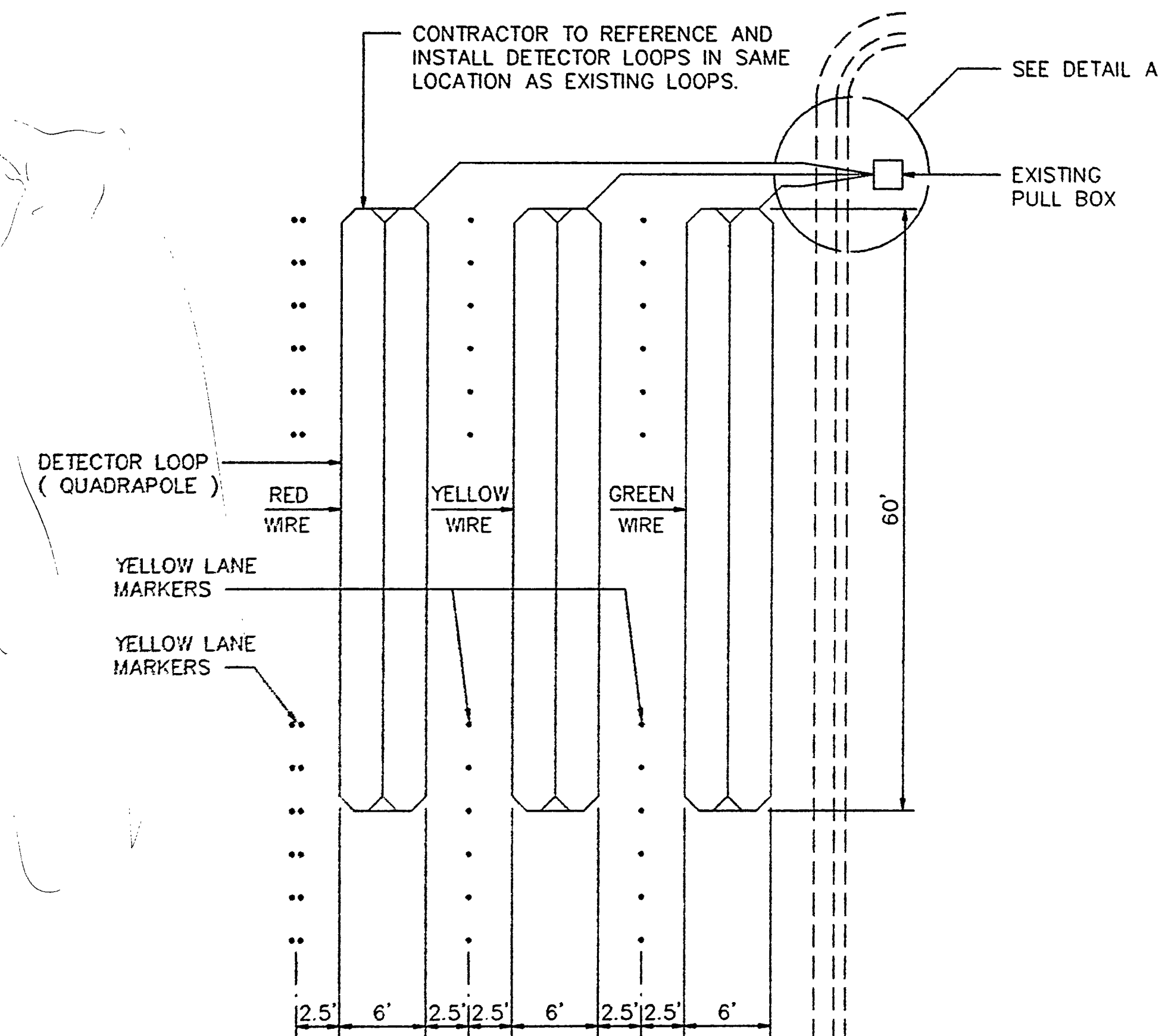
DeShazo, Starek, & Tang, Inc.
ENGINEERS • PLANNERS
330 Union Station
Dallas, Texas 75202-4802
(214) 748-6740
Fax: (214) 748-7037

DESIGN BY: BDJ DATE: 2-14-92
 DRAWN BY: SAM DATE: 2-14-92
 CHECKED BY: BDJ DATE: 2-14-92
 APPROVED BY: DATE:



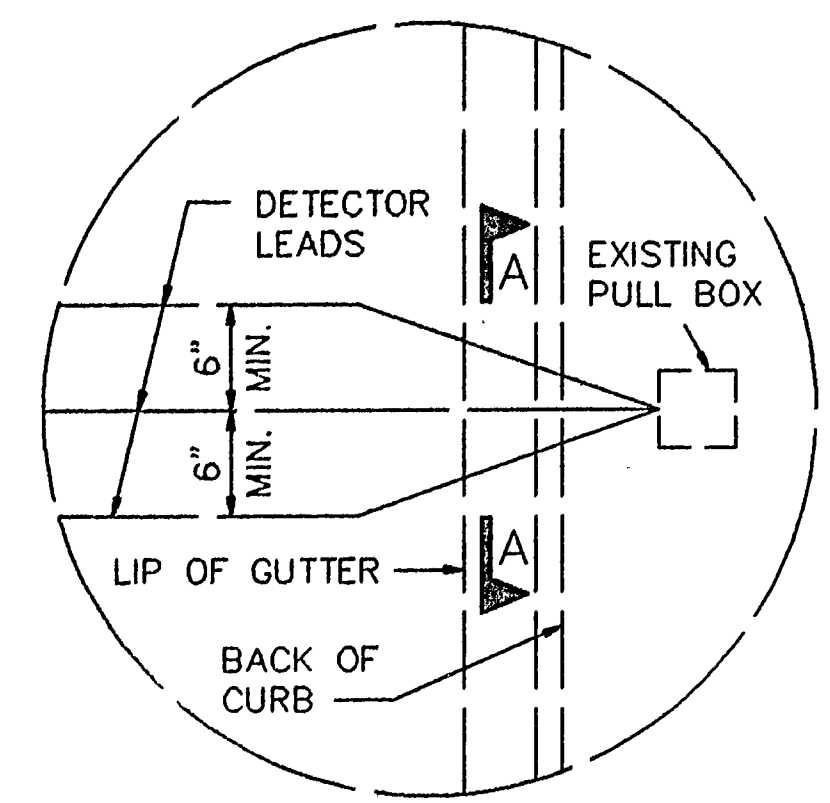
TRAFFIC SIGNAL HEAD
IDENTIFICATION
Scale: NONE

SHEET
15
OF
19
91268-15

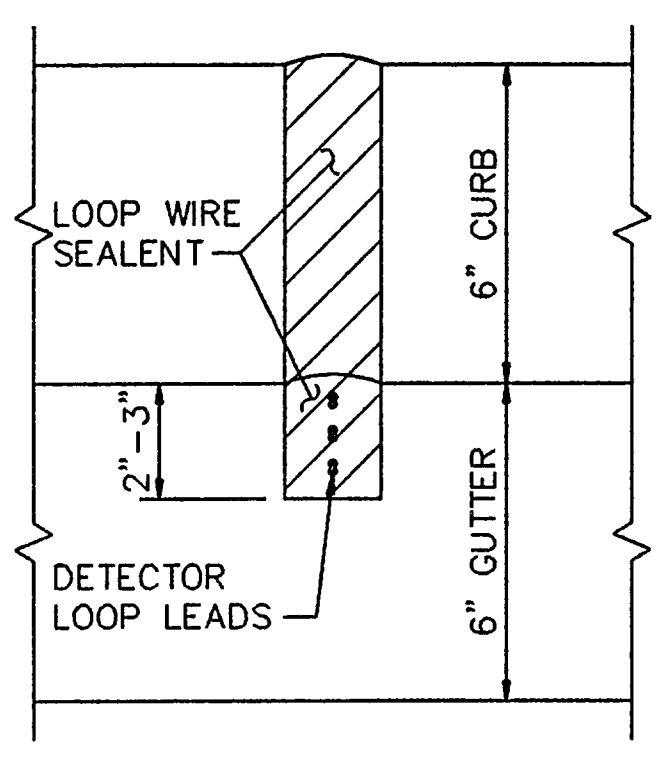


- NOTES :
1. CONTRACTOR TO PROVIDE INDIVIDUAL SAWED CHANNELS THRU CURB & GUTTER FOR EACH WIRE LOOP.
 2. SPLICE IN PULL BOXES SHALL BE SOLDERED AND WEATHER SEALED.

PLAN



DETAIL A



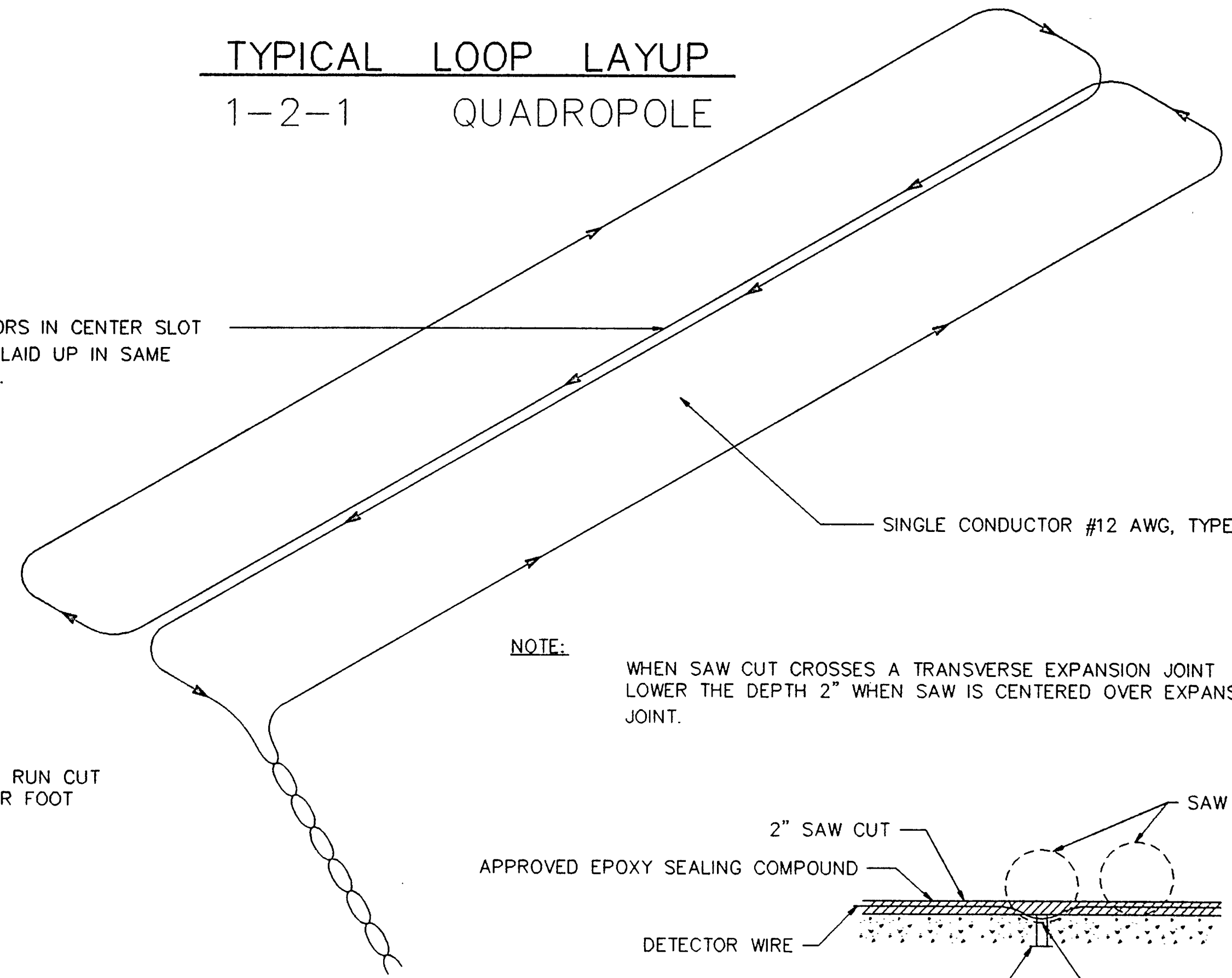
SECTION A-A

VEHICLE LOOP DETECTOR LAYOUT

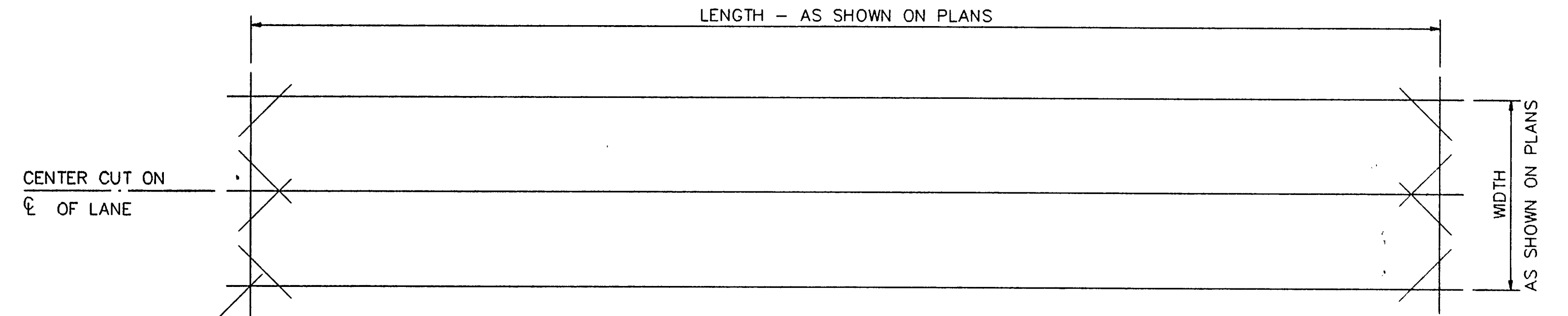
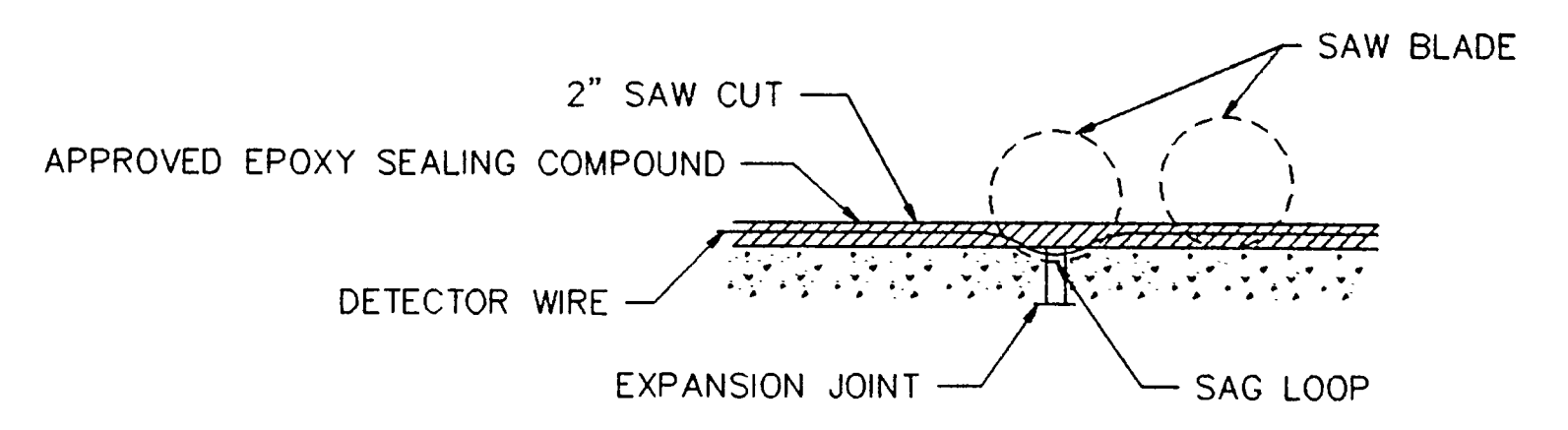
1. INSTALLATION OF WIRE LOOPS IS TO BE MADE IN THE SHORTEST TIME PRACTICAL, NOT TO EXCEED A 4 HR. MAX. AND SCHEDULED DURING OFF PEAK HOURS TO MINIMIZE DELAY TO VEHICLE TRAFFIC.
2. THE PAVEMENT CUT IS TO BE CUT WITH A CONCRETE SAW TO NEAT LINES AND LOOSE MATERIAL REMOVED. THE CUT SHOULD BE CLEAN AND DRY WHEN THE SEALING COMPOUND IS PLACED.
3. THE LEAD-IN WIRES ARE TO BE TWISTED A MINIMUM OF TWO TURNS PER FOOT AND REMAIN UNDISTURBED AFTER THE LOOP HAS BEEN TUNED.
4. EACH LOOP IS TO BE RETURNED TO CONTROLLER VIA ONE PAIR OF UNSPLICED SHIELDED LEAD-IN WIRES. MULTIPLE, TWISTED LEADS TO MORE THAN ONE LOOP IN SINGLE LEAD RUN SAW SLOT ARE NOT PERMISSIBLE.
5. ALL LOOPS TO PENETRATE CURB IN A SEPERATE CONDUIT.

TYPICAL LOOP LAYUP
1-2-1 QUADROPOLE

CONDUCTORS IN CENTER SLOT MUST BE LAID UP IN SAME DIRECTION.

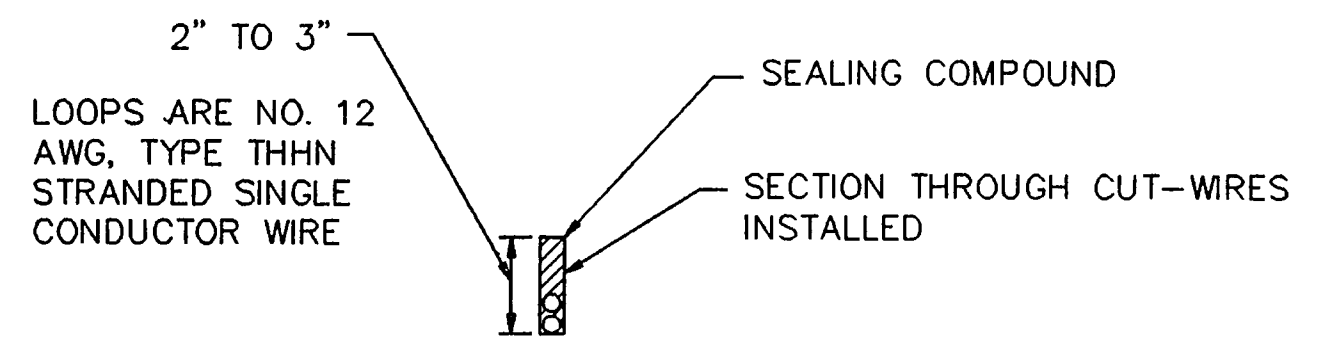


WIRES TWISTED IN LEAD RUN CUT AT LEAST, 2 TURNS PER FOOT



PLAN

SAW - CUT PATTERN FOR DETECTOR LOOPS



Tom Simerly
10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES, INC.

DeShazo, Starek, & Tang, Inc.
ENGINEERS • PLANNERS
380 Union Station
Dallas, Texas 75202-4802
(214) 748-6740
Fax: (214) 748-7037

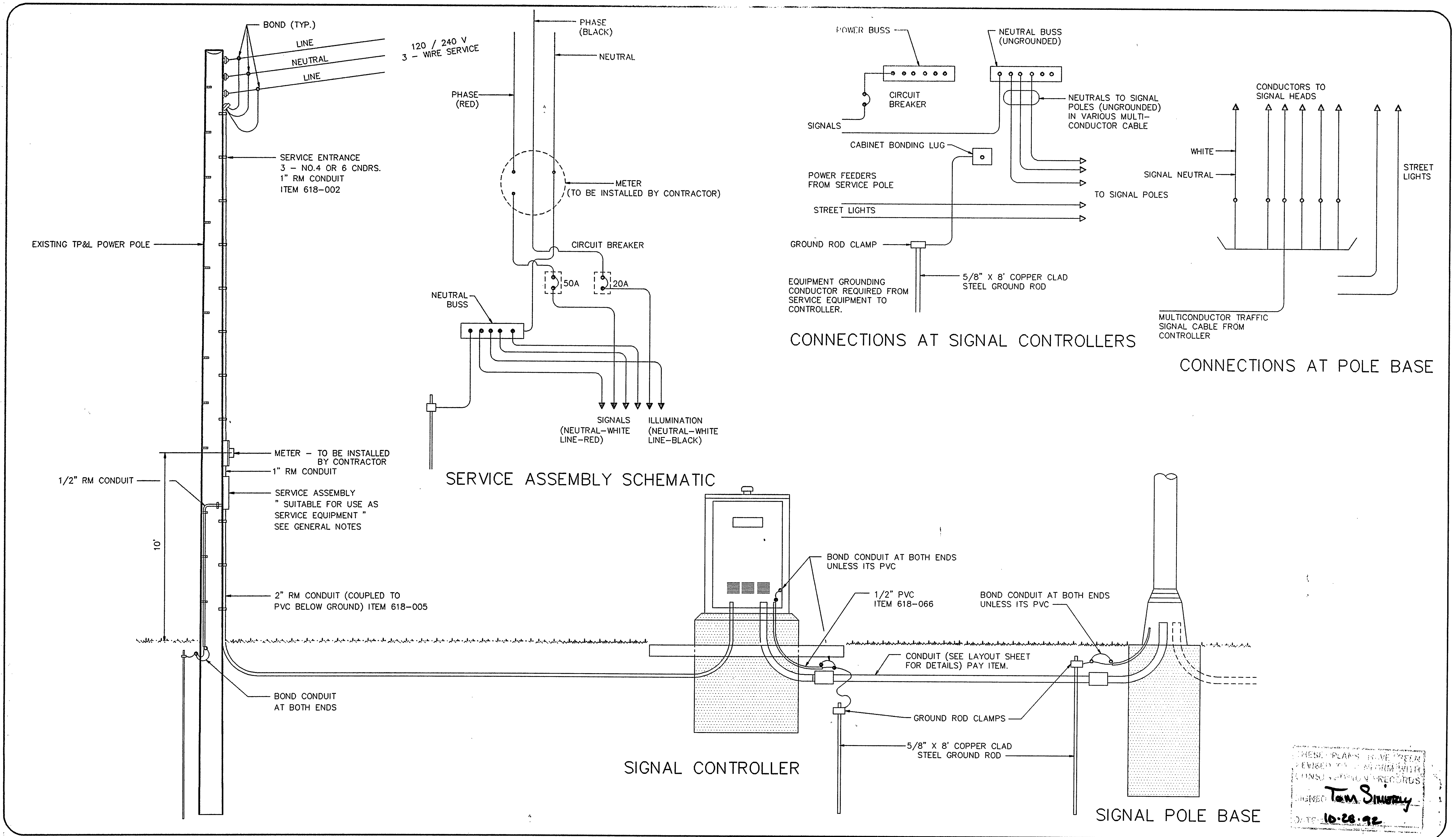
DESIGN BY: BDJ DATE: 2-14-92
DRAWN BY: SAM DATE: 2-14-92
CHECKED BY: BDJ DATE: 2-14-92
APPROVED BY: DATE: _____



TRAFFIC SIGNAL DETAILS

Scale: NONE

SHEET 16 OF 19
91268-16

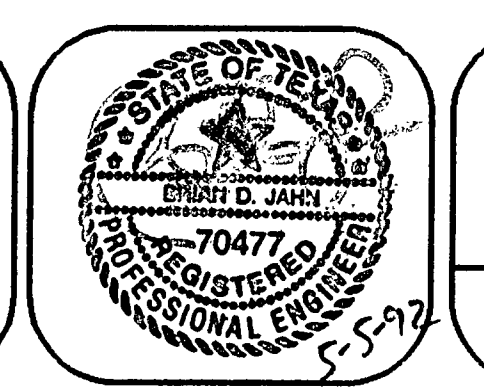


REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES, INC.

DeShazo, Starek, & Tang, Inc.
ENGINEERS • PLANNERS
330 Union Station
Dallas, Texas 75202-4802
(214) 748-6740
Fax: (214) 748-7037

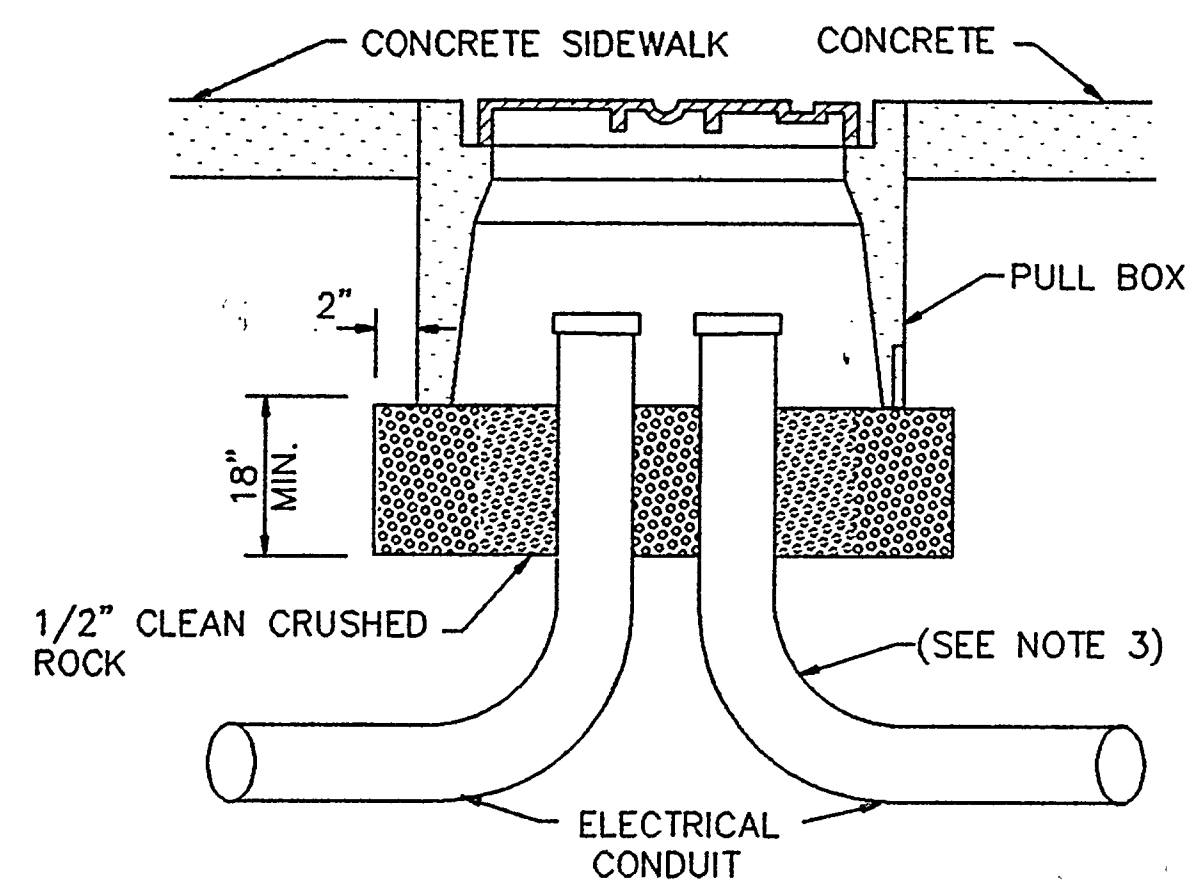
DESIGN BY: BDJ DATE: 2-14-92
DRAWN BY: SAM DATE: 2-14-92
CHECKED BY: BDJ DATE: 2-14-92
APPROVED BY: _____ DATE: _____



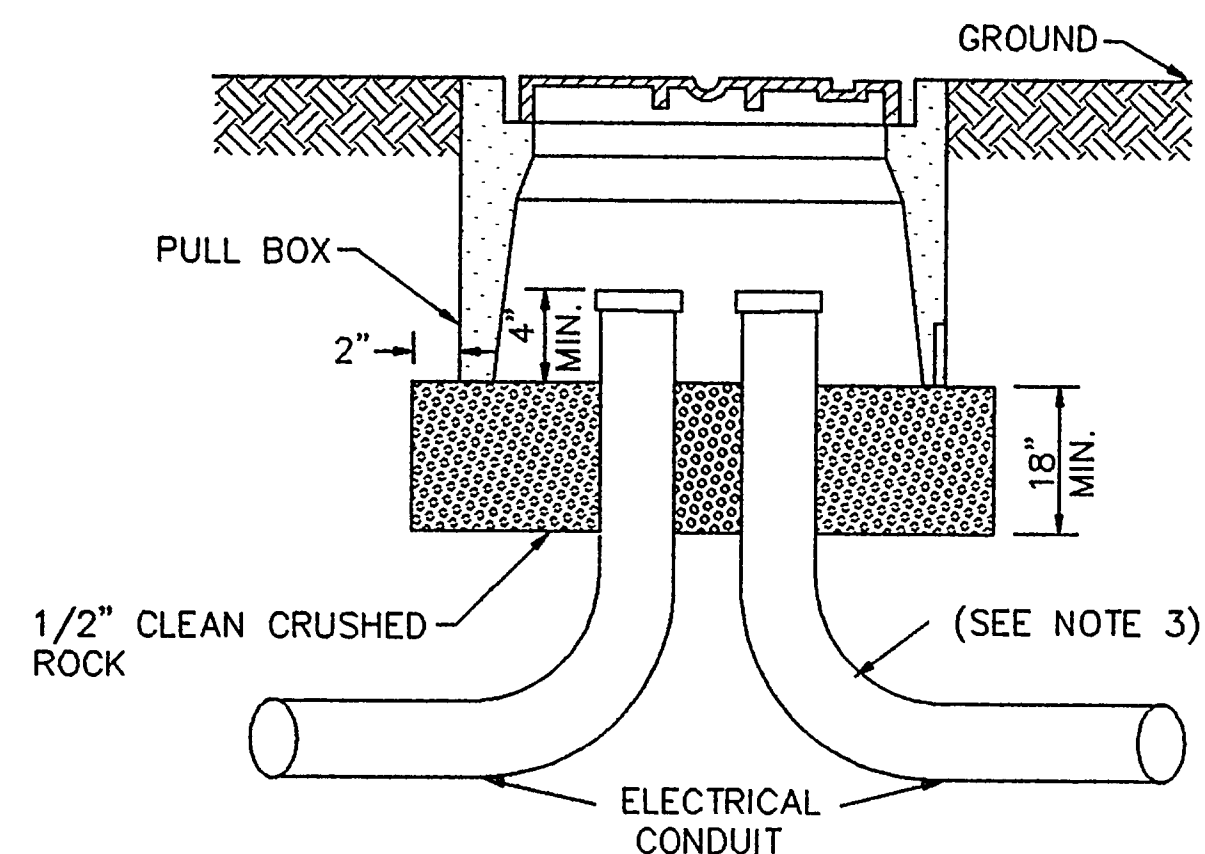
SERVICE POLE AND GROUNDING DETAILS
Scale: NONE

SHEET 17 OF 19
91268-17

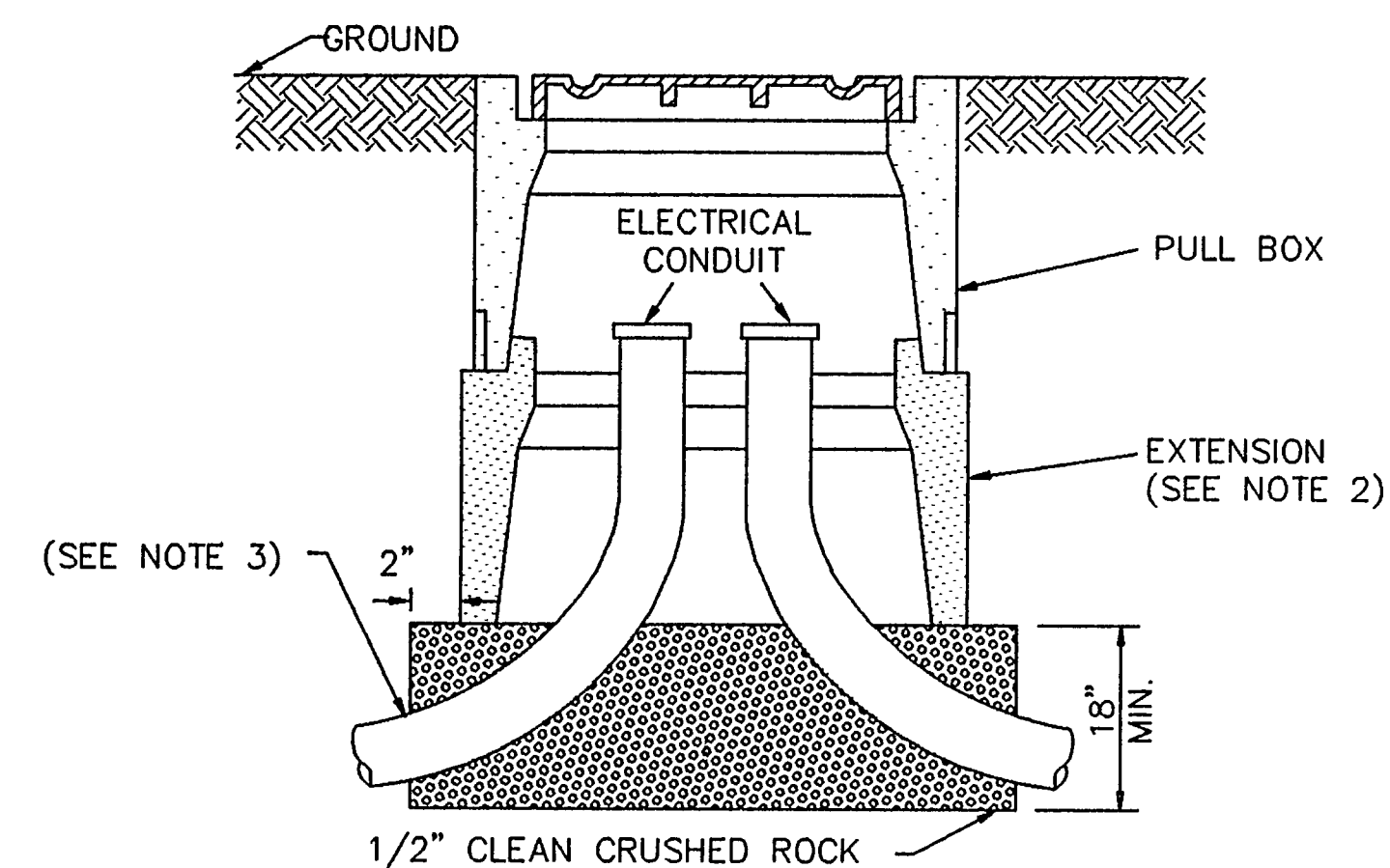
THESE PLANS HAVE BEEN REVISIONED TO CONFORM WITH LATEST CODES AND RECORDS
DRAWN BY *Tom Simms*
DATE: 10-28-92



**TYPICAL PULL BOX AND CONDUIT
DETAILS IN EXISTING SIDEWALK**



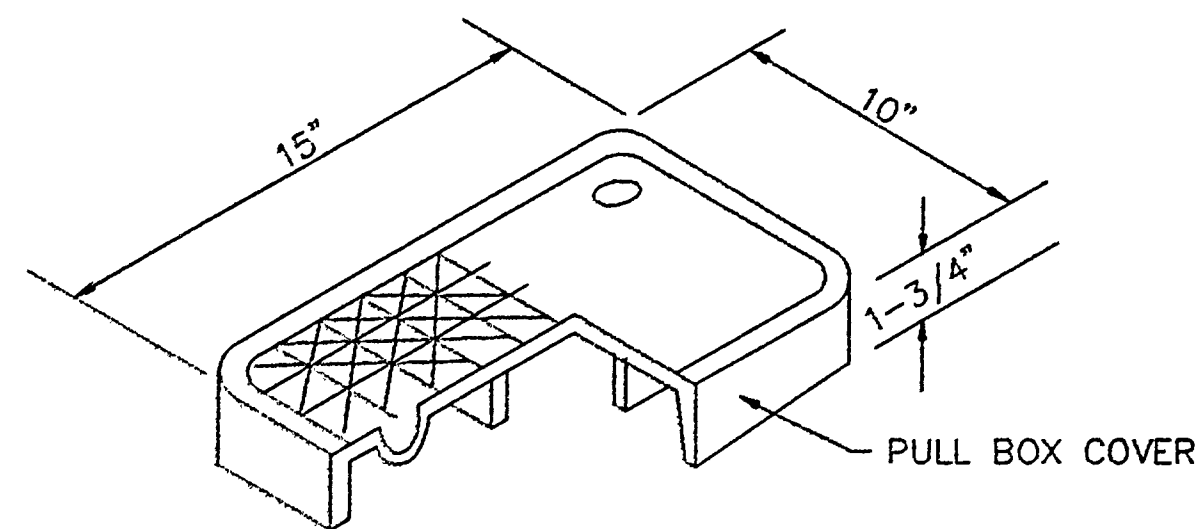
**TYPICAL PULL BOX AND CONDUIT
DETAILS PLACED IN GROUND**



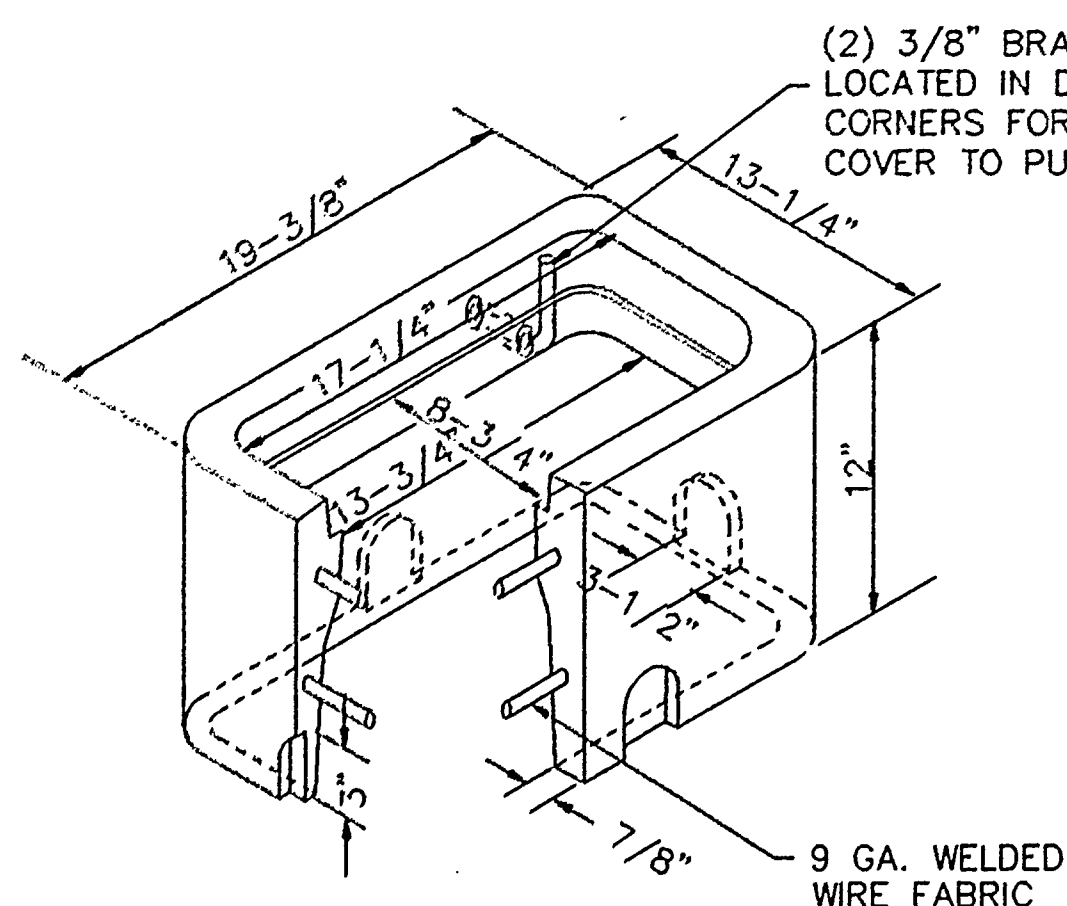
**TYPICAL PULL BOX AND CONDUIT
DETAILS WITH EXTENSION**

NOTES :

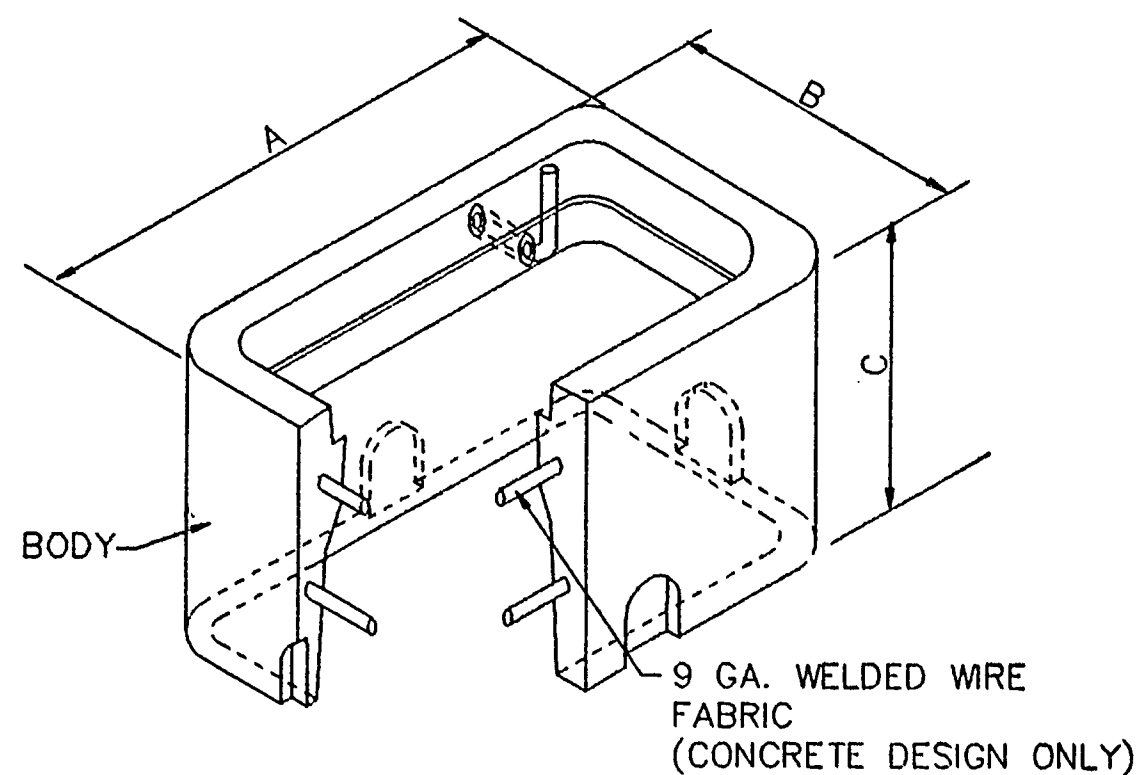
- (1) IF SPECIFIED IN THE PLANS, A 1/2" X 8'-0" GROUND ROD SHALL BE INSTALLED INSIDE THE PULL BOX. THE COST AND INSTALLATION OF THIS ROD SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PULL BOX.
- (2) IF SPECIFIED, THE PULL BOX EXTENSION SHALL BE INSTALLED AT THE LOCATIONS SHOWN IN THE PLANS. THE COST AND INSTALLATION OF THE PULL BOX EXTENSION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PULL BOX.
- (3) CONDUIT BENDS AS SHOWN ARE DIAGRAMMATIC AND SHALL CONFORM TO NATIONAL ELECTRICAL CODE.
- (4) SEE NORTH CENTRAL TEXAS STANDARD CONSTRUCTION SPECIFICATIONS FOR ADDITIONAL INFORMATION CONCERNING THE MATERIALS AND INSTALLATION OF THE PULL BOX, EXTENSIONS AND CONDUITS.
- (5) WHEN A PULL BOX IS INSTALLED BY THE GRADING OR SURFACING CONTRACTOR, THE PULL BOX COVER LEGEND SHALL BE "TRAFFIC SIGNALS", UNLESS OTHERWISE SPECIFIED IN THE PLANS.
- (6) THE COMPLETE PULL BOX INSTALLATION SHOULD BE BUILT TO FIT EXISTING FIELD CONDITIONS. THE PULL BOX SHOULD BE PLACED A MIN. OF 2'-0" BEHIND CURB AND SHALL PRESENT A NEAT, WORKMAN LIKE APPEARANCE. THE COST FOR THE REPLACEMENT OF EXISTING SIDEWALK MATERIAL SHALL BE INCLUDED IN THE UNIT PRICE BID FOR STRUCTURAL CONCRETE.
- (7) COVERS FOR PULL BOX SHALL BE CAST IRON WITH TEXT.
- (8) ALL PULL BOXES SHALL BE CONSTRUCTED OF CAST IRON MATERIALS.



(2) 3/8" BRASS BOLTS LOCATED IN DIAGONAL CORNERS FOR SECURING COVER TO PULL BOX



**TYPICAL
PULL BOX SIZE I
CONCRETE DESIGN**
(DIMENSIONS ARE NOMINAL)

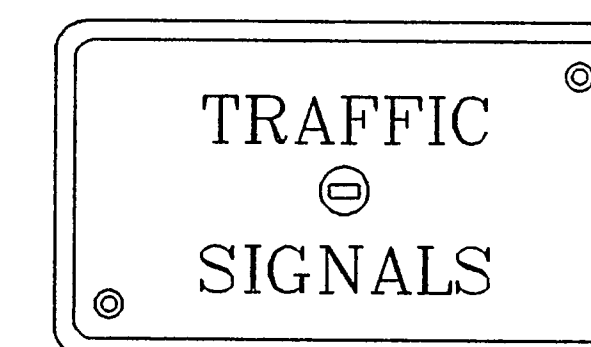
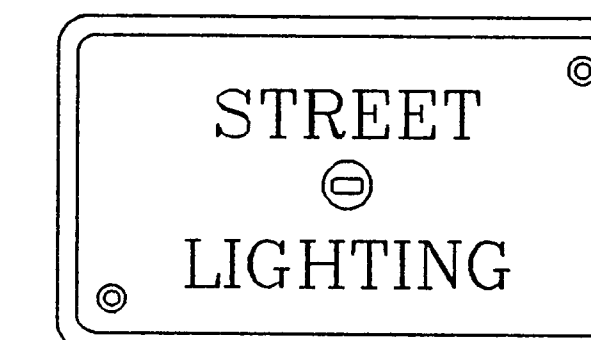
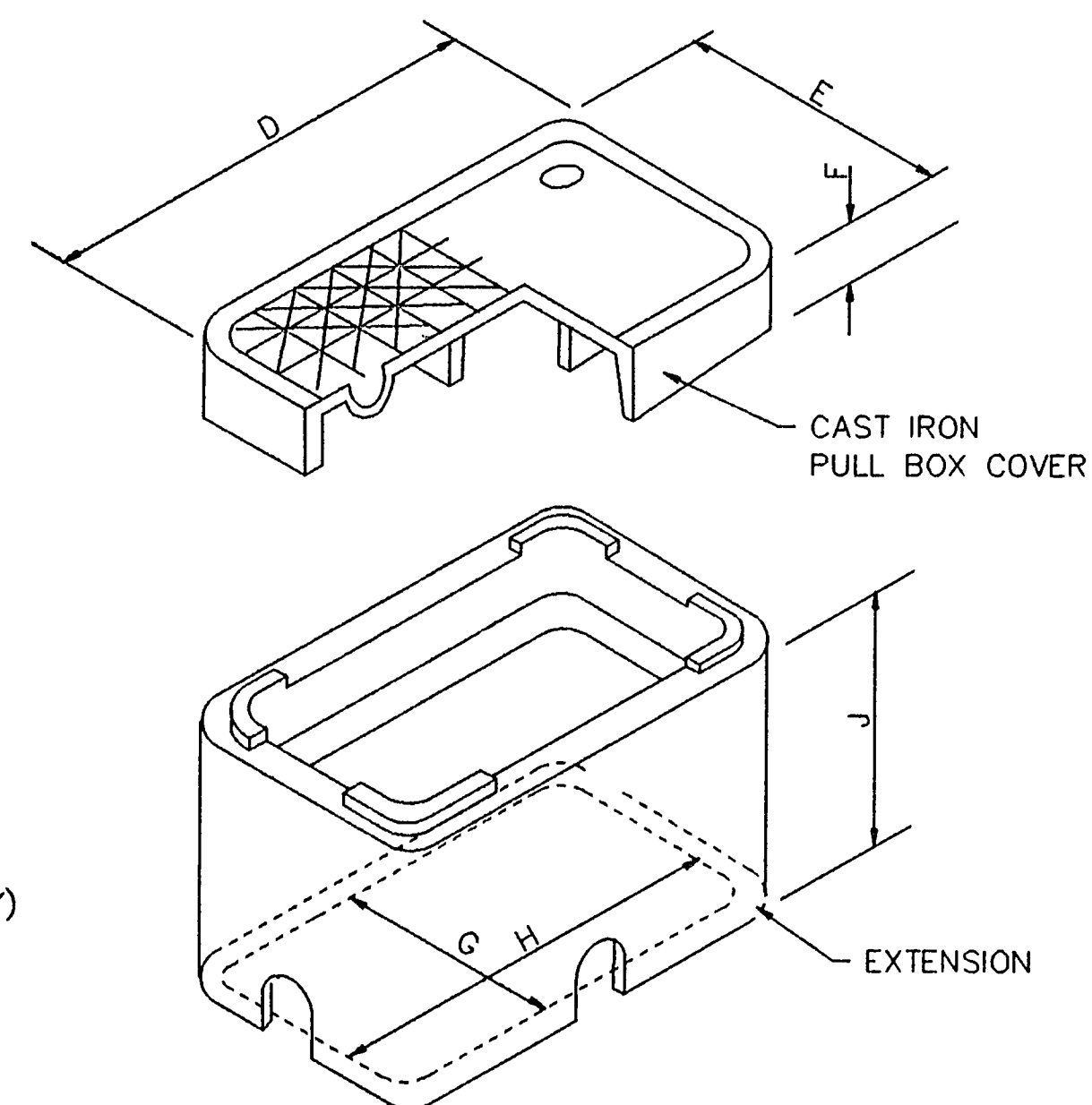


**TYPICAL
PULL BOX SIZE II**

NOMINAL PULL BOX SIZE II DIMENSIONS

PULL BOX CONSTRUCTION MATERIAL	PULL BOX DIMENSIONS			CAST IRON PULL BOX LID DIMENSIONS			PULL BOX EXTENSION DIMENSIONS		
	A	B	C	D	E	F	G	H	J
CONCRETE	25"	15"	12"	21 3/4"	11 3/4"	2"	12 1/4"	22 1/4"	10 1/4"

THE DIMENSIONS SHOWN IN THE SCHEDULE ABOVE MAY VARY SLIGHTLY BY MANUFACTURER'S DESIGNS



**TYPICAL
PULL BOX COVERS**

THESE PLANS HAVE BEEN REVISIONED TO COMPLY WITH CONSTRUCTION RECORD
 SIGNATURE: *Tom Simoney*
 DATE: 10-28-92

REVISIONS			
NO.	DESCRIPTION	DATE	BY

**DUNAWAY ASSOCIATES,
INC.**

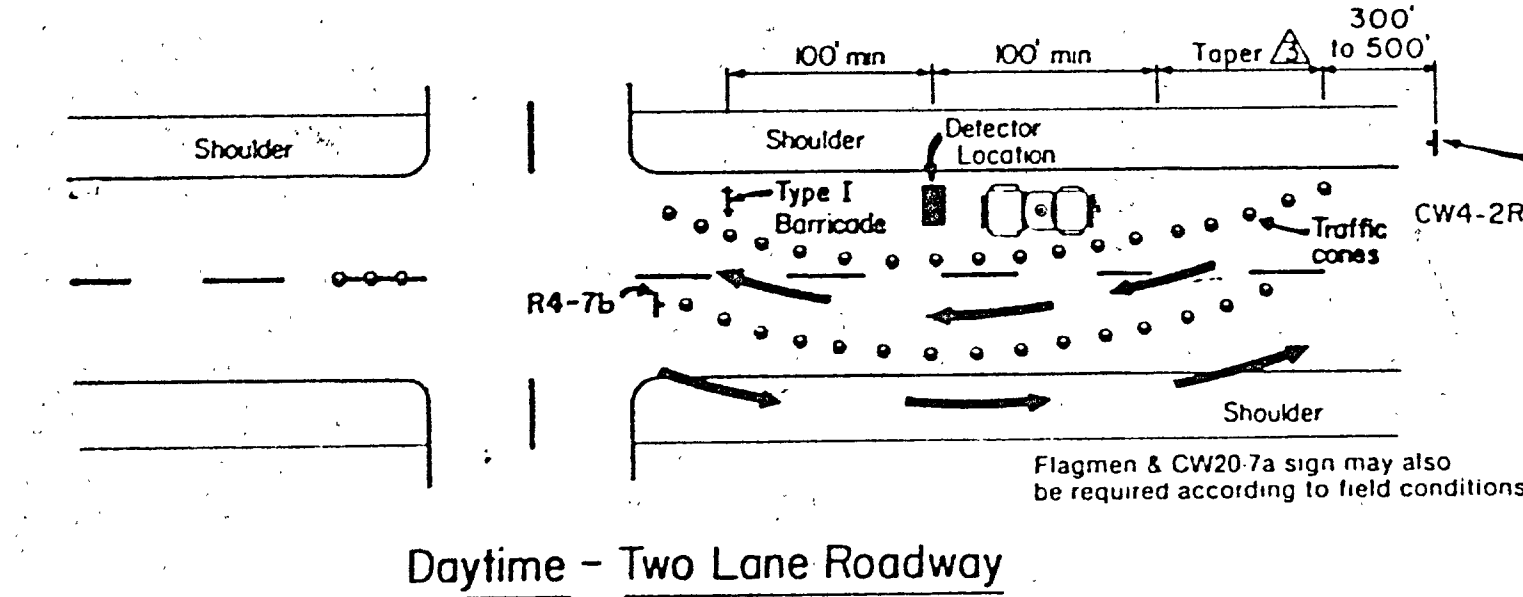
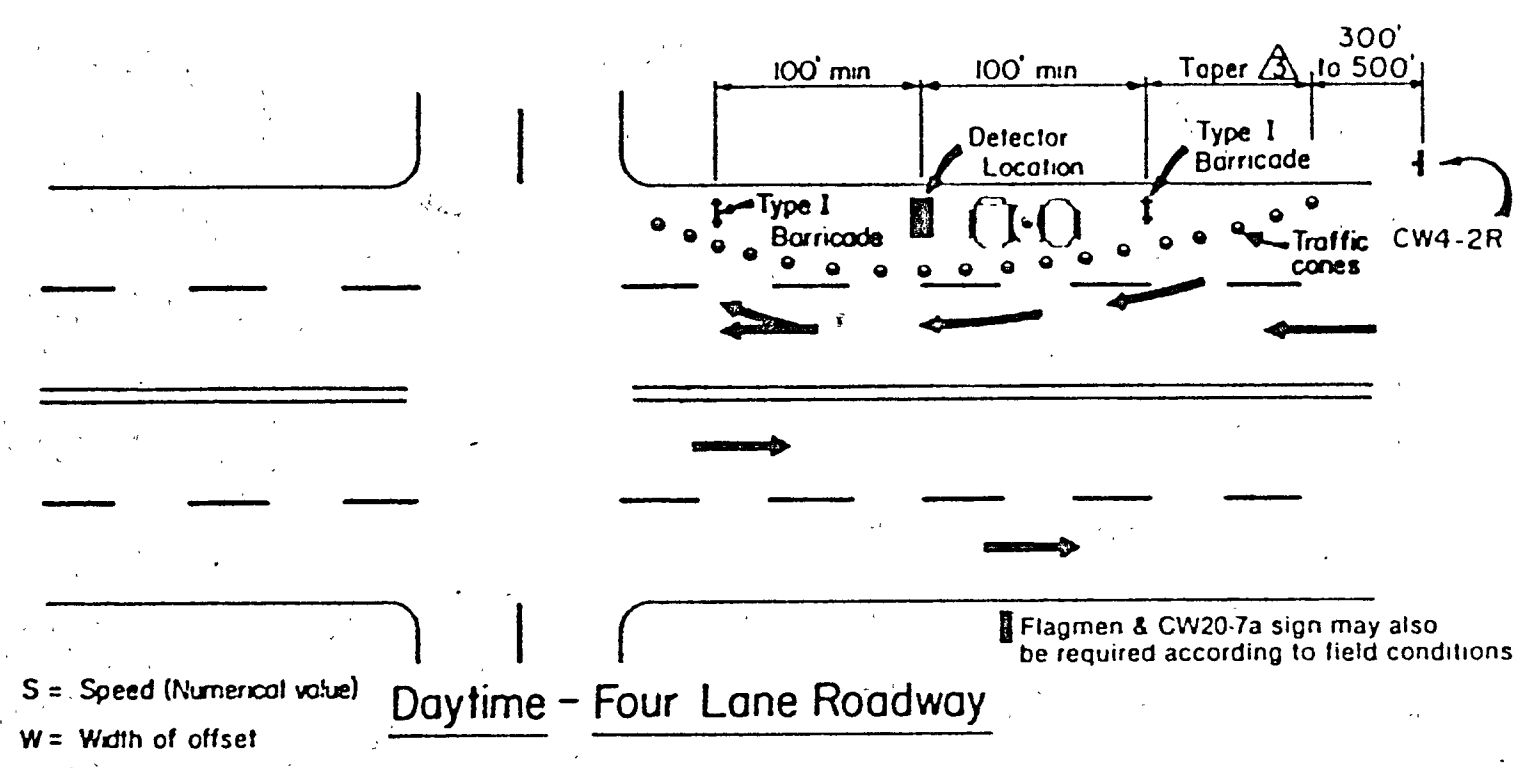
DeShazo, Starek, & Tang, Inc.
 ENGINEERS • PLANNERS
 330 Union Station
 Dallas, Texas 75202-4802
 (214) 748-6740
 Fax: (214) 748-7037

DESIGN BY: BDJ DATE: 2-14-92
 DRAWN BY: SAM DATE: 2-14-92
 CHECKED BY: BDJ DATE: 2-14-92
 APPROVED BY: DATE:



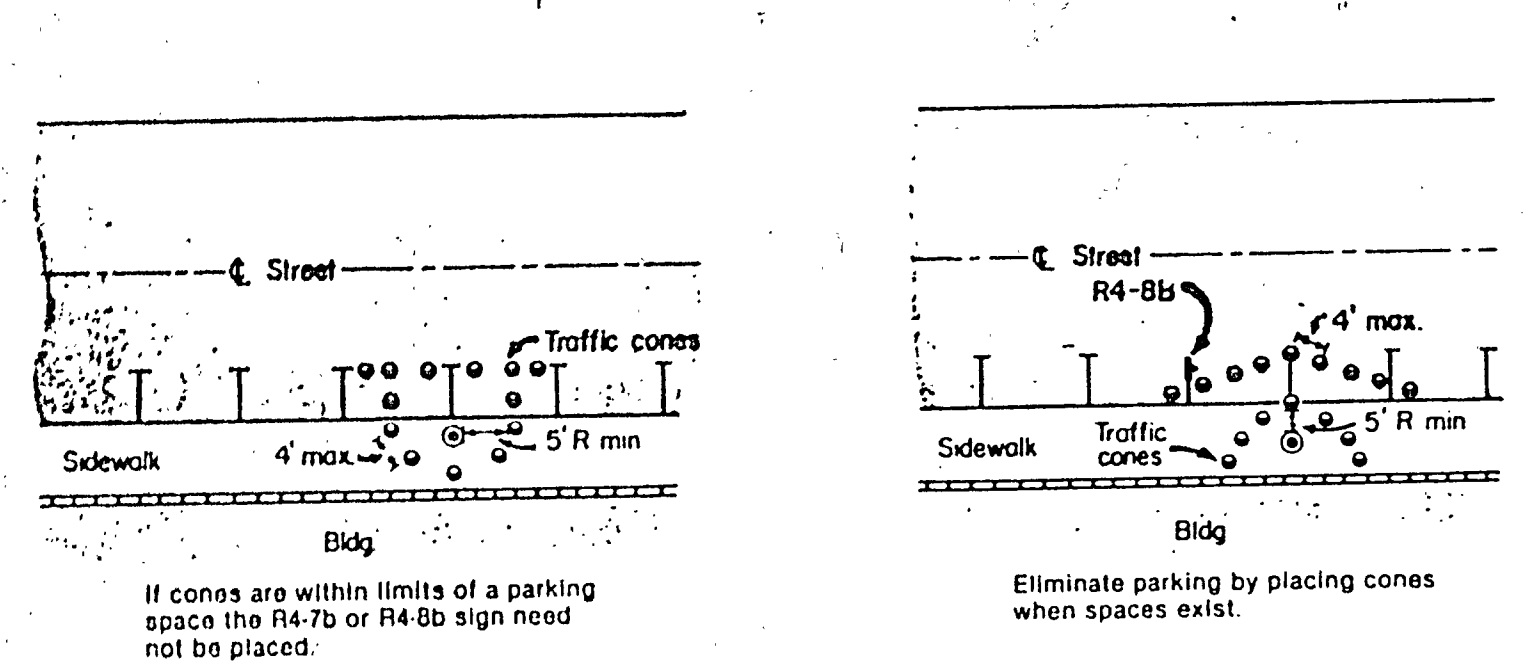
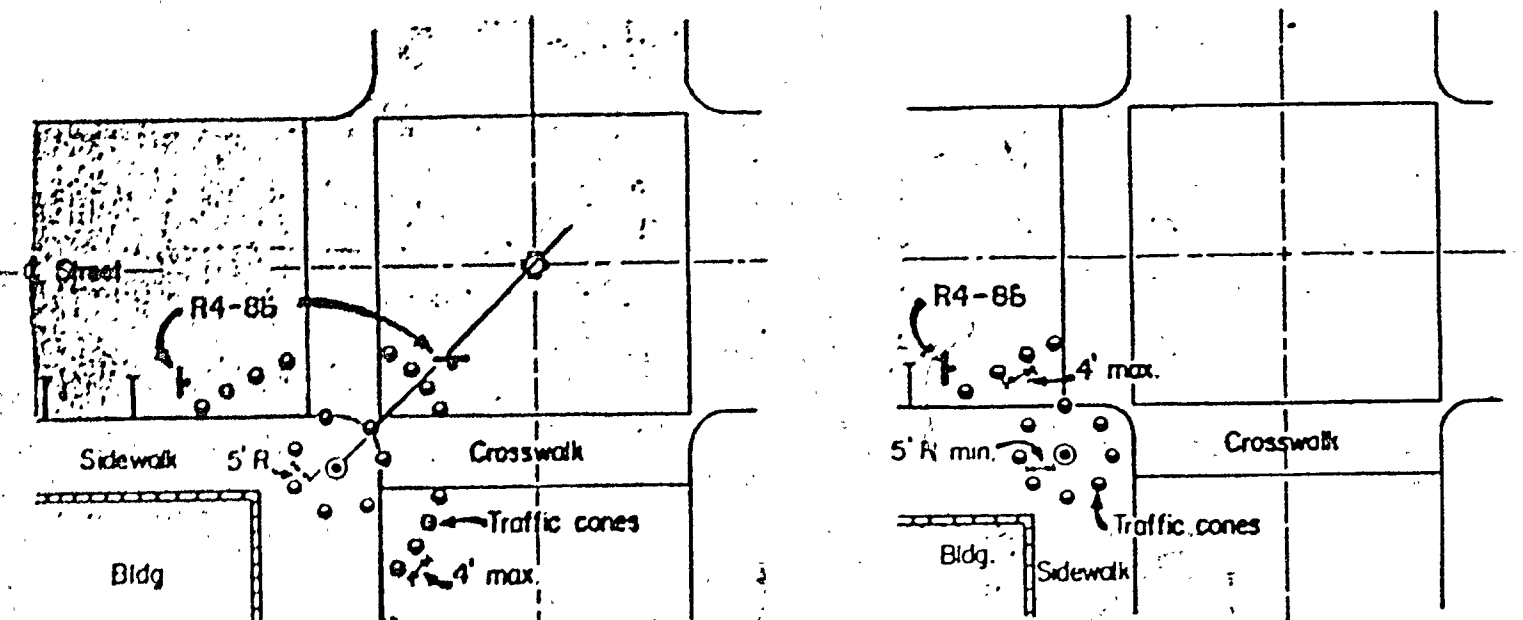
PULL BOX DETAILS
 Scale: NONE

SHEET
 18
 OF
 19
 91268-18



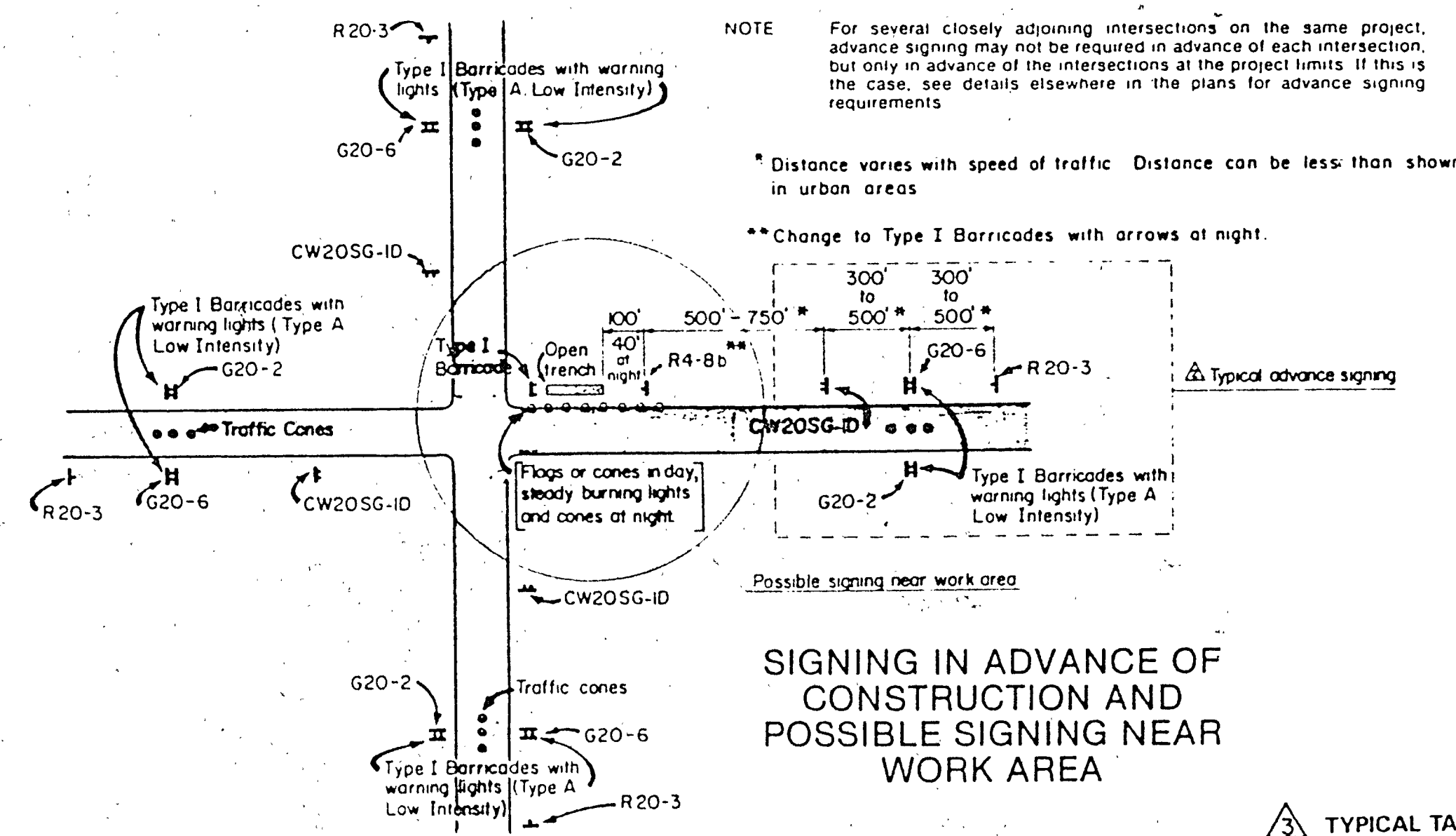
TYPICAL DETECTOR INSTALLATION

- At Night—1. Steady burn lamps for delineation instead of cones.
- 2. Flashers on barricades.



TYPICAL RESTRICTED PEDESTRIAN MOVEMENTS

Where pedestrian movements are anticipated at night, all holes, trenches or other hazardous areas shall be adequately protected by use of barricades, lights or other protective devices

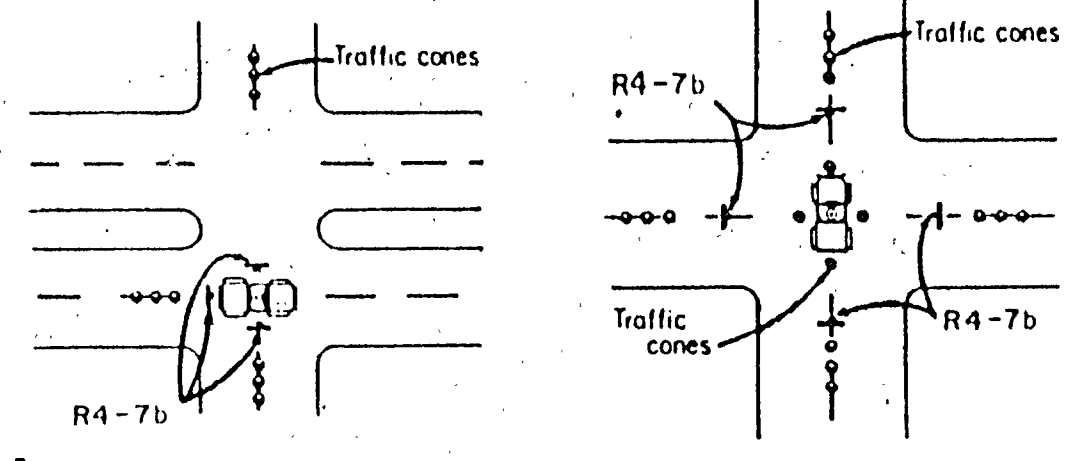


TYPICAL TAPER LENGTH (L)

Post-to-Speed	Formula	Minimum Desirable Taper Lengths*		
		10	11	12
30	$L = \frac{VS^2}{60}$	150	165	180
35		205	225	245
40		265	295	320
45		330	375	410
50	$L = WS$	500	550	600
55		550	605	660
60		600	660	720

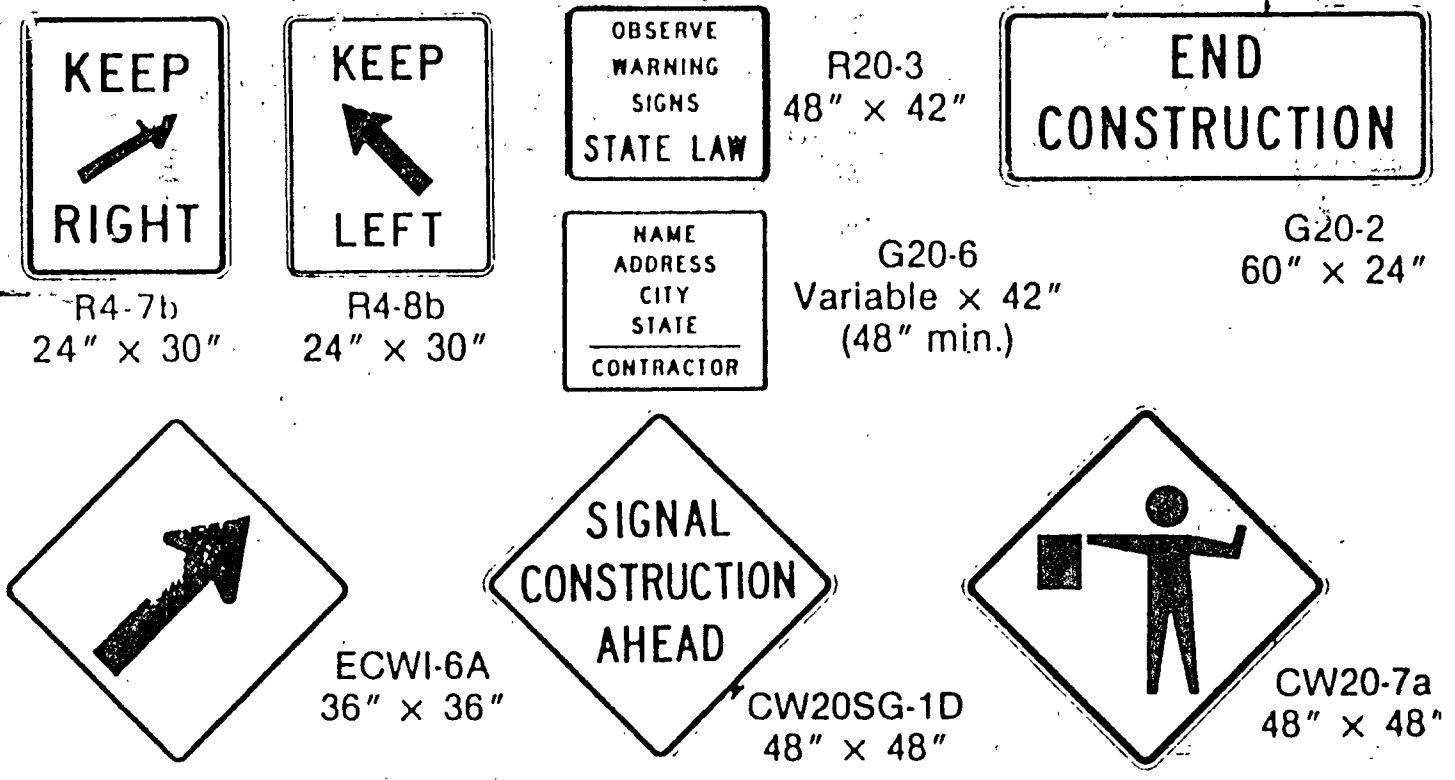
* 85TH PERCENTILE SPEED MAY BE USED ON ROADS WHERE TRAFFIC SPEEDS NORMALLY EXCEED THE POSTED SPEED LIMIT. TAPER LENGTHS HAVE BEEN ROUNDED OFF.

L = TAPER LENGTH IN FEET
W = OFFSET IN FEET
S = SPEED IN MPH



TYPICAL HANGING SIGNAL INSTALLATIONS

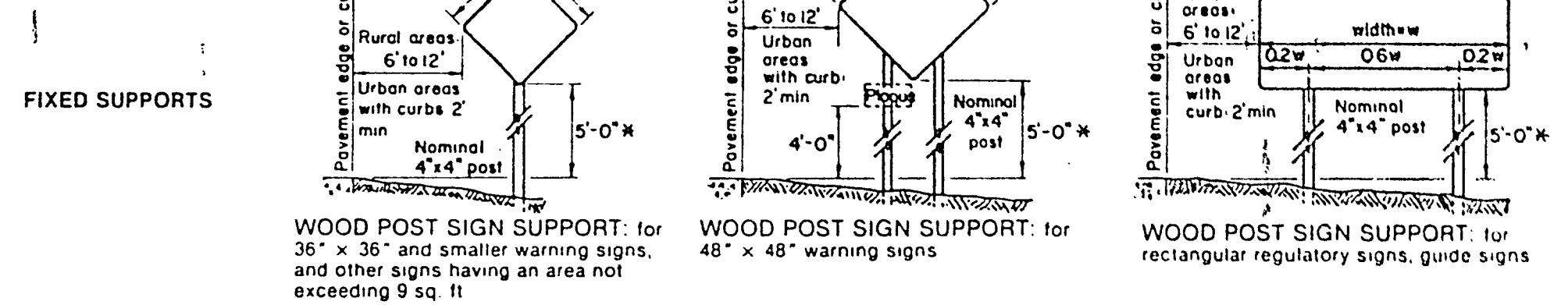
- 1. Flagmen & CW20-7a sign may also be required according to field conditions.
- 2. Use vehicle equipped with yellow rotating beacon or strobe.



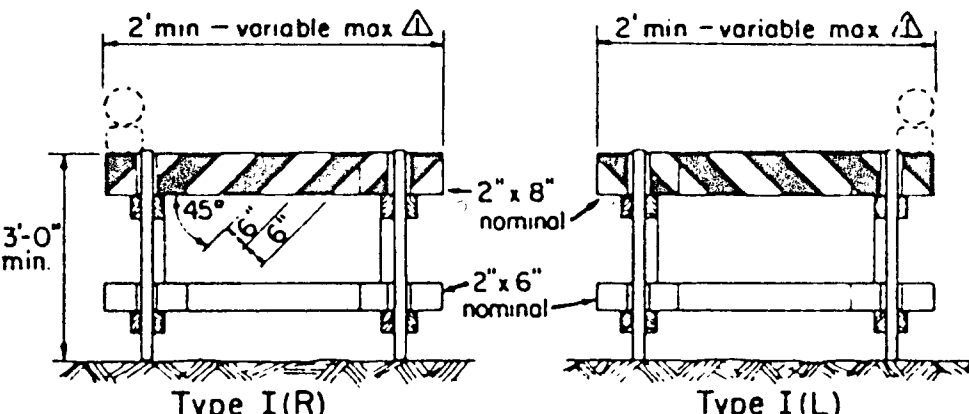
TYPICAL SIGNS USED IN TRAFFIC SIGNAL CONSTRUCTION AREAS

TYPICAL SIGN SUPPORTS

Other type of portable or temporary sign supports may be used with approval of the ENGINEER

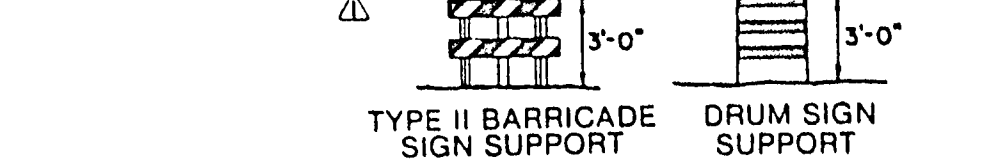


For Type I Barricades, both sides of the top rail shall have reflective orange and reflective white striping



TYPICAL BARRICADES

TEMPORARY SUPPORTS



PORTABLE SUPPORTS



GENERAL NOTES

ReflectORIZED signs shall be constructed of retro-reflective sheeting in conformance with project specifications and shall be maintained to meet the appearance, color and reflectivity requirements of those specifications. Paints and coloration of signs shall be equal to the Department's standards. Signs shall comply with the general requirements specified in the "Standard Specifications for Construction of Highways, Streets and Bridges" in effect at the time of contract award.

All traffic control devices shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways." Contractors shall furnish a copy of a certification from the manufacturer of the lights that the warning lights meet the requirements of the ITE Standard for Flashing and Steady Burn Warning Lights as contained in the latest edition of the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways."

All signs shown have black letters and borders on a reflective orange background except the R20-3, R4-7b, R4-8b, and G20-6 signs which have a reflective white background.

Signs erected on portable supports for use on construction projects normally mean signs which are used during the day to warn or guide traffic through and/or around the actual construction area, but at the end of the workday such signs are either removed or turned away from the view of traffic. Portable supports shall be as shown on this sheet or as approved by the Engineer. Signs required for nighttime usage should not normally be mounted on temporary supports, except when approved by the Engineer. Signs erected on fixed supports for use on construction projects normally mean signs that are to remain in place for both day and night usage to regulate, warn and guide traffic in advance of and within the limits of the project including the crossroad approaches. However, under certain conditions, such as where a sign may be required for a few days' duration and then is no longer needed or where a sign is moved from a location to location every few days or where it is not practical or desirable to provide a fixed mounting, such signs may be erected on a temporary type of support. Temporary supports shall be as shown on this sheet or as approved by the Engineer. Signs erected on temporary supports should be at a minimum height of three (3) feet. Signs erected on fixed supports should be at a minimum height of five (5) feet in rural areas and seven (7) feet in urban areas and other rural locations where sight distance obstructions are present. Regardless of the type of support used, regulatory signs should not be erected at height less than the 5- or 7-foot minimum specified above unless a lower height is approved by the Engineer. Posts for fixed supports should be set in the ground without concrete footings.

Where portable or temporary supports require the use of weights to keep a sign or barricade from turning over, the use of some type of sandbag is recommended. The use of pieces of concrete, rocks, iron, steel or other solid objects will not be permitted.

For additional information and guidelines on barricades and construction signs see the Texas Manual on Uniform Traffic Control Devices.

Signing shown is typical and may be adjusted to fit field conditions by the Engineer.

No more than two signs shall be placed on a barricade.

Where a sign is to be mounted on a barricade, the barricade length should not be less than the horizontal dimension of the sign. If lights are also to be mounted on the barricade, the barricade should not be less than the sign width plus about 12" for each light to be attached. Barricades of a greater length than the above will be satisfactory.

The advance signs and barricades shall be in place when signal construction operations are in progress. The contractor may remove the advance signs and barricades when there are no construction operations underway if permitted elsewhere in the plans. Any obstructions or hazards at the work area shall be clearly marked and delineated at all times.

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DUNAWAY ASSOCIATES, INC.

DeShazo, Starek, & Tang, Inc.
ENGINEERS • PLANNERS
330 Union Station
Dallas, Texas 75202-4802
(214) 748-6740
Fax: (214) 748-7037

DESIGN BY: BDJ
DRAWN BY: BBP
CHECKED BY: BDJ
APPROVED BY: _____

DATE: 3-11-92
DATE: 3-11-92
DATE: 3-11-92
DATE: _____

55-92

TYPICAL CONSTRUCTION LAYOUTS FOR TRAFFIC SIGNAL INSTALLATIONS

Scale: NONE

SHEET 19 OF 19
91268-19