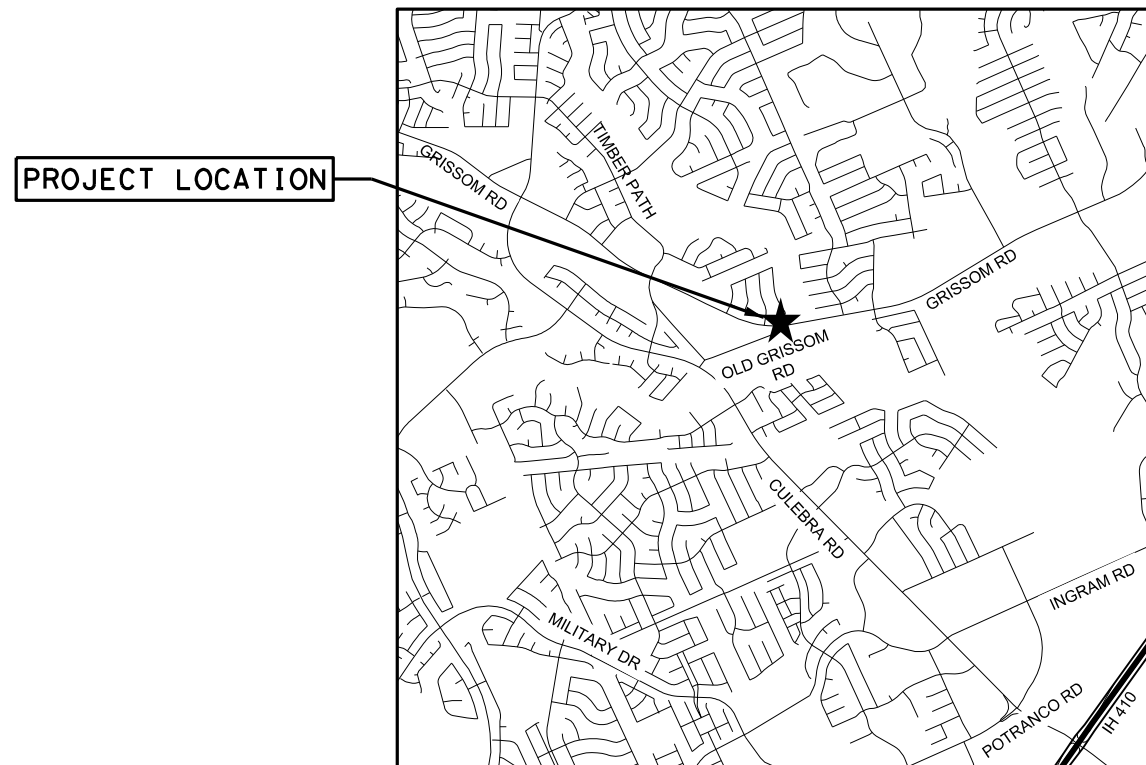


CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

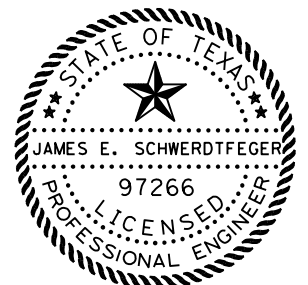
GRISSOM RD AT OLD GRISSOM RD
TRAFFIC SIGNAL DESIGN



CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

THROUGH INNOVATION AND DEDICATION, WE BUILD AND MAINTAIN SAN ANTONIO'S INFRASTRUCTURE

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James Schwerdtfeger

12/21/2023



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County: BEXAR

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*****GENERAL NOTES*****
2014 Specification Book (Revised March 15, 2022)

--General--

- G-3

Contact the Engineer or the City when construction operations are within 400 feet of a signalized intersection to determine/verify the location of loop detectors, conduit, ground-boxes, etc. Repair or replace any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, the Engineer reserves the right to perform the repair or replacement work and the Contractor will be billed for this work.
- City of San Antonio: (210) 207-8642
- G-4

Remove existing raised pavement markings as the work progresses or as approved. This work is subsidiary to the various bid items. Properly dispose materials removed.
- G-6

If there are waste areas or material source areas, follow the Texas Aggregate Quarry and Pit Safety Act requirements.
- G-7

Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Properly dispose unsalvageable materials in accordance with local, state, and federal regulations. Deface traffic signs so that they will not reappear in public as signs.
- G-8

Any sign panels that are adjusted or removed and replaced, shall be done the same workday unless otherwise approved. This work shall be considered subsidiary to Item 502.
- G-9

Notify the Engineer at least two weeks prior to a proposed traffic pattern change(s) that will require a revision to traffic signals.
- G-10

Locate and reference all manholes and valves within the construction area with station and offset. Each manhole and valve shall be identified by its owner (SAWS, CPS, etc.). No roadwork will begin until this list has been submitted. All valves and manhole covers have to be accessible at all times, therefore; temp. CTB, material stock piles, etc. cannot be placed over these valves or covers.
- G-11

Adjust or construct all manholes and valves to final pavement elevations prior to the final mat of ACP. If, between the final elevation adjustment and the final mat of ACP, the manholes and valves are going to be exposed to traffic, place temporary asphalt around the manhole and valve

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to provide a +/- 50:1 taper. The cost of elevation adjustment and the concrete apron around the manhole and valve will be part of the manhole and valve work. The asphalt tapers are part of the ACP work.

G-12 Hurricane Evacuation

Hurricane Season is from June 1 thru November 30. As the closest metropolitan city inland from the Texas Coast, the City of San Antonio is a major shelter destination during mandatory hurricane evacuations. As such, planned work zone lane or road closures may be restricted and/or suspended during mandatory hurricane evacuation operations. The District will coordinate these restrictions at a minimum H-120 from any projected impact to the Texas Coast.

No time charges will be made if the Engineer determines that work on the project was impacted by the hurricane.

The Engineer may order changes in the Traffic Control Plan to accommodate evacuation traffic, and may suspend the work, all or in part, to ensure timely completion of this work. All work to implement changes in the Traffic Control Plan will be paid through existing bid prices or through Item 9.5, Force Account. However, the Department will not entertain any request for delay damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.

- G-13

The Contractor should be aware that the "City Public Service" (CPS) will be consulted by the Engineer in matters concerning the execution of the work, materials and testing related to the CPS work. As such; a CPS employee may be observing the construction and related operations as they progress.

- G-14

If a sanitary sewer overflow (SSO) occurs:

1. Attempt to eliminate the source of the SSO.

2. Contain sewage from the SSO to the extent possible to prevent contamination of waterways.

3. Call SAWS at (210) 233-2015.

- G-16

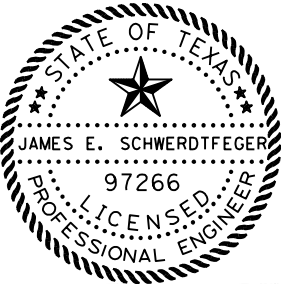
Submit locate request for SAWS water and sewer

- G-17

Contractor questions on this project are to be addressed to the following individual(s):
Marc Jacobson, P.E. PTOE, Marc.Jacobson@sanantonio.gov

General Notes

Sheet B



James Schwerdtfeger

12/21/2023

REVISION		DATE	DESCRIPTION	BY
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		GRISSOM RD AT OLD GIRSSOM RD TRAFFIC DESIGN		
		GENERAL NOTES		
DEVELOPER:				
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Contractor questions will be accepted through email, phone, and in person by the above individuals.

--Item 5--

5-1 Reference all existing striping and other pavement markings to allow these markings to be re-established. Ensure the markings (lane lines, edge lines, ramp gores, etc.) are in line with signs, TMS arrows, etc. located on overhead sign supports.

5-5 When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations. A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines in order to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and backfeed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.

5-6 Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, nests containing migratory birds must be avoided and no work will be performed in the nesting areas until the young birds have fledged.

Structures

Bridge and culvert construction operations cannot begin until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting

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deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

5-7 Provide a non-intrusive back-up alarm system on all heavy equipment used in close proximity to residential areas. This item is subsidiary to various bid items.

--Item 6--

6-1 Show the stockpile lot and/or sub lot numbers on all tickets for all materials.

6-2 Steel Wrapped or Asbestos Utility Lines:

Existing steel wrapped natural gas and/or asbestos cement (AC) water lines that will no longer be in service are usually abandoned in place (AIP). However, if any of these lines have to be removed for whatever reason (in the way of other construction, to make tie-ins, etc.), comply with Item 6.

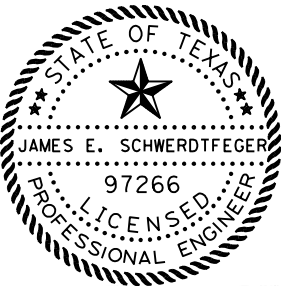
If removal of AC water lines is included in the construction contract, then notify the Engineer of proposed dates of removal of the AC water lines in accordance to Item 6. Excavate to the top of the AC water line to allow a separate contractor hired by the State to remove the AC water line. The excavation for the AC water line removal is subsidiary to the work that created the need for the removal (excavation for structures, roadway, a new line, tie-ins, etc.).

--Item 7--

7-1B The total disturbed areas within the project is anticipated at less than one (1) acre. Due to this type of construction, the project qualifies for exclusion under the Construction General Permit (CGP) issued by the Texas Commission on Environmental Quality (TCEQ). However; should the sum of the Engineer's anticipated disturbances and the Contractor's (On ROW and off



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Sheet D



James Schwerdtfeger

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GENERAL NOTES			
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ROW) PSL’s equal or exceed the one (1) acre threshold; both TxDOT and the Contractor have project responsibilities under the CGP that reverts to non-exclusion status. Obtain approval for all non-depicted areas of disturbance that increases the initial soil and vegetation disturbed area estimates before work starts at these locations.

7-2 Notify the Engineer of the disturbed acreage within one (1) mile of the project limits. Obtain authorization from the TCEQ for Contractor PSL’s for construction support activities on or off ROW.

7-3A No significant traffic generators events identified.

--Item 8--

8-1 Working days will be computed and charged in accordance with Article 8.3.1.4 – Standard work week.

8-3 Create and maintain a Bar Chart schedule.

--Item 9--

9-1 When approved, provide uniformed, off-duty law enforcement officers with marked vehicles during work that requires a lane closure. The officer in marked vehicles shall be located as approved to monitor or direct traffic during the closure. The method used to direct traffic at signalized intersections shall be as approved. Additional officers and vehicles may be provided when approved or directed.

Complete the daily tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Show proof of certification by the Texas Commission on Law Enforcement Standards.

All law enforcement personnel used in Work Zone Traffic Control shall be trained for performing duties in work zones and are required to take “Safe and Effective Use of Law Enforcement Personnel in Work Zones” (Course #133119) which can be found online at the following site: www.nhi.fhwa.dot.gov

Certificates of completion should be available to all who finish the course. These should be kept by the officers in order to substantiate completion when reporting to the work site.

Minimums, scheduling fees, etc. will not be paid; TxDOT will consider paying cancellation fees on a case by case basis.

--Item 500--

500-1 "Materials on Hand" payments will not be considered in determining percentages for mobilization payments.

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--Item 502--

502-1 Place standard markings no later than 14 days after surface treatment operations are completed.

502-2 When advanced warning flashing arrow panels and/or changeable message sign is specified, have one standby unit in good condition at the job site. Standby time shall be considered subsidiary to the bid item.

502-3 Treat the pavement drop-offs as shown in the TCP.

502-4 After written notification, the time frame is provided on the Form 599 to provide properly maintained signs and barricades before considered in non-compliance. Failure to make corrections as noted may result in payment for this item being withheld.

502-5 There are traffic signals at the intersection of Castroville Rd @ Cupples Rd, Commercial @ Harding Blvd, Ingram Rd @ Oakhill Rd, McCullough Ave @ Brooklyn Ave, Military Dr @ Westfield, Nacogdoches Rd @ Astronaut Dr, New Braunfels Ave @ Claywell Rd, and Zarzamora St @ Culberson Ave. Keep the signals in operation at all times except when necessary for specific installation operations, including any modifications to existing signal heads to maintain clear visibility at all times. Adjustment of any signal head will be subsidiary to Item 502. When it is necessary for a signal to be turned off, hire off duty police officers to control the traffic until the signals are back in satisfactory condition.

502-6 Moving an existing sign to a temporary location is subsidiary to this Item. Installations with permanent supports at permanent locations will be paid for under the applicable bid item (s).

502-7 Mount temporary mailboxes on plastic drum in accordance with Compliant Work Zone Traffic Control Devices, Section K. Mounting and moving the mailbox as needed for the various construction phases is subsidiary to this Item.

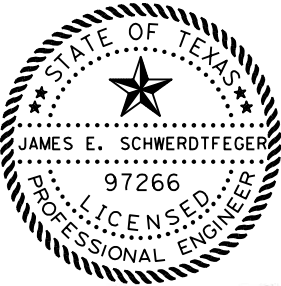
502-8 Notify the Engineer in writing 10 business days in advance of any temporary or permanent lane, ramp, connector, etc. closures/detours, restrictions to lane widths, alterations to vertical clearances, or modifications to radii. Any other modifications to the roadway that may adversely affect the mobility of oversized/overweight trucks also require 10 business days advance written notice to the Engineer. Unless shown in the TCP, no lane, ramp, connector, etc. closures are allowed during special events. At least one lane has to remain open at all times. Lane closures will not be allowed if this reporting requirement is not met.

502-8A For closures not listed in the TCP; the lane closures are limited to between the hours of 9AM and 3 PM, and at least one lane has to remain open at all times.

502-9 Avoid placing stockpiles within the roadway’s horizontal clear zone. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.



General Notes

Sheet F



James Schwerdtfeger

12/21/2023

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- 502-10

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets.
- 502-11

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 2 hours or within a reasonable time frame as specified by the Engineer.
- 502-13

If Nighttime work is required and work is not behind positive barrier then full TY 3 reflective gear is required to be worn by all workers, hard hat halos are required to be worn by the flaggers at flagging stations, TY III barricades are required to be spaced at 500 ft, and a mandatory night work meeting is required.
- 502-14

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.
- 502-15

Moving or adjustment of traffic signal heads, VIVDS, and radar detection for the purpose of alignment with the shifting of lanes in conjunction with the traffic control plan will be subsidiary to various bid items.
- Item 506--

An Inspector will perform a regularly scheduled SWP3 inspection every 7 calendar days.
- 506-3

Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.
- 506-4

Failure to correctly maintain daily monitoring reports and submitting to TxDOT on a daily/weekly basis may result in the monthly estimate being withheld.
- Item 531--

The curb ramp locations shown in the plans have taken into account the geometric features of the intersection, traffic signals, and the pavement markings. If anything changes during construction, the location of curb ramps must be adjusted to ensure they meet TAS requirements.

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- 618-1

--Item 618--
It might be necessary to cut concrete for placement of conduit. Saw cut existing concrete, remove the concrete from the steel reinforcement (bars or fabric) and bend the steel to install the conduit. After the conduit has been placed, bend the steel back to its original position and back-fill the trench with an approved concrete. This work is subsidiary to this Item.
- 618-2

The conduit depth for illumination under the City of San Antonio streets is 36 inches.
- 618-3

Use materials from Material Producers list as shown on the Construction Division's (CST) web site. Category is "Roadway Illumination and Electrical Supplies."
- 628-1

--Item 628--
Make all arrangements for electrical service, and compliance with local standards and practices for proper installations.
- 644-1

--Item 644--
The wedge anchor system shown on State Standard Sheet SMD (TWT) is not allowed.
- 644-2

The set screw type for Triangular Slipbase Systems is not allowed. Use the following products for the Triangular Slipbase System.
- Triangular Slip Base Systems
(For use with 10 BWG and Schedule 80 Round Posts)

Southern Plains Fabrication	SPF Triangular Slipbase Housing	Info@SouthernPlainsFabrication.com http://SouthernPlainsFabrication.com (806) 241-0060
Structural and Steel Products	Triangular Slipbase Breakaway Support	CustServ@s-steel.com http://s-steel.com (800) 782-5804
- 666-1

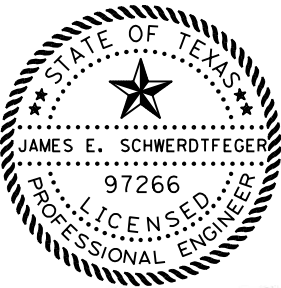
--Item 666--
Use TY II material (vs. an acrylic or epoxy) as the sealer for the TY I markings, place the TY II a minimum of 14 calendar days (to provide adequate curing) before placing the TY I markings.
- 666-2

Failure to provide the retroreflectometer testing data within the time specified in the specifications will result in non-payment of the bid item.
- 672-1

--Item 672--
Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The

General Notes

Sheet H



James Schwerdtfeger

12/21/2023

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<div><div></div><div>GRISSOM RD AT OLD GIRSSOM RD TRAFFIC DESIGN</div></div>		GENERAL NOTES	
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adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

--Item 677--

Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.

--Item 680--

680-1 Furnish and install all required materials and equipment necessary for the complete and operating traffic signal installation at the following intersections: Castroville Rd @ Cupples Rd, Commercial @ Harding Blvd, Ingram Rd @ Oakhill Rd, McCullough Ave @ Brooklyn Ave, Military Dr @ Westfield, Nacogdoches Rd @ Astronaut Dr, New Braunfels Ave @ Claywell Rd, and Zarzamora St @ Culberson Ave.

680-2 All workers installing electrical materials, including conduit in trenches, service poles and all other system electrical apparatus, will be directly supervised by persons who have completed a TxDOT approved course in electrical underground installations. Furnish evidence of satisfactory completion of the underground electrical installation for roadway illumination and signal control course for all personnel responsible for direct supervision of electrical installation work.

680-3 The locations shown on the plans for signal pole foundations, controller foundations, conduit and other items may be adjusted to better fit field conditions as approved.

680-4 Furnish and install a new City of San Antonio type 332 Cabinet and 2070 Controller with Intelight Maxtime software.

680-5 Deliver controller cabinet and assembly to the City of San Antonio signal shop for programming and testing two weeks in advance prior to contractor installing equipment in the field.

680-6 Connect all field wiring to the controller assembly into the polyphaser. The City of San Antonio Signal Shop representative will assist in determining how the detection cables are to be connected, and will also program the controller for operation, hook up the malfunction management unit (MMU) or conflict monitor, detector units, and other equipment, and turn on the controller. Have a qualified technician on the project site to place the traffic signals in operation.

680-7 Once final punch list is complete, contractor is allowed to begin flashing signal operations. Signal shall flash for a minimum of 7 days prior to full operation, unless otherwise approved by the Engineer.

680-8 Use LED lamps from the prequalified material producer lists as shown on the Texas Department of Transportation (TxDOT) – Construction Division’s (CST) material producer list. Category is

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“Roadway Illumination and Electrical Supplies.” under item 610. No substitutions will be allowed for materials found on this list.

680-9 Demonstrate that the field wiring is properly installed, install the controller assembly, connect the wiring and turn on the controller.

680-10 The following wiring sequence shall be used when connecting signal sections to the cabinet:

Conductor No.	Base Color	Tracer Color	Signal Face
1	Black		Yellow Ball
2	White		Neutral
3	Red		Red Ball
4	Green		Green Ball
5	Orange		Yellow Arrow
6	Blue		Green Arrow
7	White	Black	Spare

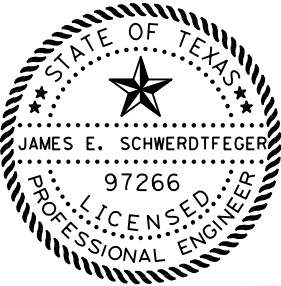
680-11 All existing signal equipment with the exception of the signal controller and related equipment become the property of the Contractor. Deliver the controller and related equipment to the Signal shop, located at 4615 NW Loop 410 (corner of IH 410 and Callaghan Road) in San Antonio, Texas or to the Area Office as directed.

680-12 Use qualified personnel to respond to and diagnose all trouble calls during the thirty-day test period. Repair any malfunction to Contractor-supplied signal equipment. Provide to the Engineer a local telephone number, not subject to frequent changes and available on a 24-hour basis, for reporting trouble calls. Response time to reported calls must be less than 2 hours. Make appropriate repairs within 24 hours. Place a logbook in the controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call. Do not clear the error log in the conflict monitor or MMU during the thirty-day test period without approval.

680-13 Integrate the proposed traffic signal(s) into the existing Advanced Traffic Management System (ATMS) as shown on the plans. Centrac's ATMS software, which utilizes Econolite controllers, is currently in use in the San Antonio District. Provide controllers on this project that fully communicate with the existing ATMS software. For use when signal controller is furnished by contractor.

General Notes

Sheet J



James Schwerdtfeger

12/21/2023

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- 680-14

This project includes the installation of at least one cellular modem at the location(s) specified in the plans. Cellular modem(s) and power supply(s) will be furnished by the department. Provide all materials not supplied by the department necessary for the cellular modem installation. All materials provided by the contractor must be new unless otherwise shown on the plans. Equipment provided by the department shall be stored by the department for pick up at the TxDOT San Antonio district office, 4615 NW Loop 410 San Antonio, TX 78229. Prevent damage to all cellular modem components supplied by the department. Replace any component that is damaged or lost during transportation or installation at the contractor’s expense. Verify operation of the cellular modem(s) together with operation of its links; demonstrate that data can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the cellular modem(s) data packets are being received at the central site via a networked computer. Transportation, installation and incidentals for installation of the cellular modem(s) shall be considered subsidiary to item 680. For use when a cellular communication link will be established to Transguide.
- 680-15

Provide a submittal compliance matrix with all traffic signal submittals.
- 680-16

Contractor shall be responsible for field verifying the depths of the drill shafts to meet the minimum clearances specified in the plans before ordering materials.
- 680-17

Damage to existing facilities such as traffic signal equipment, conduit, cables, etc. caused by the contractor during construction will be replaced by the contractor at no cost to TxDOT with equipment as approved by the engineer. Replace all pavements, sidewalk, curb, rip-rap or any item damaged during construction subsidiary to various bid items with no direct payment. Any damage that was not caused by the contractor during operations will be reimbursed for repair of damage caused by: motor vehicle, watercraft, aircraft, or railroad-train incident, vandalism or acts of God, such as earthquake, tidal wave, tornado, hurricane, or other cataclysmic phenomena of nature.
- 680-18

Ensure that all TMS (Traffic Management System) equipment furnished and installed is completely compatible with the existing hardware and software located within the Transguide operations center (i.e. Transguide central software). The contractor shall contact the traffic management engineer for details on the system network architecture.
- 680-19

Contractor shall be responsible for integrating and testing all new TMS equipment and any existing TMS equipment that is relocated into the existing network management system, subsidiary to the various bid items.
- 680-20

Security against theft and vandalism of all traffic signal equipment is the full responsibility of the contractor until the date of final acceptance of the project by the engineer.

General Notes

Sheet K

Control: 0915-12-624, ETC

Sheet

County: BEXAR

Highway: CS

- 680-21

Maintenance of all TMS equipment furnished and installed on this project is the full responsibility of the contractor until date of final acceptance of this project by the engineer. All required documentation must be turned in before TxDOT will accept project for maintenance.
- 680-22

Perform all electrical work in accordance with the National Electrical Code and Texas Department of Transportation Specifications.
- 680-23

In accordance with the Underground Facility Damage Prevention Act (One Call Bill) the phone number for a utility locator is 1-800-545-6005. It is the Contractor's responsibility to make arrangements for utility locators as needed.
- 680-24

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way. Call the TxDOT offices listed below for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages incurred to the above mentioned utilities when working without having the utilities located prior to excavation.
- Item 682--

682-1

Provide all signal heads from the same manufacturer. Pedestrian signals may be by a different manufacturer than the vehicle signal heads.
- 682-2

Cover all signal faces until placed in operation.
- 682-3

All pedestrian signal faces shall be single section LED Type. Die cast polycarbonate is acceptable in lieu of die cast aluminum. All mounting attachments shall be constructed of steel pipe and mounted as shown on the plans.
- 682-4

For all proposed mast arm pole assemblies, use mounting bracket assembly Option "C" as shown on the State Standard Sheet(s) "Single Mast Arm Assemblies”.
- Item 684--

684-1

Provide an extra 10’ for each cable terminating in the controller cabinet. All cables shall be continuous without splices from terminal point to terminal point. All proposed signal cable shall be #12 AWG stranded copper.
- Item 686 & 687--

686-1

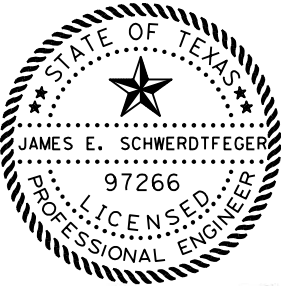
Provide all signal poles from the same manufacturer. Pedestrian poles may be from a different manufacturer.
- Item 688--

688-1

The sealant used for vehicle loop wire must be approved.

General Notes

Sheet L



James Schwerdtfeger

12/21/2023

REVISION		DATE	DESCRIPTION	BY
		Texas PE Firm Reg. #F-929		
711 Navarro St, Suite 560, San Antonio, Texas 78205		T +1 210 299 7900 E usinfrastructure@rpsgroup.com		
	GRISSOM RD AT OLD GIRSSOM RD TRAFFIC DESIGN			
	GENERAL NOTES			
DEVELOPER:				
CONT.		BUDGET PROJ.		
SUBMITTED				
APPROVED				
MAP NO.				SHEET
SECT. NO.				
DR. SN	CK. JS	JOB NO. 8310		7 OF 65

Control: 0915-12-624, ETC

Sheet

County: BEXAR

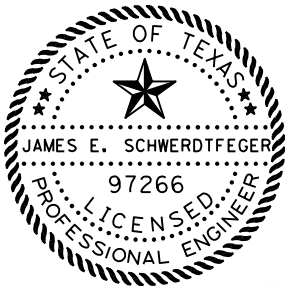
Highway: CS

- 688-2

The force to activate the control shall be no greater than 5 lb/f. The button placement has to be coordinated with the concrete pad to access the button and if any mounting modifications are needed (extensions, brackets, etc.) to meet ADA and TDLR requirements the adjustment will be subsidiary to Item 688. The concrete pad (if required) shall be paid separately.
- 688-3



The pedestrian push button shall be wired with a 2/C#14 loop detector cable in lieu of a #12 A.W.G. XHHW wire.
- 688-4

Furnish and install new Polara Enterprises accessible pedestrian signals (APS) push buttons or approved equivalent.



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12/21/2023

REVISION	DATE	DESCRIPTION	BY
<div><div></div><div>Texas PE Firm Reg. #F-929</div><div>711 Navarro St, Suite 560, San Antonio, Texas 78205 T +1 210 299 7900 E usinfrastructure@rpsgroup.com</div></div>			
<div></div>		GRISSOM RD AT OLD GIRSSOM RD TRAFFIC DESIGN	
GENERAL NOTES			
DEVELOPER:			
CONT.		BUDGET PROJ.	
SUBMITTED			
APPROVED			
MAP NO.			SHEET
SECT. NO.			
DR. SN	CK. JS	JOB NO. 8310	
			8 OF 65

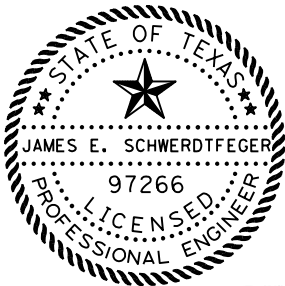
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SUMMARY OF QUANTITIES				
ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QUANTITY
TRAFFIC SIGNAL ITEMS				
416	6030	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF	24
416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	42
618	6023	CONDT (PVC) (SCH 40) (2")	LF	280
618	6029	CONDT (PVC) (SCH 40) (3")	LF	460
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	310
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	670
620	6007	ELEC CONDR (NO.8) BARE	LF	1,240
620	6009	ELEC CONDR (NO.6) BARE	LF	240
620	6010	ELEC CONDR (NO.6) INSULATED	LF	500
621	6002	TRAY CABLE (3 CONDR) (12 AWG)	LF	720
624	6010	GROUND BOX TY D (162922)W/APRON	EA	4
628	6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	4
680	6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1
	**	TYPE 332 CONTROLLER FOUNDATION	EA	1
	**	CONTROLLER, IN GROUND MOUNTED CABINET	EA	1
	**	TRAFFIC SIGNAL CONTROLLER ASSEMBLY (TYPE 332	EA	1
	**	MAST ARM, 8' LUMINAIRES	EA	2
	**	ROD, 5/8" X 10' COPPER CLAD GROUND	EA	1
	**	EMERGENCY PREEMPTION DETECTOR	EA	3
	**	EMERGENCY PREEMPTION DETECTOR CABLE	LF	583
	**	STREET NAME SIGN	EA	3
	**	ILSN ARM	EA	3
	**	OVERHEAD SIGNS	EA	1
682	6001	VEH SIG SEC (12")LED(GRN)	EA	7
682	6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
682	6003	VEH SIG SEC (12")LED(YEL)	EA	7
682	6004	VEH SIG SEC (12")LED(YEL ARW)	EA	3
682	6005	VEH SIG SEC (12")LED(RED)	EA	7
682	6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA	4
682	6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	6
682	6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	1
682	6056	BACKPLATE W/REF BRDR(5 SEC)(VENT)ALUM	EA	1
684	6030	TRF SIG CBL (TY A)(14 AWG)(4 CONDR)	LF	1,030
684	6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	LF	1,620
684	6049	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)	LF	660
686	6046	INS TRF SIG PL AM(S)1 ARM(44')ILSN	EA	1
686	6048	INS TRF SIG PL AM(S)1 ARM(44')LUM&ILSN	EA	2
687	6001	PED POLE ASSEMBLY	EA	4
688	6001	PED DETECT PUSH BUTTON (APS)	EA	4
	**	SIGN, PEDESTRIAN PUSH BUTTON (9" X 15") (R10-3eL)	EA	3
	**	SIGN, PEDESTRIAN PUSH BUTTON (9" X 15") (R10-3eR)	EA	1
6010	6001	CCTV FIELD EQUIPMENT	EA	1
	**	CCTV COMM CABLE	LF	300
6058	6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6083	6001	VIDEO IMAGING AND RADAR VEHICLE DETECTION	EA	2
6437	6001	FEDS PROCESSOR UNIT	EA	1
6437	6002	FEDS FISH EYE CAMERA ASSEMBLY	EA	1
6437	6004	LIFETIME FEDS DATA COLLECT & REPORTING	EA	1
6437	6005	FEDS ETHERNET REPEATER	EA	1
6437	6006	FEDS COMMUNICATION CABLE	LF	300

** MATERIALS SUBSIDIARY TO PERTINENT ITEMS

SUMMARY OF QUANTITIES				
STRIPING AND CURB RAMP ITEMS				
ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QUANTITY
500.1	*	CONCRETE CURB	LF	68
502.1	*	CONCRETE SIDEWALK	SY	4
531	*	R10-17 LEFT TURN YIELD ON FLASHING YELLOW ARROW	EA	1
531.46	*	W3-3 SIGNAL AHEAD (36" X 36")	EA	2
531.11	*	R3-5 LEFT ONLY (30" X 36")	EA	1
531.11	*	R3-5 RIGHT ONLY (30" X 36")	EA	1
531	6004	CURB RAMPS (TY 1) (MOD)	EA	1
531	6005	CURB RAMPS (TY 2) (MOD)	EA	1
531	6006	CURB RAMPS (TY 3) (MOD)	EA	1
666	6036	REFL PAV MRK TY 1 (W) 8" (SLD) (100MIL)	LF	419
666	6048	REFL PAV MRK TY 1 (W) 24" (SLD) (100MIL)	LF	230
666	6054	REFL PAV MRK TY 1 (W) (ARROW) (100MIL)	EA	6
666	6078	REFL PAV MRK TY 1 (W) (WORD) (100MIL)	EA	3
666	6138	REFL PAV MRK TY 1 (Y) 4" (SLD) (100MIL)	LF	1,340
666	6147	REFL PAV MRK TY 1 (Y) 24" (SLD) (100MIL)	LF	29
666	6156	REFL PAV MRK TY I (Y) (MED NOSE) (100 MIL)	EA	2
672	6007	REFL PAV MRKR TY 1-C	EA	20
672	6009	REFL PAV MRKR TY II-A-A	EA	94
677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	1,100
677	6007	ELIM EXT PAV MRK & MRKS (24")	LF	32
677	6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	2
677	6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	2

* CITY OF SAN ANTONIO QUANTITY



James Schwerdtfeger

12/21/2023

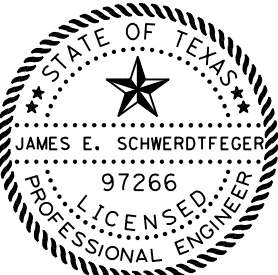
REVISION	DATE	DESCRIPTION	BY
		Texas PE Firm Reg. #F-929	
711 Navarro St, Suite 560, San Antonio, Texas 78205		T +1 210 299 7900 E usinfrastructure@rpsgroup.com	
		GRISSOM RD AT OLD GIRSSOM RD TRAFFIC DESIGN	
SUMMARY OF QUANTITIES			
DEVELOPER:			
CONT.		BUDGET PROJ.	
SUBMITTED			
APPROVED			
MAP NO.		SHEET	
SECT. NO.		N.T.S.	
DR. SN	CK. JS	JOB NO. 8310	
		9 OF 65	

LEGEND

- PROPOSED SIGNAL POLE
- PROPOSED MAST ARM
- PROPOSED PEDESTRIAN POLE
- PROPOSED VERTICAL LED SIGNAL HEAD
- PROPOSED PEDESTRIAN LED SIGNAL HEAD W/ PUSHBUTTON AND SIGN
- PROPOSED CONTROLLER CABINET W/ BBS
- PROPOSED OVERHEAD SIGN
- PROPOSED CCTV
- PROPOSED CAMERA (ADVANCE) (VIVIDS) (V#-A)
- PROPOSED OPTICOM DETECTOR (PD-#)
- PROPOSED ELECTRICAL SERVICE (AERIAL DROP)
- PROPOSED FISHEYE CAMERA (FEDS) (V-#)
- PROPOSED CONDUIT
- PROPOSED BORE
- PROPOSED TRAFFIC FLOW
- PROPOSED GROUND BOX

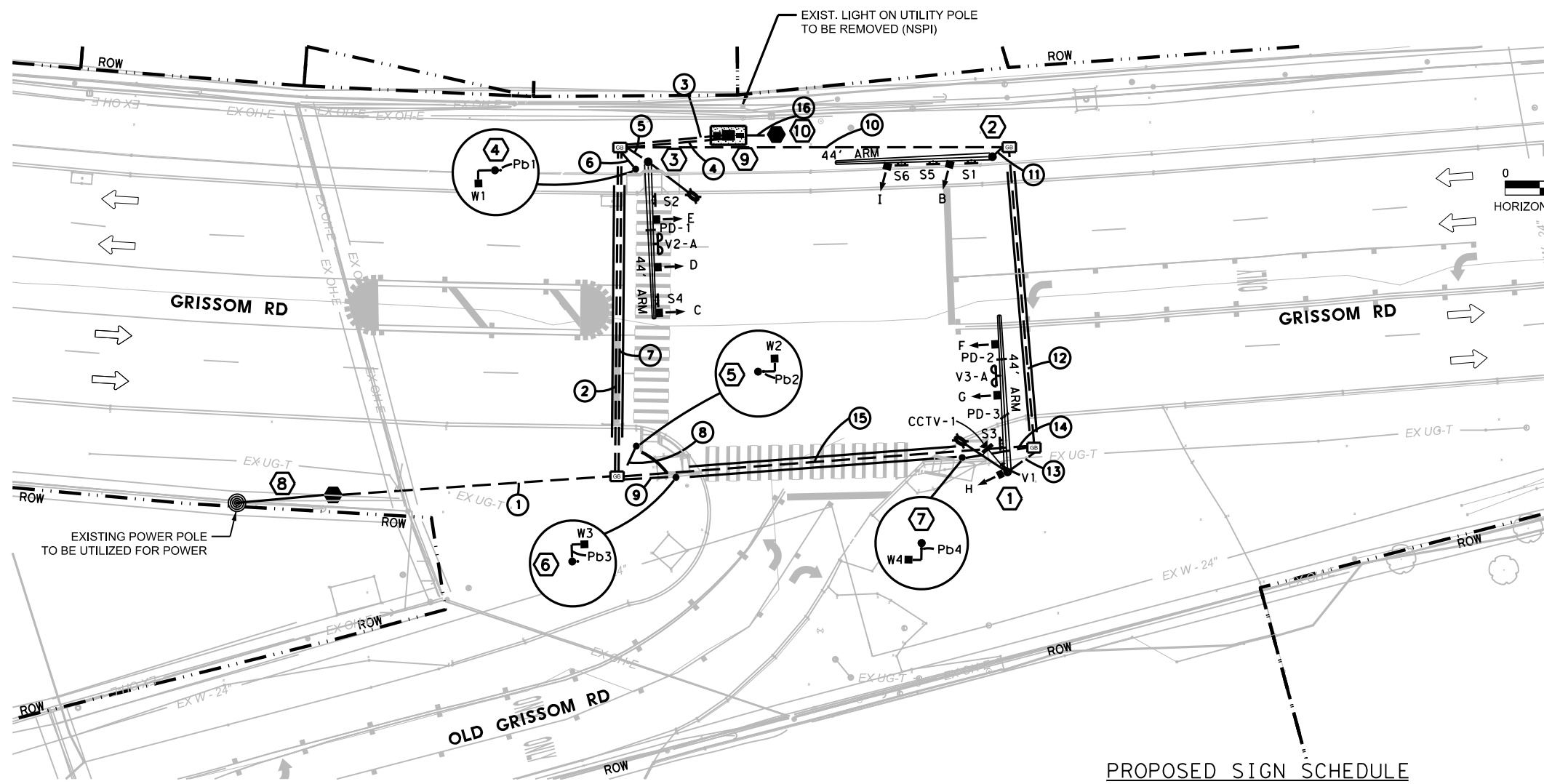
NOTES

- LOCATION OF UNDERGROUND AND ABOVEGROUND SIGNAL RELATED ITEMS AND UTILITIES ARE APPROXIMATE.
- VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
- BACKUP BATTERY SYSTEM WILL BE INSTALLED IN ITS OWN CABINET, SIDE-MOUNTED TO THE SIGNAL CONTROLLER CABINET.

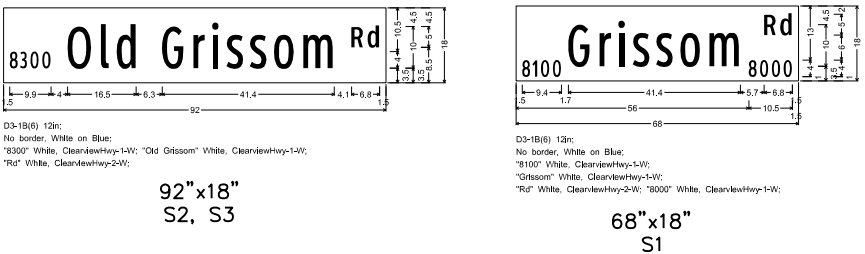


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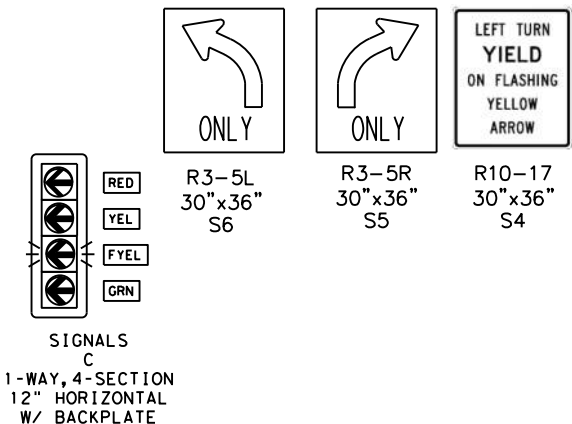
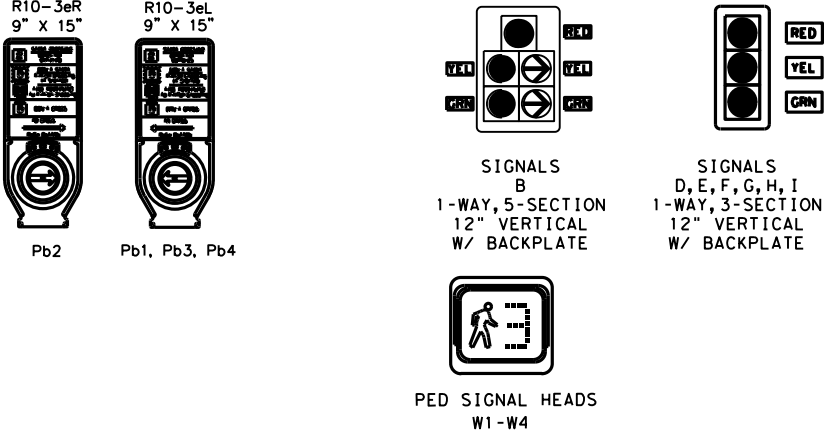
12/21/2023



PROPOSED SIGN SCHEDULE



PROPOSED SIGNAL HEAD SCHEDULE





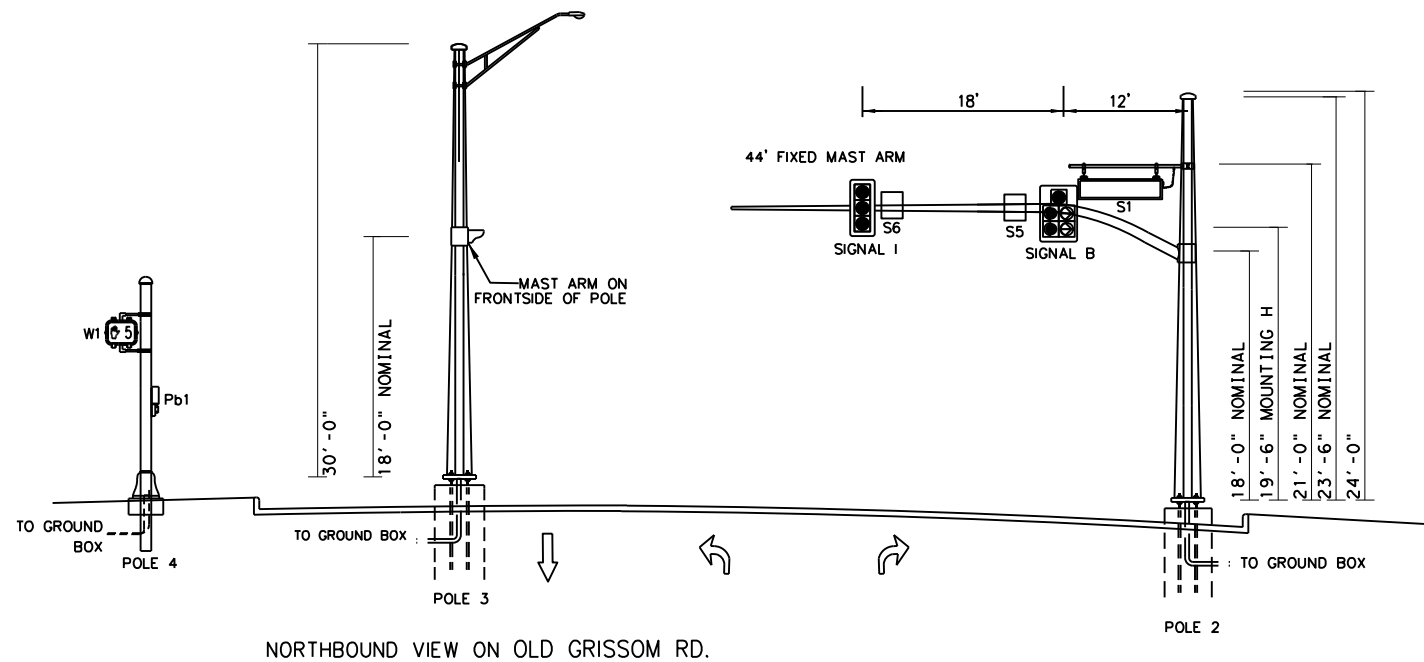
POSTED SPEED LIMIT
GRISSOM RD = 45 MPH
OLD GRISSOM RD = 30 MPH

GENERAL NOTES

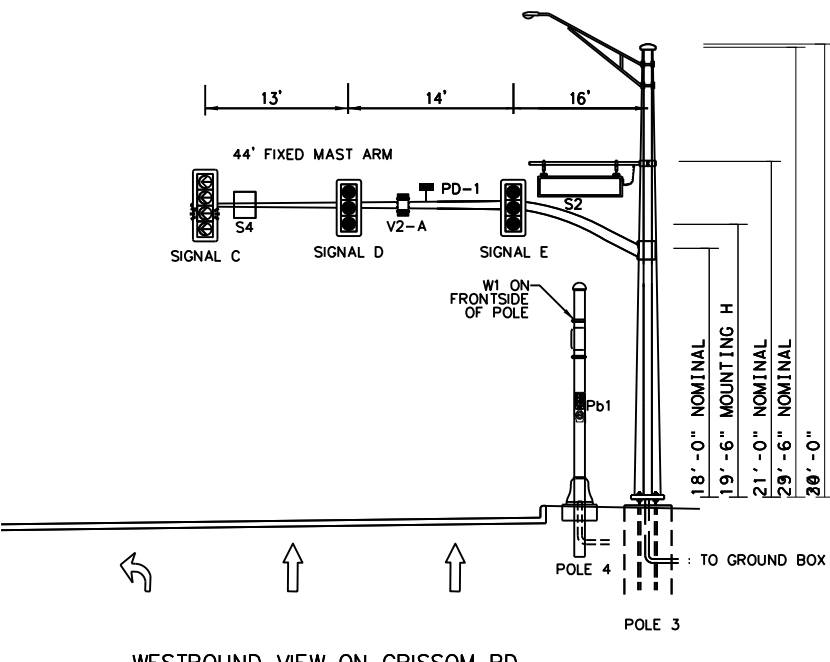
- LOCATION OF TRAFFIC SIGNAL POLES, CONTROLLER ASSEMBLIES AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY COSA PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUPPLY AND INSTALL THE ADDRESS IN PERMANENT NUMBERS AND LETTERS TO THE STREET SIDE OF THE SERVICE ENCLOSURE. SAID ADDRESS SHALL ALSO BE RECORDED AND GIVEN TO THE CITY OF SAN ANTONIO INSPECTOR FOR THE CITY'S RECORDS.
- SIDEWALK SHALL BE EXTENDED UP TO THE MAST ARM POLES, AS NEEDED, TO PROVIDE PEDESTRIAN ACCESS TO THE PEDESTRIAN PUSH BUTTONS.
- THE TOP OF ALL SIGNAL POLE FOUNDATIONS SHALL BE INSTALLED FLUSH WITH THE SIDEWALK, FINISH SURFACE OR AS DIRECTED BY THE TRAFFIC ENGINEER. IF THE POLE IS NOT ADJACENT TO A SIDEWALK OR FINISH SURFACE, THE TOP OF THE FOUNDATION SHALL BE 3" ABOVE THE GROUND SURFACE.
- ALL ILSN SIGNS SHALL BE INSTALLED ON THE ILSN MAST ARM AS DIRECTED BY THE ENGINEER.
- AN ADDITIONAL 2" SCHEDULE 80 PVC SHALL BE INSTALLED AT EACH POLE FOUNDATION STUBBED OUT 1' FROM THE FACE OF THE FOUNDATION. STUB OUTS SHALL BE APPROPRIATELY CAPPED BELOW GRADE FOR FUTURE USE.
- MINIMUM CLEARANCE OF 10' RADIUS FROM NEUTRAL AND 20' RADIUS FROM PRIMARY SHALL BE MAINTAINED BETWEEN PROPOSED TRAFFIC SIGNAL EQUIPMENT, INCLUDING SPAN WIRE AND EXISTING OVERHEAD ELECTRICAL LINES.
- CONTRACTOR SHALL CONTACT THE CITY TRAFFIC ENGINEER AT (210) 207-8462. A MINIMUM OF SEVEN (7) DAYS PRIOR TO BEGINNING OF CONSTRUCTION.
- CONTRACTOR SHALL CONTACT THE CITY TRAFFIC ENGINEER AT (210) 207-8462. A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO THE TRAFFIC SIGNAL TURN-ON.
- CONTRACTOR SHALL CONTACT COSA INSPECTION TEAM PRIOR TO INSTALLATION OF ALL DETECTION ON MAST ARM POLES.

CONTRACTOR SHALL CONTACT ENGINEER OF RECORDS IN LOCATING THE TRAFFIC SIGNAL POLES AND PEDESTRIAN SIGNAL POLES AND IDENTIFYING ALL UTILITY CONFLICTS WITH THE PEDESTRIAN SIGNAL POLES PRIOR TO CONSTRUCTION.

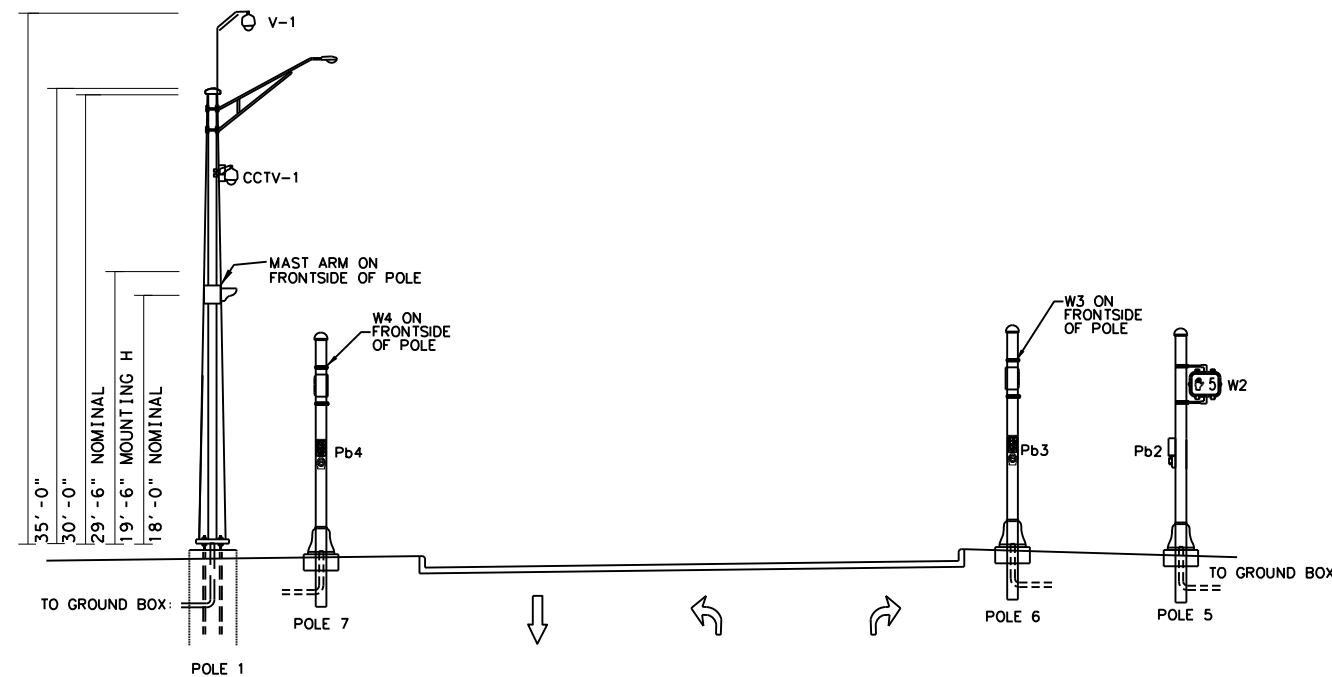
REVISION	DATE	DESCRIPTION	BY
 Texas PE Firm Reg. #F-929 711 Navarro St, Suite 560, San Antonio, Texas 78205 T+1 210 299 7900 E usinfrastructure@rpsgroup.com			
 GRISSOM RD AT OLD GRISSOM RD TRAFFIC DESIGN			
PROPOSED SIGNAL LAYOUT			
DEVELOPER:			
CONT. BUDGET PROJ.			
SUBMITTED			
APPROVED			
MAP NO.			SHEET
SECT. NO.			10 OF 65
DR. SN	CK. JS	JOB NO. 8310	



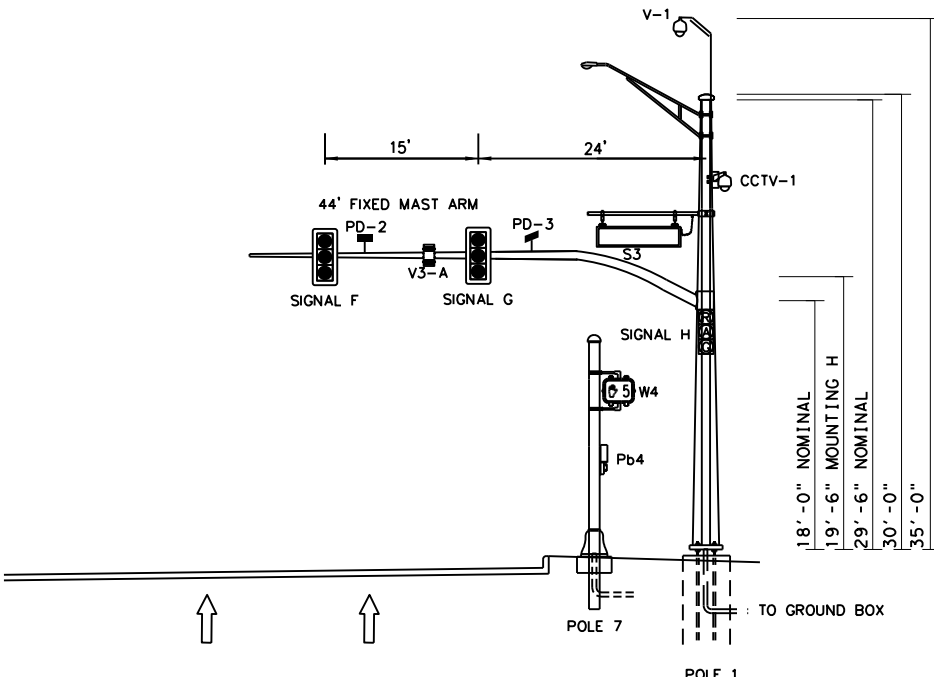
NORTHBOUND VIEW ON OLD GRISSOM RD.



WESTBOUND VIEW ON GRISSOM RD.



SOUTHBOUND VIEW ON OLD GRISSOM RD.

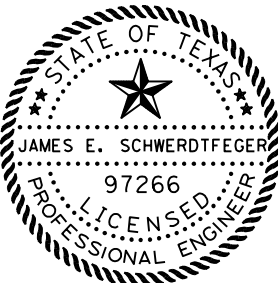


EASTBOUND VIEW ON GRISSOM RD.

NOTES

- HEADS WILL BE INSTALLED PER TXMUTCD 2011.
- FOUNDATIONS WILL BE ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCE.
- LOCATION OF SIGNAL HEADS ARE APPROXIMATE. ANY CHANGES WILL BE APPROVED BY THE ENGINEER.
- MAST ARM ATTACHMENT HEIGHT WILL BE CALCULATED BY THE CONTRACTOR IN THE FIELD AND APPROVED BY THE ENGINEER.
- MAST ARM DAMPING PLATE TO BE INSTALLED ON ARMS 40' OR LONGER.
- PD-#: PREEMPT DETECTOR.
- V-#: PRESENCE CAMERA DETECTOR (FEDS).
- V*-A: ADVANCE CAMERA DETECTOR (VIVDS).



NOT TO SCALE



James Schwerdtfeger

12/21/2023

CONTRACTOR SHALL CONTACT ENGINEER OF RECORDS IN LOCATING THE TRAFFIC SIGNAL POLES AND PEDESTRIAN SIGNAL POLES AND IDENTIFYING ALL UTILITY CONFLICTS WITH THE PEDESTRIAN SIGNAL POLES PRIOR TO CONSTRUCTION.

REVISION		DATE	DESCRIPTION	BY
<div><div></div><div>Texas PE Firm Reg. #F-929 711 Navarro St, Suite 560, San Antonio, Texas 78205 T +1 210 299 7900 E usinfrastructure@rpsgroup.com</div></div>				
<div></div>		GRISSOM RD AT OLD GRISSOM RD TRAFFIC DESIGN		
		PROPOSED SIGNAL ELEVATION		
DEVELOPER:				
CONT.		BUDGET PROJ.		
SUBMITTED _____				
APPROVED _____				
MAP NO.				SHEET
SECT. NO. N.T.S.				
DR. SN CK. JS JOB NO. 8310				
				11 OF 65

CONDUCTOR & CONDUIT SCHEDULE																	
CONDUIT RUN NUMBER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NUMBER OF 2" CONDUITS		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NUMBER OF 3" CONDUITS		1	2	2	2						2		2			2	
CONUIT RUN LENGTH (FT)		82	95	30	30	10	20	95	11	17	105	10	87	10	21	120	12
RUN TYPE		T	B	T	T	T	T	B	T	T	T	T	B	T	T	B	T
AWG	CIRCUIT	NUMBER OF WIRES															
#14 9-COND. TY A STRANDED CABLE	SIGNALS																
	Ø1																
	Ø2				1	1											
	Ø3																
	Ø4				1						1	1					
	Ø5				1	1											
	Ø6				1						1		1	1			
	Ø7																
#14 9-COND. TY A STRANDED CABLE	PED. SIGNAL																
	Ø2																
	Ø4				2			1	1	1							
	Ø6				2					1	1		1		1		
	Ø3																
#16 3-COND. TY C STRANDED CABLE	PED. PUSH BUTTON																
	Ø6				2			1		1	1		1		1		
	Ø4				2			1	1	1							
	Ø2																
	Ø3																
#6 XHHW	120V POWER HOT	1	1	1													
	120V POWER COMMON	1	1	1													
BARE BOND	BARE BOND GROUND #6	1	1	1													
BARE BOND	BARE BOND GROUND #8				3	1	1	1	1	1	3	1	3	1	1	2	1
'OPTICOM MODEL 138 DETECTOR CABLE	OPTICOM DETECTOR																
	Ø2				1	1											
	Ø4										1		1	1			
	Ø6				1						1		1	1			
	Ø8																
#14 4-COND. TY A STRANDED CABLE	ILSN SIGNS	3	3			1					2	1	1	1			
ETHERNET	FEDS CAMERA				1						1		1	1			
ETHERNET	CCTV CAMERA				1						1	1	1	1			
ETHERNET	VIVDS CAMERA				2	1					1		1	1			
#12 3-COND. TRAY CABLE	LUMINAIRE TRAY CABLE	2	2			1					1		1	1			

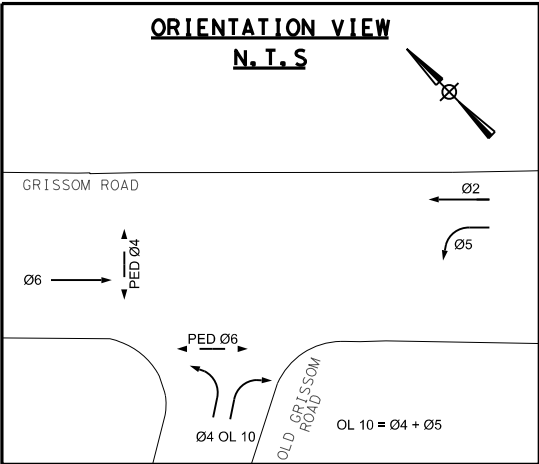
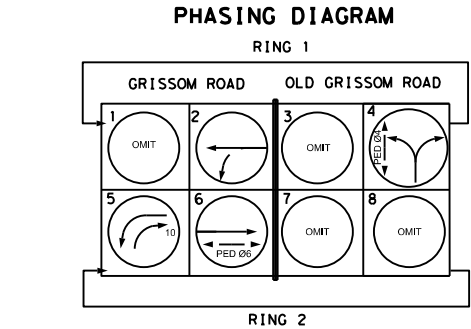
B=BORED CONDUIT (PER LIMITS SHOWN ON SIGNAL LAYOUT) T=TRENCH

B=BORED CONDUIT (PER LIMITS SHOWN ON SIGNAL LAYOUT) T=TRENCH

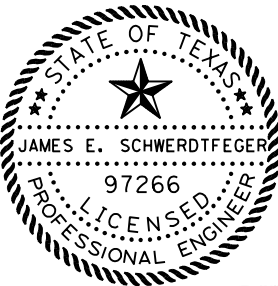
POLE SCHEDULE								
	POLE	1	2	3	4	5	6	7
	POLE TYPE	SMA-80	SMA-80	SMA-80	PED	PED	PED	PED
	POLE HEIGHT (FT)	30	24	30	N/A	N/A	N/A	N/A
	MAST ARM LENGTH (FT)	44	44	44	N/A	N/A	N/A	N/A
	ILSN	YES	N/A	YES	N/A	N/A	N/A	N/A
	ILSN ARM LENGTH (FT)	7	9	7	N/A	N/A	N/A	N/A
	FOUNDATION TYPE	36-A	36-A	36-A	24-A	24-A	24-A	24-A
	FOUNDATION DEPTH (FT)	14	14	14	6	6	6	6
CABLE	CIRCUIT	NUMBER OF CONDUCTORS						
#8 BARE (SOLID)		1	1	1	1	1	1	1
#12 9-COND. TY A STRANDED CABLE	TRAFFIC SIGNALS	Ø1			1			
		Ø2						
		Ø3			1			
		Ø4		1				
		Ø5			1			
		Ø6	1					
		Ø7						
		Ø8						
#12 4-COND. TY A STRANDED CABLE	PED SIGNALS	POLE 1						
		POLE 2						
		POLE 3						
		POLE 4				1		
		POLE 5					1	
		POLE 6						1
		POLE 7						
#16 3-COND. TY C STRANDED CABLE	PED PUSH BUTTON	POLE 1						
		POLE 2						
		POLE 3						
		POLE 4				1		
		POLE 5					1	
		POLE 6						1
		POLE 7						
'OPTICOM MODEL 138 DETECTOR CABLE	OPTICOM DETECTOR	POLE 1	2					
		POLE 2						
		POLE 3			1			
#14 4-COND. TY A STRANDED CABLE	ILSN SIGNS	POLE 1	1					
		POLE 2		1				
		POLE 3			1			
#12 3-COND. TRAY CABLE	LUMINAIRE	POLE 1	1					
		POLE 2						
		POLE 3			1			
ETHERNET	CCTV CAMERA	POLE 1	1					
ETHERNET	FEDS CAMERA	POLE 1	1					
ETHERNET	VIVDS CAMERA	POLE 1			1			
		POLE 3			1			

POLE & EQUIPMENT INFORMATION	
POLE	DESCRIPTION
1	INSTALL 30 FT SMA-80 ON 14 FT DRILLED SHAFT FDN (36-A) W/ 44 FT MAST ARM, ONE LUMINAIRE (LED), ONE 7 FT ILSN MAST ARM W/ SIGN, THREE VEHICLE SIGNAL HEADS AS ILLUSTRATED, TWO OPTICOM DETECTORS, ONE FISH EYE CAMERA, ONE CAMERA ADVANCE DETECTOR, AND ONE CCTV CAMERA.
2	INSTALL 24 FT SMA-80 ON 14 FT DRILLED SHAFT FDN (36-A) W/ 44 FT MAST ARM, ONE 9 FT ILSN MAST ARM W/ SIGN AND TWO VEHICLE SIGNAL HEADS AS ILLUSTRATED, ONE R3-5L SIGN, AND ONE R3-5R SIGN
3	INSTALL 30 FT SMA-80 ON 14 FT DRILLED SHAFT FDN (36-A) W/ 44 FT MAST ARM, ONE LUMINAIRE (LED), ONE 7 FT ILSN MAST ARM W/ SIGN, THREE VEHICLE SIGNAL HEADS AS ILLUSTRATED, ONE R10-17 SIGN, AND ONE OPTICOM DETECTOR.
4	INSTALL PEDESTAL POLE ON 6 FT DRILLED SHAFT FDN (24-A) W/ ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eL AS ILLUSTRATED
5	INSTALL PEDESTAL POLE ON 6 FT DRILLED SHAFT FDN (24-A) W/ ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eR AS ILLUSTRATED
6	INSTALL PEDESTAL POLE ON 6 FT DRILLED SHAFT FDN (24-A) W/ ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eL AS ILLUSTRATED
7	INSTALL PEDESTAL POLE ON 6 FT DRILLED SHAFT FDN (24-A) W/ ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eR AS ILLUSTRATED
8	PROPOSED CPS ENERGY STEEL POLE AND METER W/ TXDOT TYPE D SERVICE
9	INSTALL TYPE 332 CABINET WITH 2070 CONTROLLER ASSEMBLY AND BATTERY BACKUP SYSTEM CABINET ON CITY TYPE CONCRETE FOUNDATION
10	INSTALL SERVICE DISCONNECT TO METER.

ELECTRICAL SERVICE DATA											
ELECTRICAL SERVICE ID	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD./ LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
P1	ELC SRV TY D 120/240 070 (NS)AL(E)SP(O)	3"	3/#4	N/A	2P/70	N/A	100	A (SIGNAL)	1P/50	40	7.0
								B (LUM)	2P/15	3	
								C (ILSN)	1P/15	12	



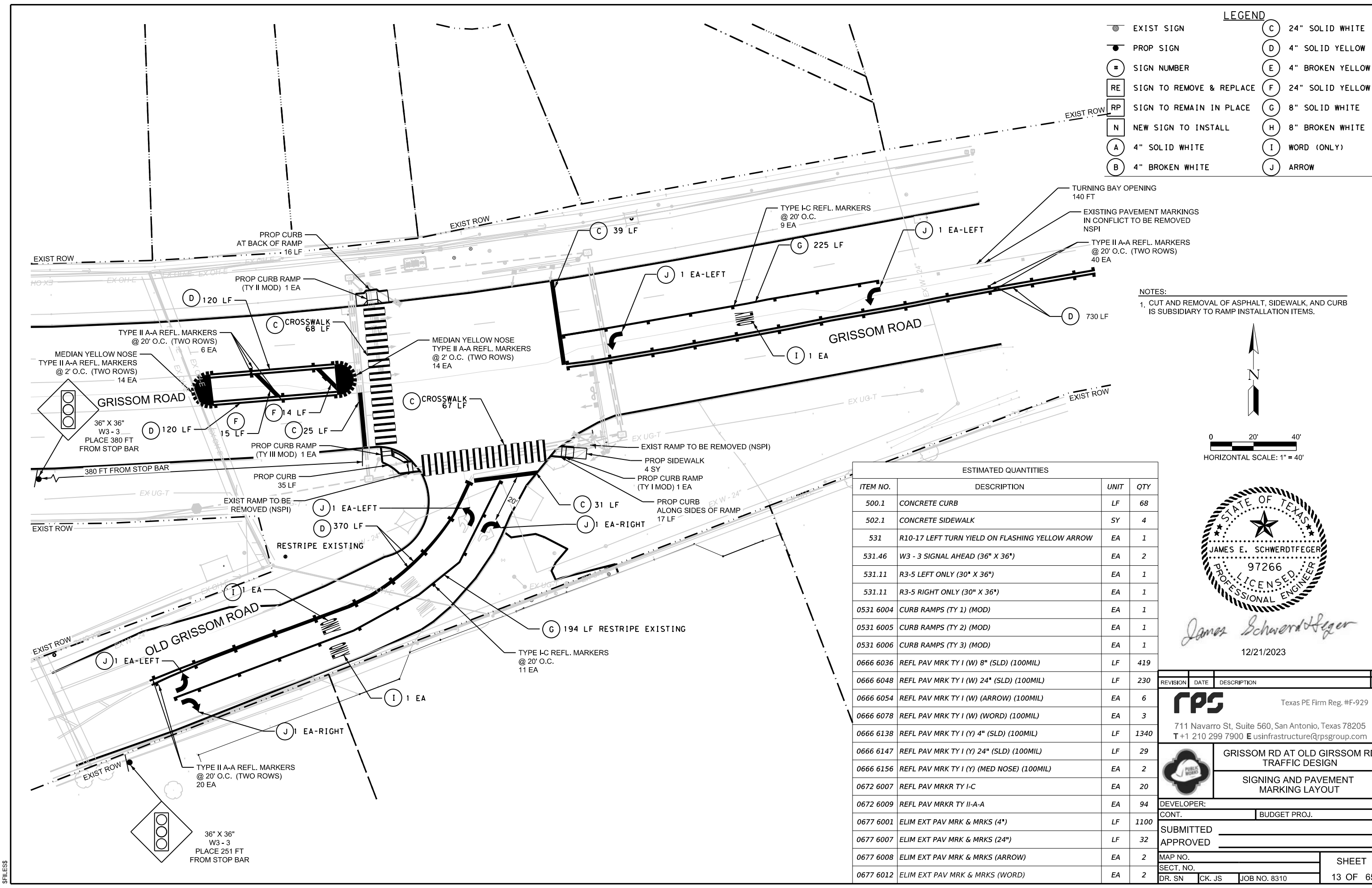
NOT TO SCALE



James Schwerdtfeger

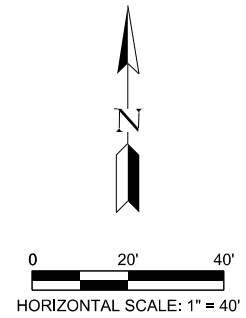
12/21/2023

REVISION		DATE	DESCRIPTION	BY
<div><div></div><div>Texas PE Firm Reg. #F-929</div><div>711 Navarro St, Suite 560, San Antonio, Texas 78205</div><div>T +1 210 299 7900 E usinfrastructure@rpsgroup.com</div></div>				
<div></div>		GRISSOM RD AT OLD GRISSOM RD TRAFFIC DESIGN		
		ELECTRICAL SCHEDULE		
DEVELOPER:				
CONT.		BUDGET PROJ.		
SUBMITTED _____				
APPROVED _____				
MAP NO. _____				SHEET
SECT. NO. N.T.S.				
DR. SN	CK. JS	JOB NO. 8310		
				12 OF 65

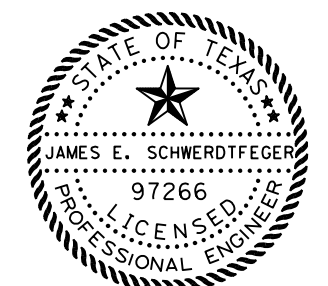


LEGEND	
	EXIST SIGN
	PROP SIGN
	SIGN NUMBER
	SIGN TO REMOVE & REPLACE
	SIGN TO REMAIN IN PLACE
	NEW SIGN TO INSTALL
	4" SOLID WHITE
	4" BROKEN WHITE
	24" SOLID WHITE
	4" SOLID YELLOW
	4" BROKEN YELLOW
	24" SOLID YELLOW
	8" SOLID WHITE
	8" BROKEN WHITE
	WORD (ONLY)
	ARROW



NOTES:
1. CUT AND REMOVAL OF ASPHALT, SIDEWALK, AND CURB IS SUBSIDIARY TO RAMP INSTALLATION ITEMS.



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
500.1	CONCRETE CURB	LF	68
502.1	CONCRETE SIDEWALK	SY	4
531	R10-17 LEFT TURN YIELD ON FLASHING YELLOW ARROW	EA	1
531.46	W3 - 3 SIGNAL AHEAD (36" X 36")	EA	2
531.11	R3-5 LEFT ONLY (30" X 36")	EA	1
531.11	R3-5 RIGHT ONLY (30" X 36")	EA	1
0531 6004	CURB RAMPS (TY 1) (MOD)	EA	1
0531 6005	CURB RAMPS (TY 2) (MOD)	EA	1
0531 6006	CURB RAMPS (TY 3) (MOD)	EA	1
0666 6036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	419
0666 6048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	230
0666 6054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	6
0666 6078	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	3
0666 6138	REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)	LF	1340
0666 6147	REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)	LF	29
0666 6156	REFL PAV MRK TY I (Y) (MED NOSE) (100MIL)	EA	2
0672 6007	REFL PAV MRKR TY I-C	EA	20
0672 6009	REFL PAV MRKR TY II-A-A	EA	94
0677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	1100
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	32
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	2
0677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	2

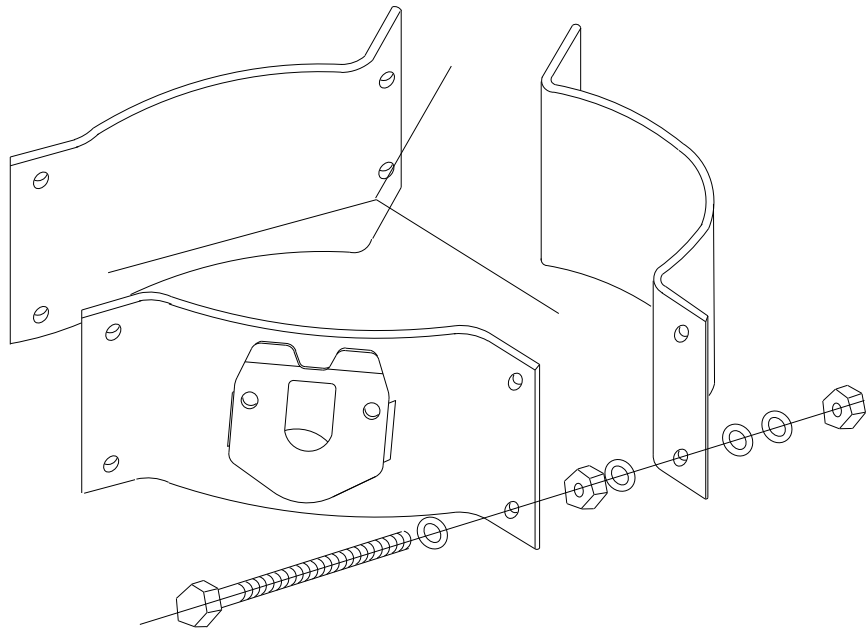
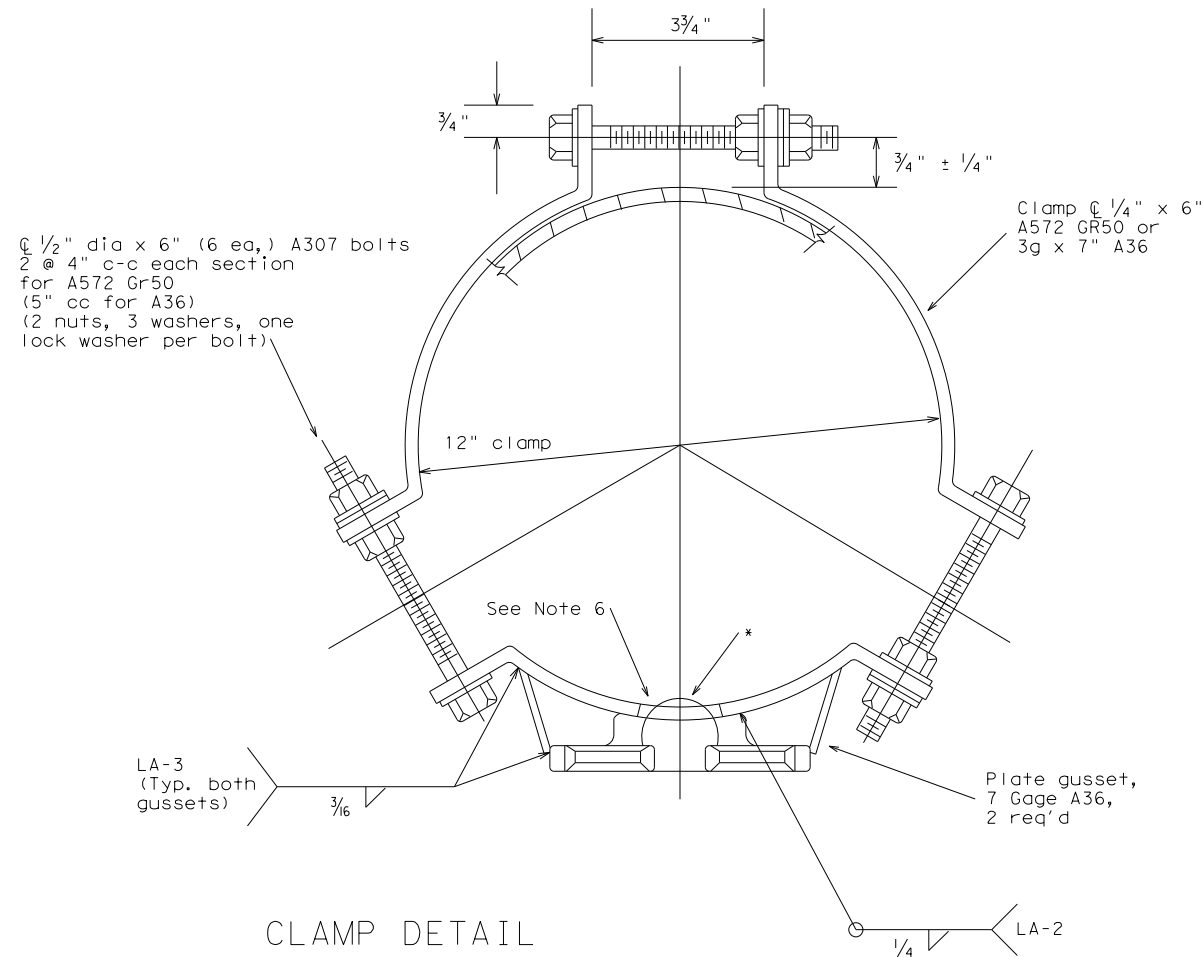
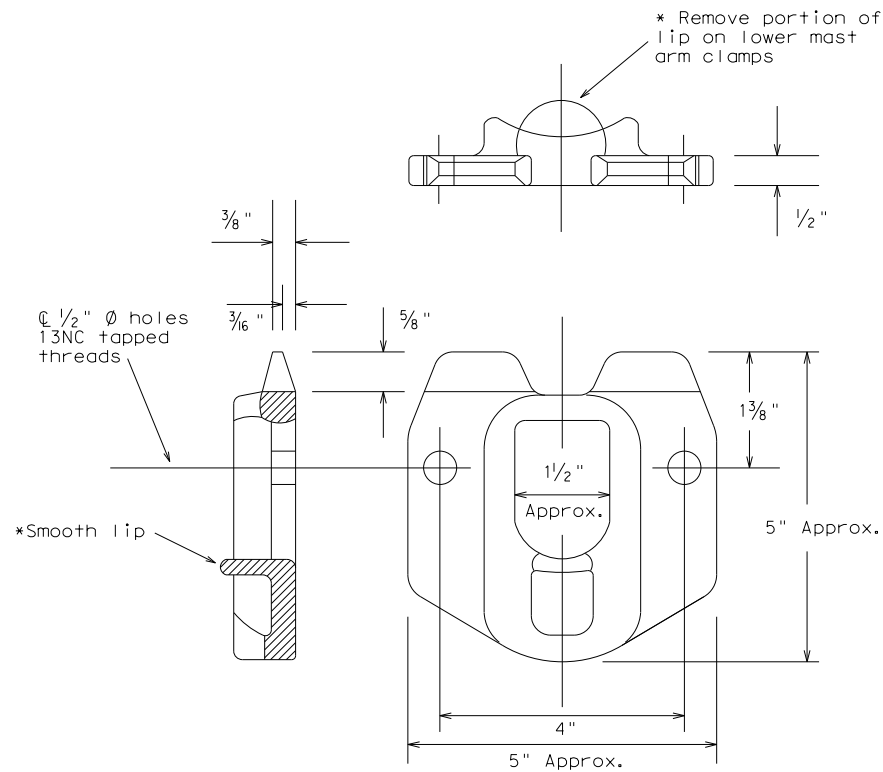


James Schwerdtfeger
12/21/2023

REVISION		DATE	DESCRIPTION	BY
<div><div></div><div>Texas PE Firm Reg. #F-929</div></div>				
711 Navarro St, Suite 560, San Antonio, Texas 78205 T +1 210 299 7900 E usinfrastructure@rpsgroup.com				
<div></div>		GRISSOM RD AT OLD GRISSOM RD TRAFFIC DESIGN		
SIGNING AND PAVEMENT MARKING LAYOUT				
DEVELOPER:				
CONT.		BUDGET PROJ.		
SUBMITTED				
APPROVED				
MAP NO.			SHEET	
SECT. NO.				
DR. SN	CK. JS	JOB NO. 8310	13 OF 65	

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For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" 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. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, 1/2 in. X 1 1/2 in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft., 12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.



CLAMP ON
FITTING ASSEMBLY FOR
LUMINAIRE MAST ARM

CFA-12

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REVISIONS		CONT	SECT	JOB	HIGHWAY
11-99	1-12				
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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.
3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.


AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.



Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUITS & NOTES

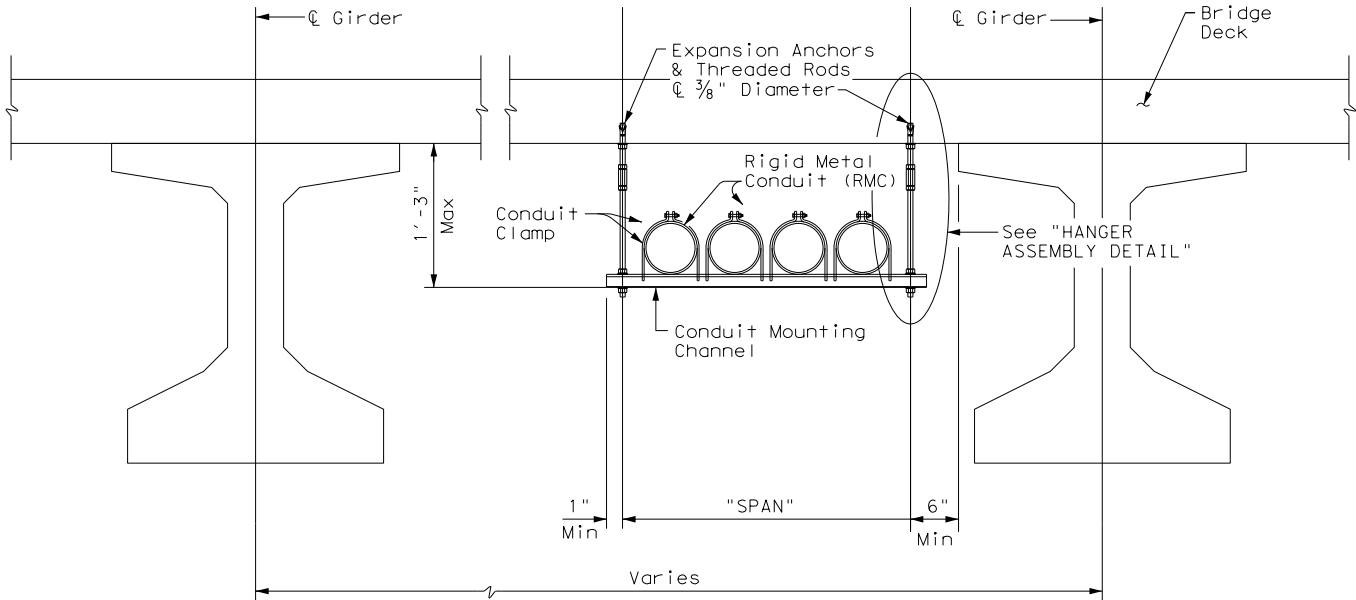
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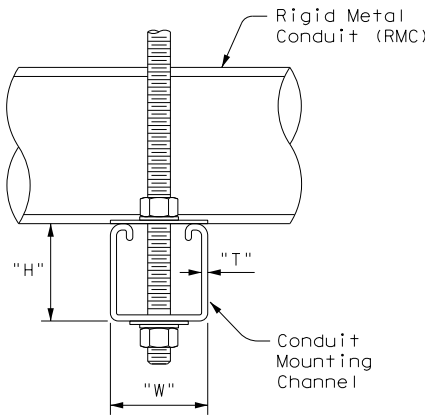
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CONDUIT HANGING DETAIL

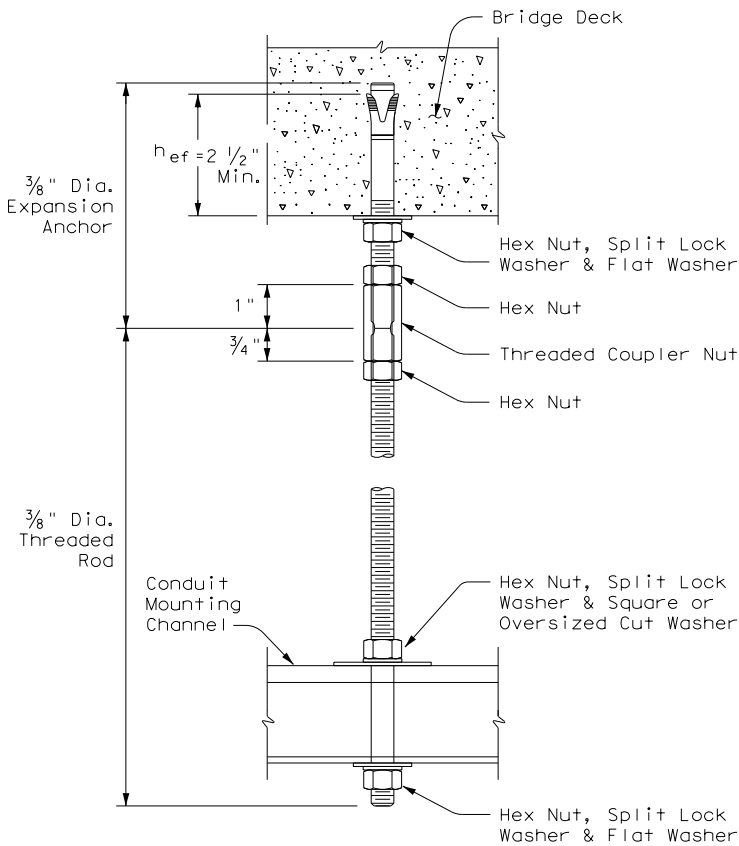
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

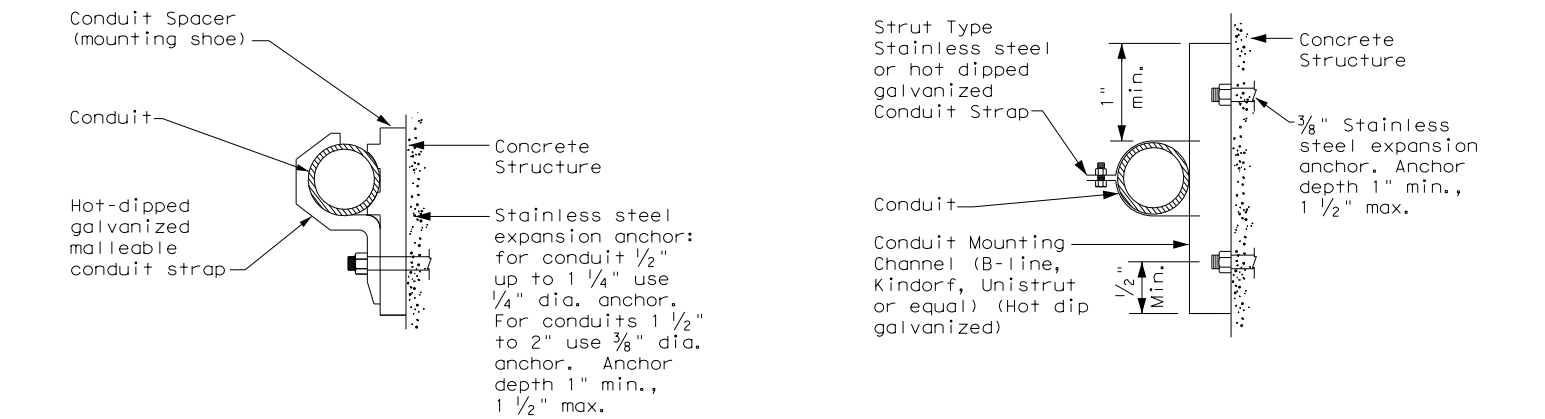


HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT

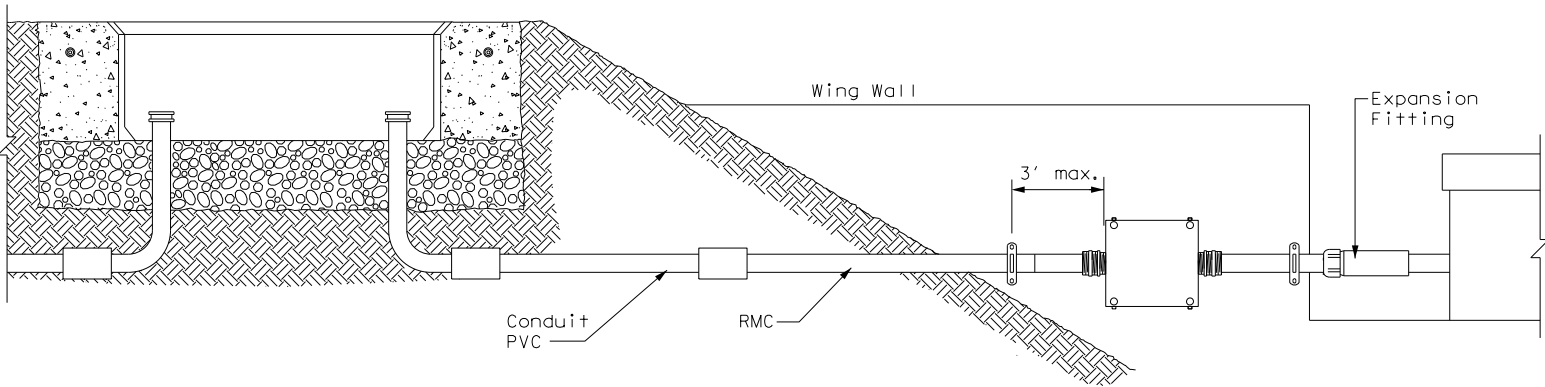


TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL




CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef}) as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.



Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUIT SUPPORTS

ED(2) - 14

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			16	

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

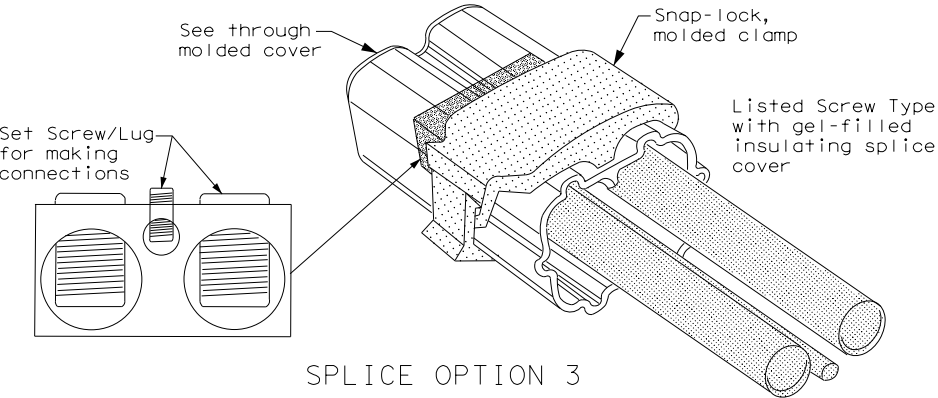
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

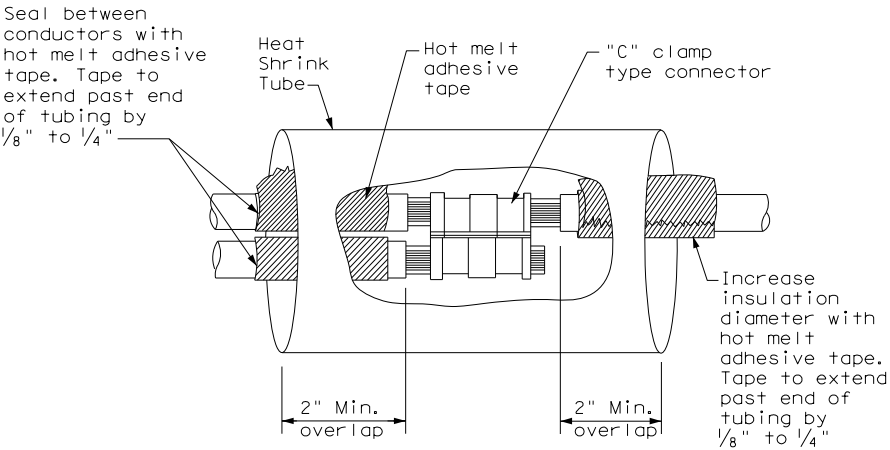
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

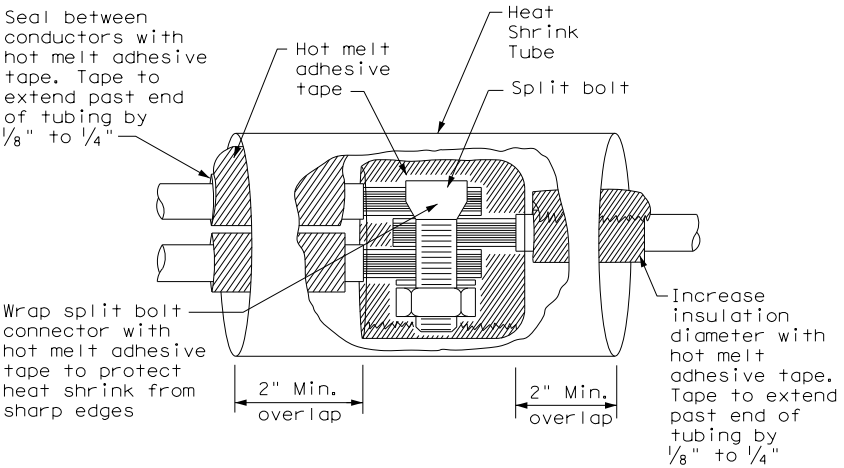
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.




SPLICE OPTION 3
Listed Screw Type



SPLICE OPTION 1
Compression Type

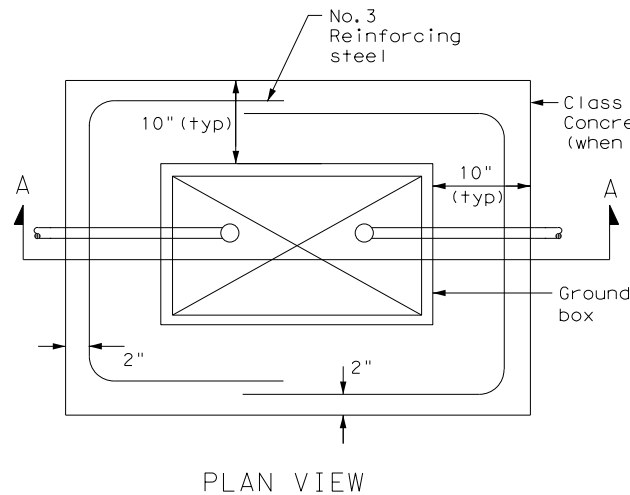


SPLICE OPTION 2
Split Bolt Type

 Texas Department of Transportation				Traffic Operations Division Standard	
ELECTRICAL DETAILS CONDUCTORS					
ED(3) - 14					
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	DIST	COUNTY			SHEET NO.
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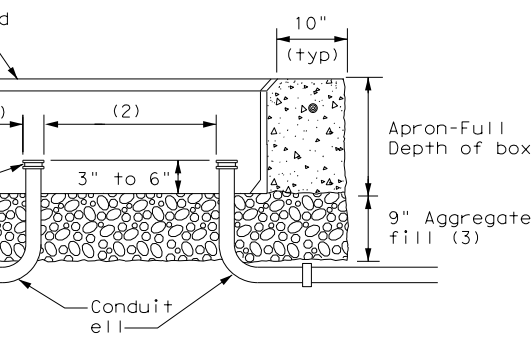


APRON FOR GROUND BOX

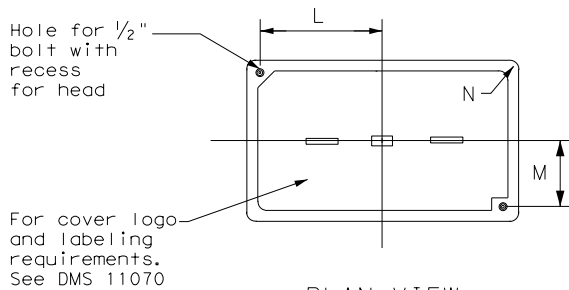
- (1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
- (2) Maintain sufficient space between conduits to allow for proper installation of bushing.
- (3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.
- (4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

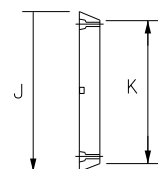
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



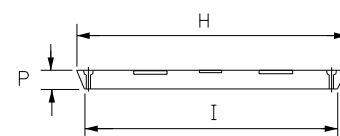
SECTION A - A



PLAN VIEW



END



SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS


1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.
2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.
3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.
4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
5. Temporarily seal all conduits in the ground box until conductors are installed.
6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

**Texas Department of Transportation**

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4) - 14

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.
2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.
3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.
7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.
9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
10. Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.
11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.
12. Ensure all mounting hardware and installation details of services conform to utility company specifications.
13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.
15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.
2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

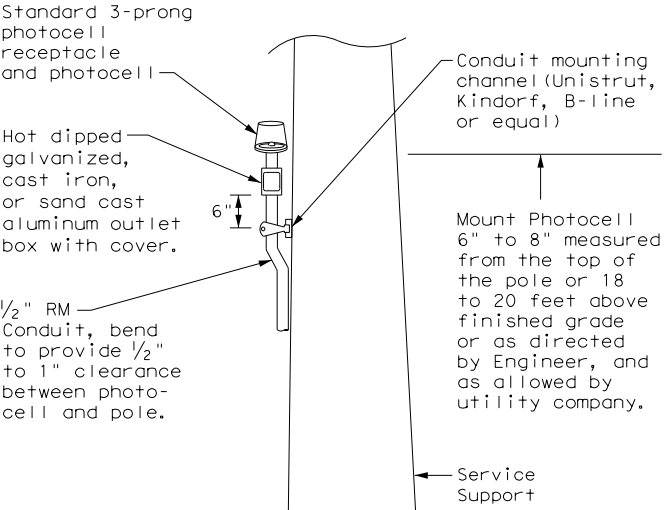
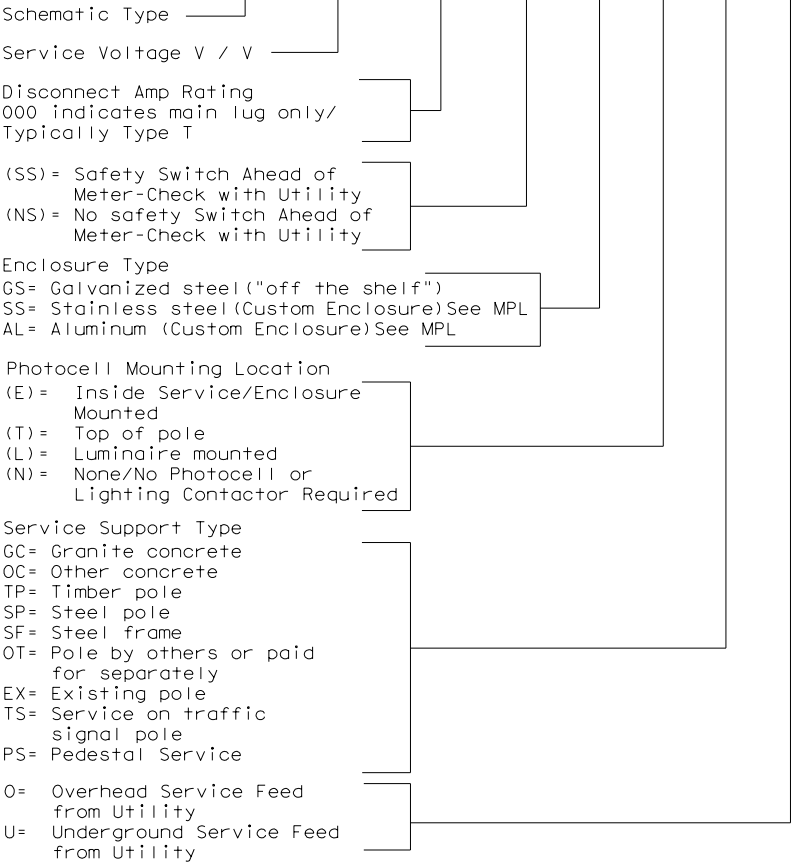
* ELECTRICAL SERVICE DATA													
Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panel/bd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load	
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1	
									Lighting SB	2P/40	25		
									Underpass	1P/20	15		
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 1/4"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3	
							30		Luminaïres	2P/20	9		
									CCTV	1P/20	3		
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 1/4"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0	
									Flashing Beacon 2	1P/20	4		

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Traffic Operations Division Standard

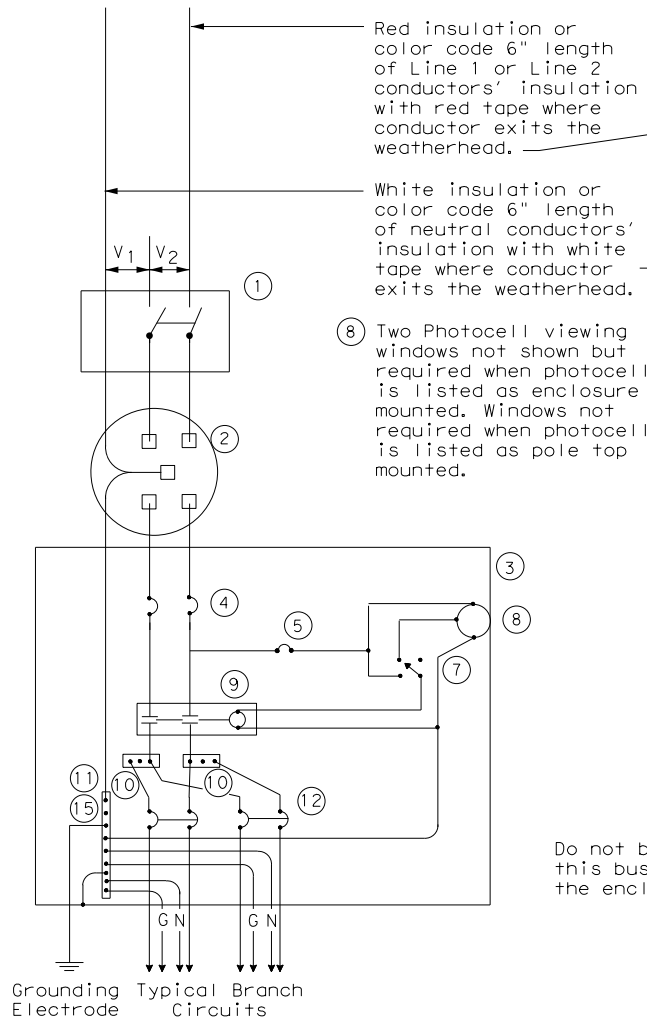
ELECTRICAL DETAILS
SERVICE NOTES & DATA

ED(5) - 14

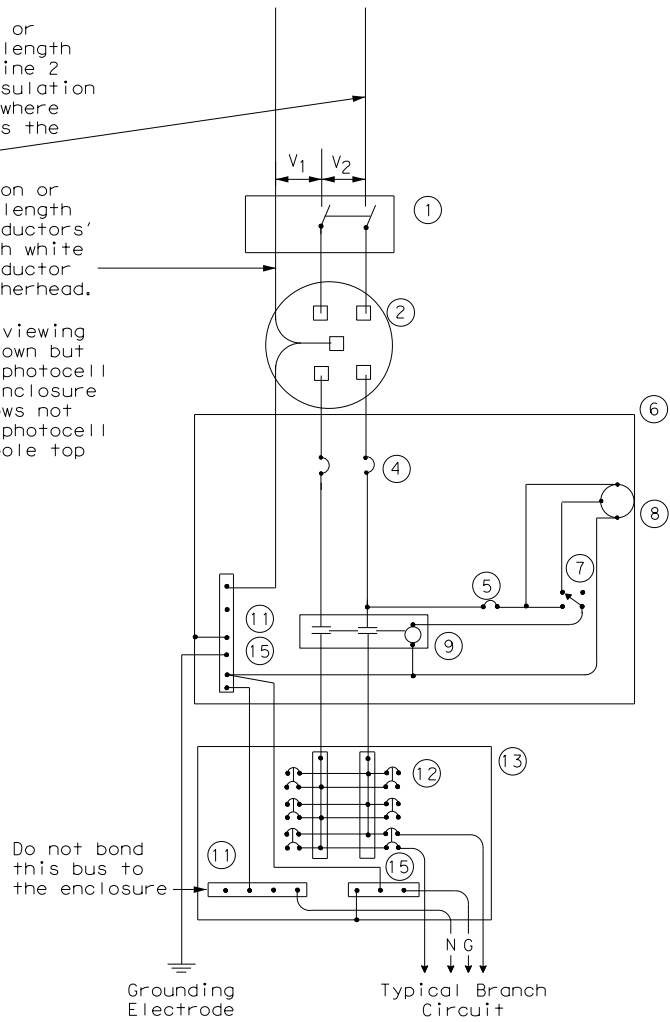
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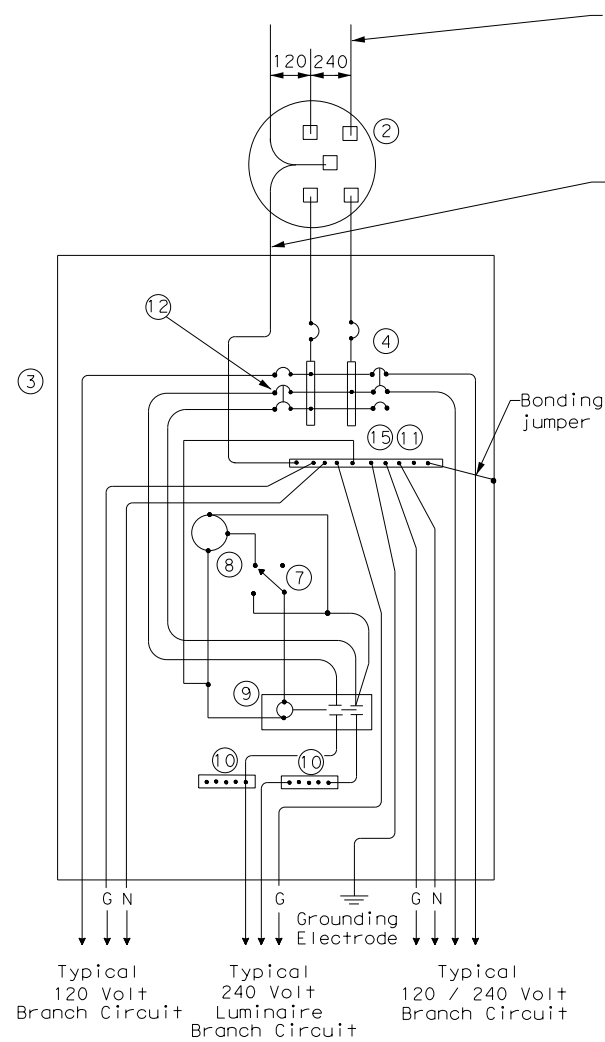
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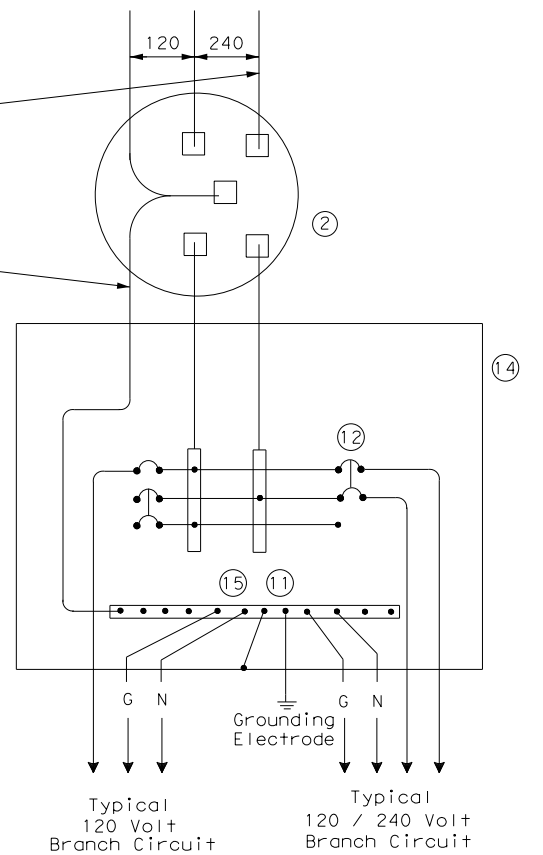
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE




SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE
Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
—	Power Wiring
—	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

**Texas Department of Transportation**

Traffic Operations Division Standard

**ELECTRICAL DETAILS
SERVICE ENCLOSURE
AND NOTES**

ED(6) - 14

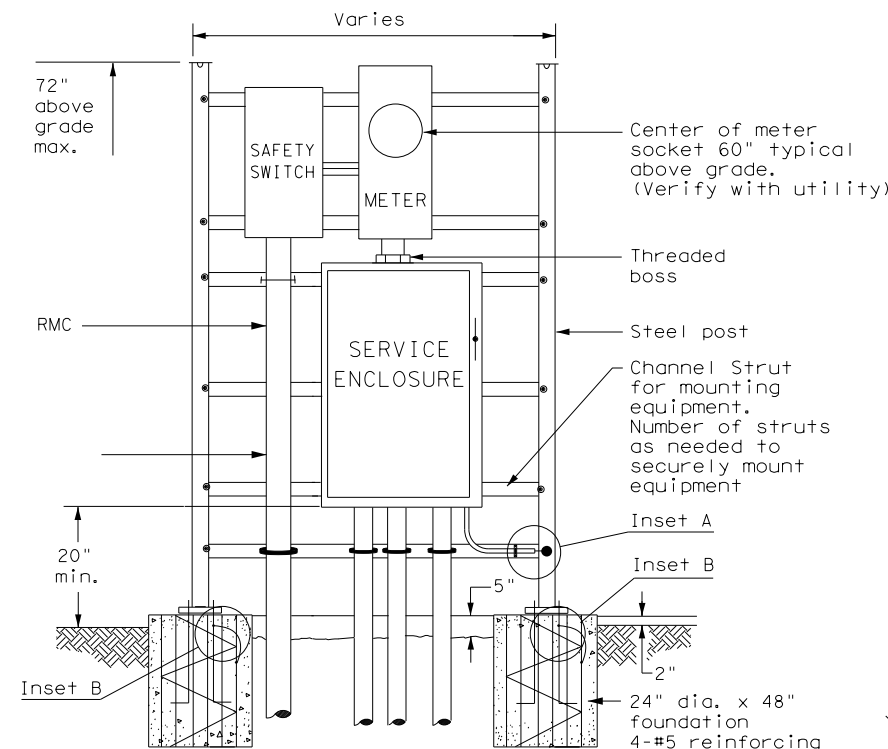
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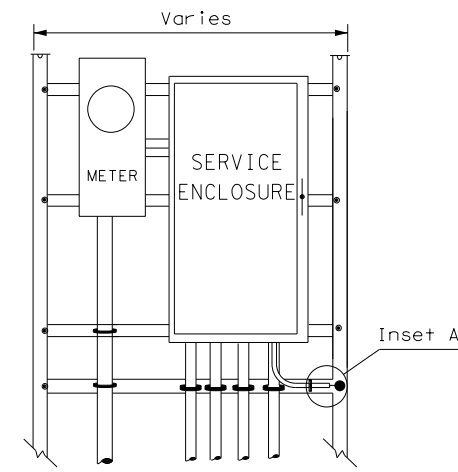
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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

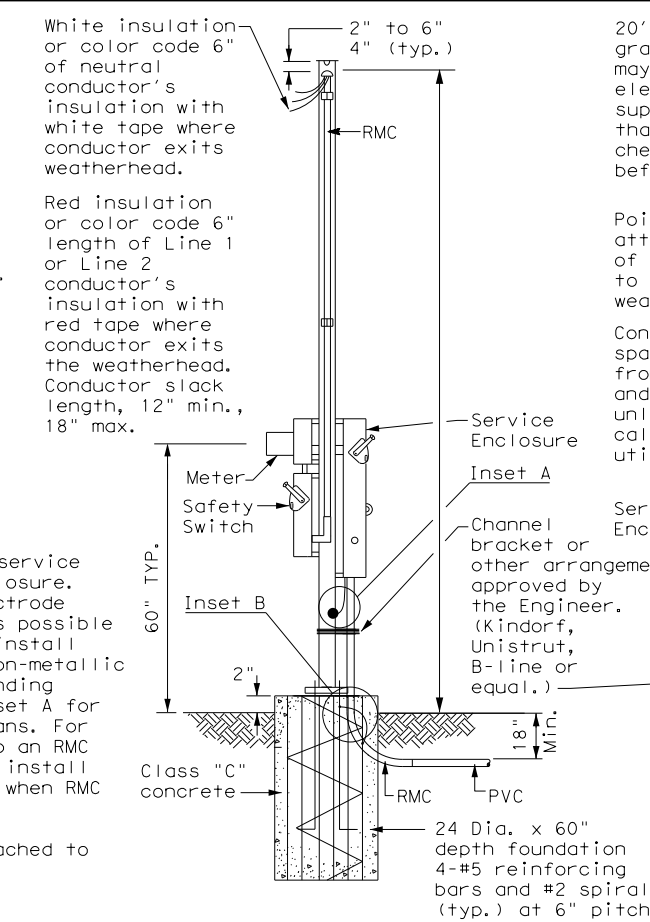
1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 1/2 in. or 1 3/8 in. wide by 1 in. up to 3 3/4 in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.
2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.
3. Provide and install galvanized 3/4 in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized 3/4 in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 1/4 in. to 3 1/2 in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.
4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.
5. Furnish and install rigid metallic ellis in all steel pole and steel frame foundations for all conduits entering the service from underground.
6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.
7. Drill and tap steel poles and frames for 1/2 in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.
8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.
9. Provide 1/4" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.
10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.
11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.



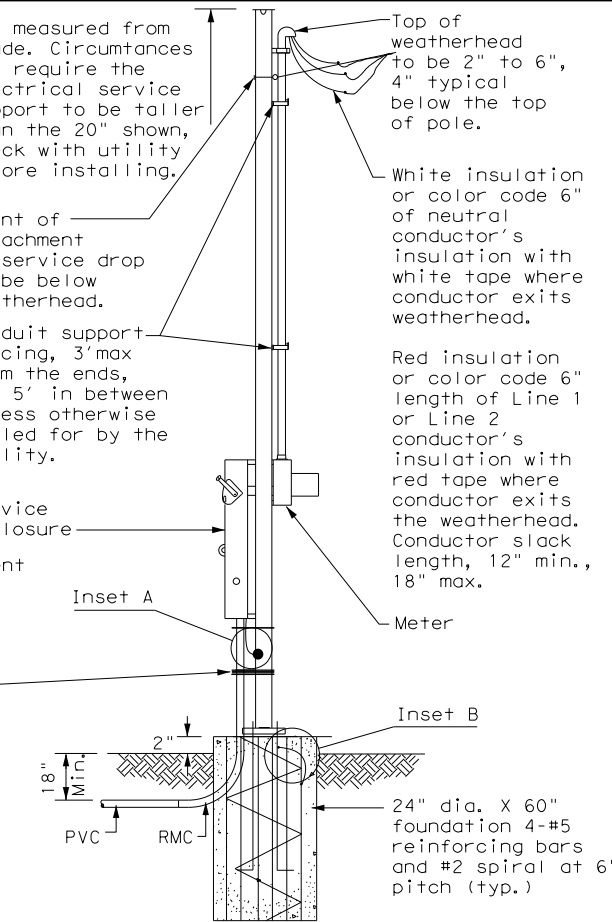
WITH SAFETY SWITCH
FRONT VIEW
SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



WITHOUT SAFETY SWITCH

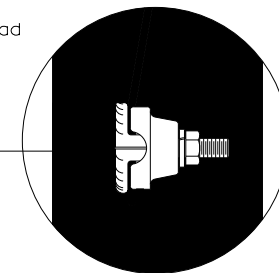


WITH SAFETY SWITCH
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE

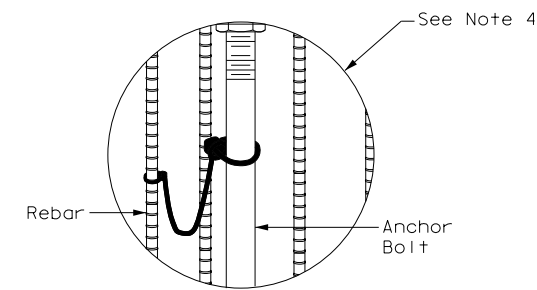


WITHOUT SAFETY SWITCH

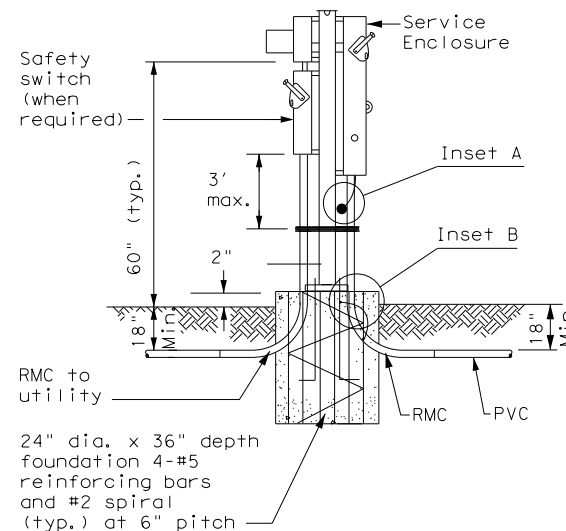
Drill, top, and thread 1/2" X 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor. See Note 7.



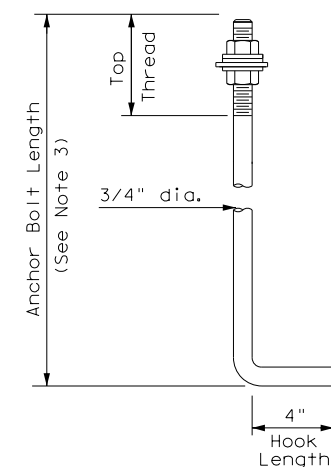
FRONT VIEW
INSET A



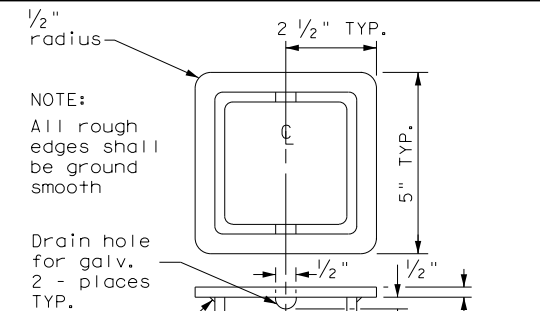
INSET B



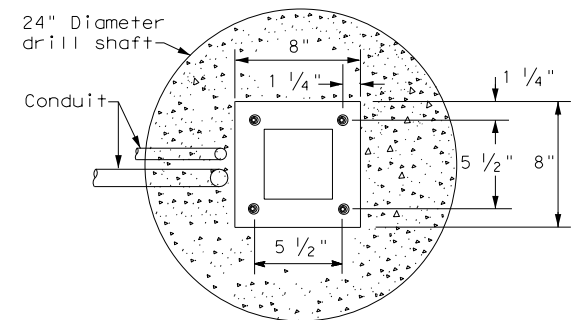
WITH SAFETY SWITCH
SERVICE SUPPORT TYPE SP (U) - UNDERGROUND SERVICE



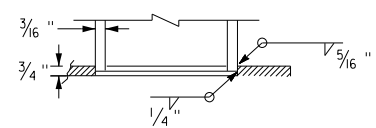
HOOKED ANCHOR DETAIL



POLE TOP PLATE

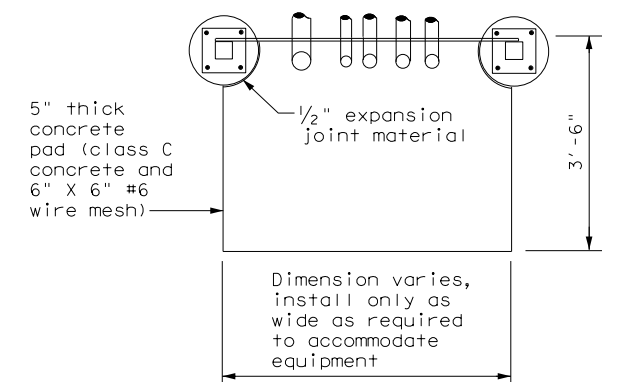


BASE PLATE DETAIL




BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



TOP VIEW

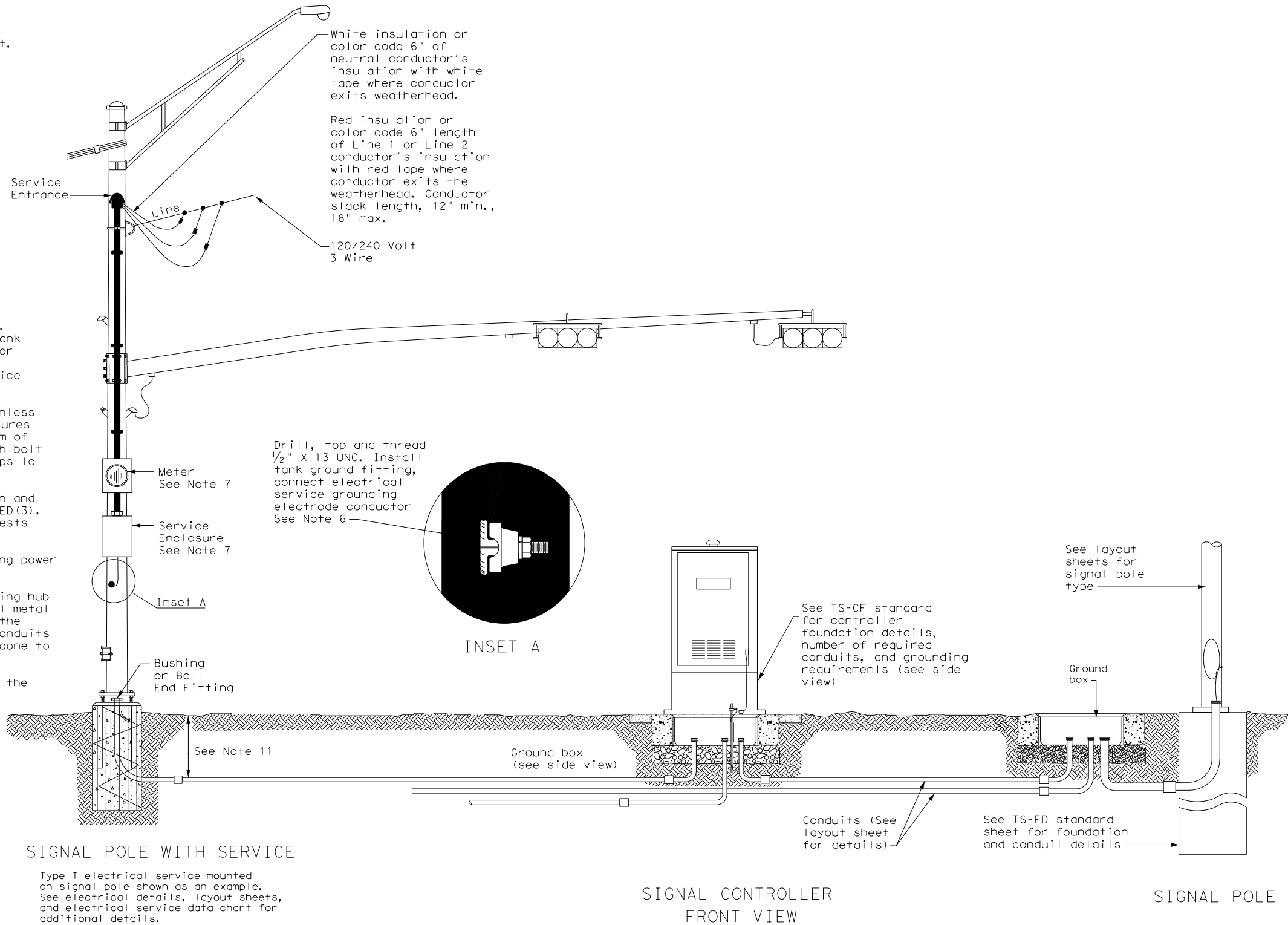
SERVICE SUPPORT TY SF (O) & SF (U)


 Texas Department of Transportation				Traffic Operations Division Standard					
<div>ELECTRICAL DETAILS</div> <div>SERVICE SUPPORT</div> <div>TYPES SF & SP</div> <div>ED(7) - 14</div>									
FILE: ed7-14.dgn		DN: TxDOT		CK: TxDOT		DW: TxDOT		CS: TxDOT	
©TxDOT October 2014		CONT		SECT		JOB		HIGHWAY	
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- ### TRAFFIC SIGNAL NOTES
1. Do not pass luminaire conductors through the signal controller cabinet.
 2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
 3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
 4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
 5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TxDOT standard TS-FD for further details.
 6. Drill and tap signal poles for 1/2 in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
 7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of 3/4 in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
 8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
 9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
 10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
 11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".





Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS

TYPICAL TRAFFIC SIGNAL

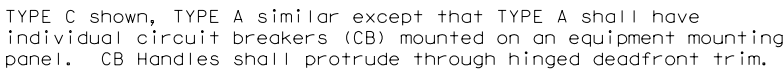
SYSTEM DETAILS

ED(8) - 14

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ANCHOR BOLT DETAIL

LEGEND	
1	Meter Socket, (when required)
2	Meter Socket Window, (when required)
3	Equipment Mounting Panel
4	Photo Electric Control Window, (When required)
5	Hinged Deadfront Trim
6	Load Side Conduit Trim
7	Line Side Conduit Area
8	Utility Access Door, with handle
9	Pedestal Door
10	Hinged Meter Access
11	Control Station (H-O-A Switch)
12	Main Disconnect
13	Branch Circuit Breakers
14	Copper Clad Ground Rod - 5/8" X 10'

 <p>Texas Department of Transportation</p>	<p>Traffic Operations Division Standard</p>			
<h1 style="margin: 0;">ELECTRICAL DETAILS</h1> <h1 style="margin: 0;">ELECTRICAL SERVICE SUPPORT</h1> <h1 style="margin: 0;">PEDESTAL SERVICE TYPE PS</h1> <h2 style="margin: 0;">ED (9) - 14</h2>				
FILE# ed9-14.dgn	DN# TxDOT	CK# TxDOT	DW# TxDOT	CK# TxDOT
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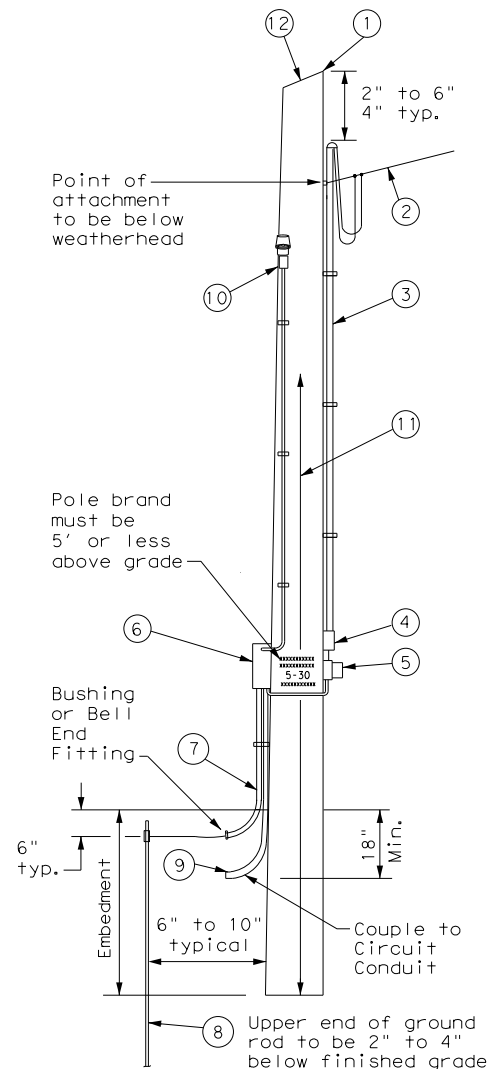
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TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrical service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to $\frac{3}{8}$ in. max. depth and $1\frac{1}{8}$ in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to $3\frac{3}{4}$ in. maximum depth, and $1\frac{1}{2}$ in. to $1\frac{5}{8}$ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, $\frac{1}{4}$ in. minimum diameter by $1\frac{1}{2}$ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

- ① Class 5 pole, height as required
- ② Service drop from utility company (attached below weatherhead)
- ③ Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)
- ④ Safety switch (when required)
- ⑤ Meter (when required)
- ⑥ Service enclosure
- ⑦ 6 AWG bare grounding electrode conductor in $\frac{1}{2}$ in. PVC to ground rod - extend $\frac{1}{2}$ in. PVC 6 in. underground.
- ⑧ $\frac{5}{8}$ in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.
- ⑨ RMC same size as branch circuit conduit.
- ⑩ See pole-top mounted photocell detail on ED(5).
- ⑪ When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.
- ⑫ When required by utility, cut top of pole at an angle to enhance rain run off.

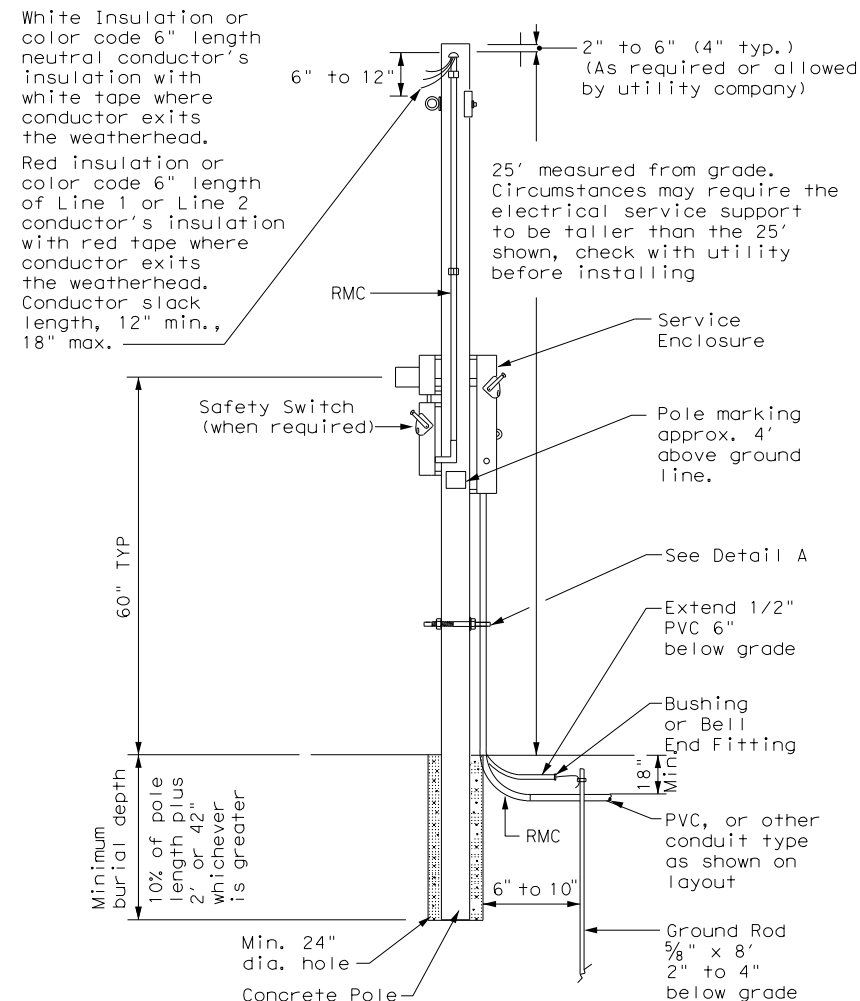


SERVICE SUPPORT TYPE TP (O)

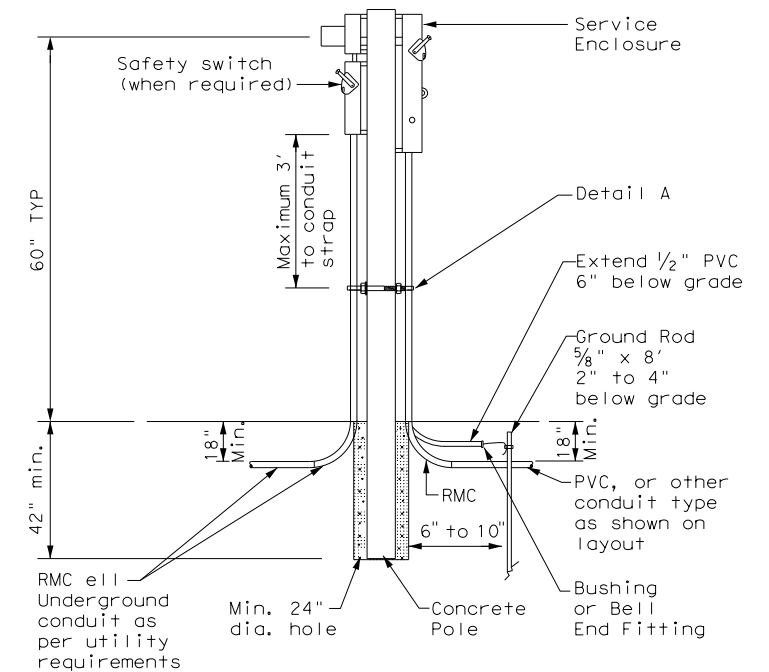
GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

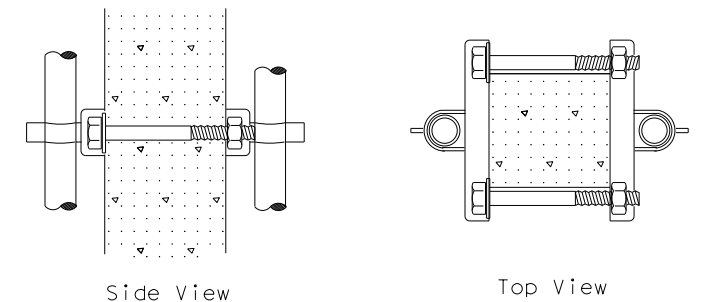
1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut $1\frac{1}{2}$ in. or $1\frac{5}{8}$ in. wide by 1 in. up to $3\frac{3}{4}$ in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



CONCRETE SERVICE SUPPORT
Overhead (O)




CONCRETE SERVICE SUPPORT
Underground (U)



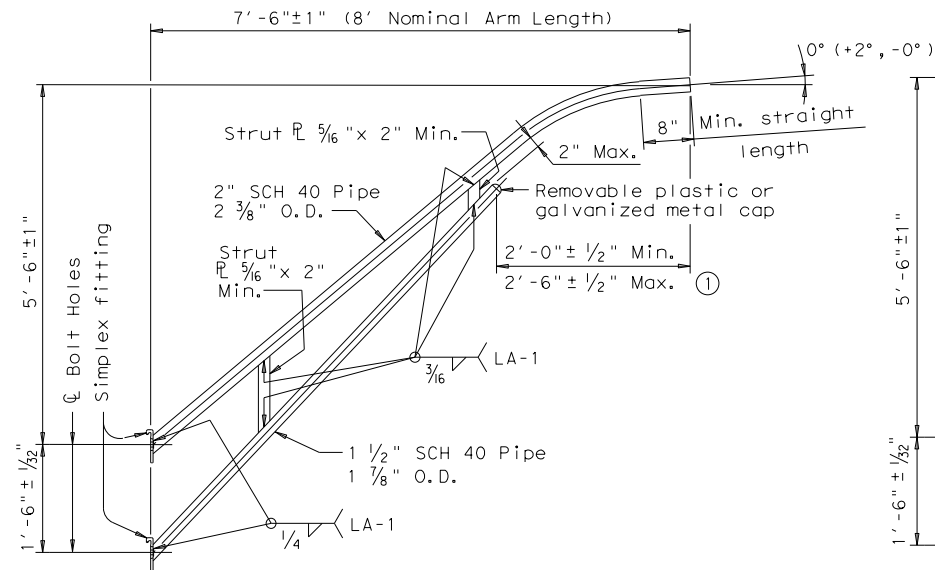
DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

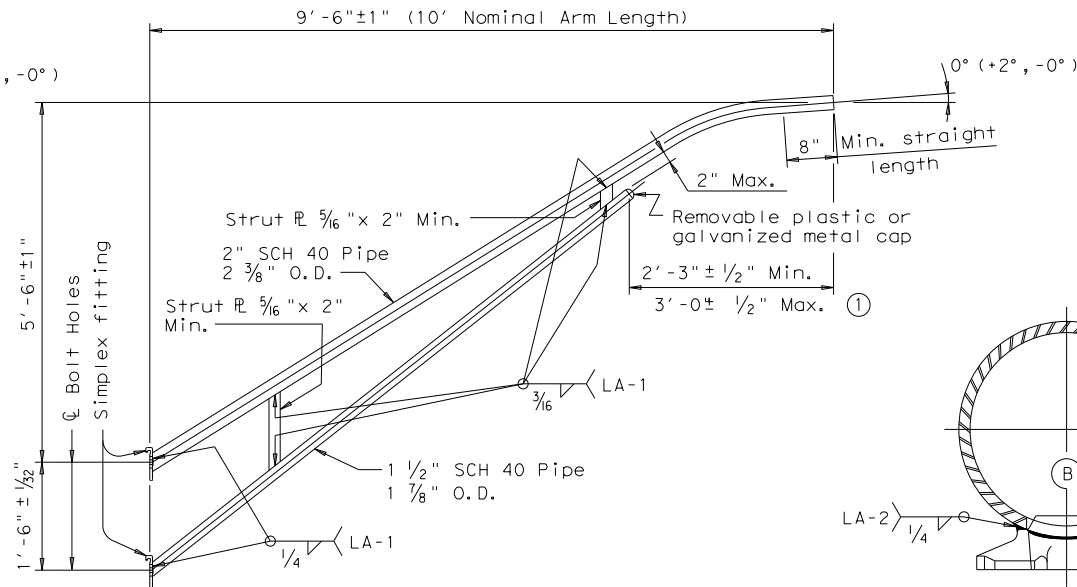
 Texas Department of Transportation				Traffic Operations Division Standard					
ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP									
ED(10) - 14									
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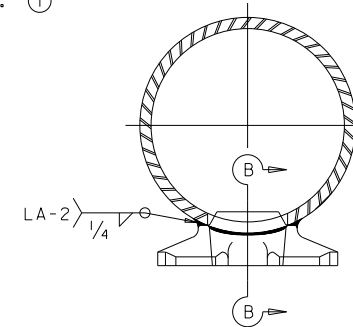
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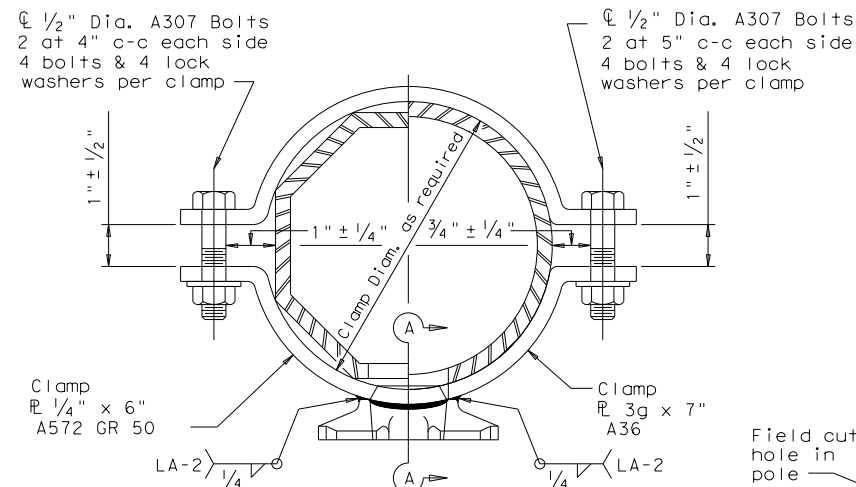
8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM

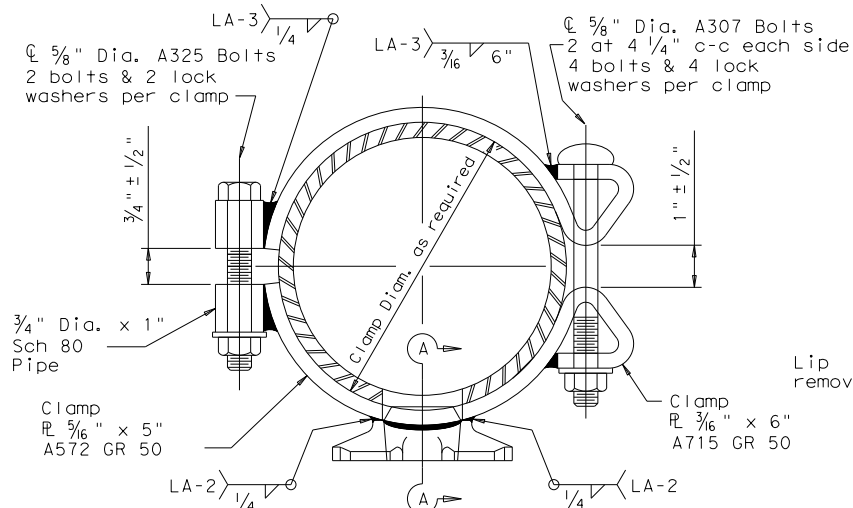


DIRECT ATTACHMENT
DETAIL



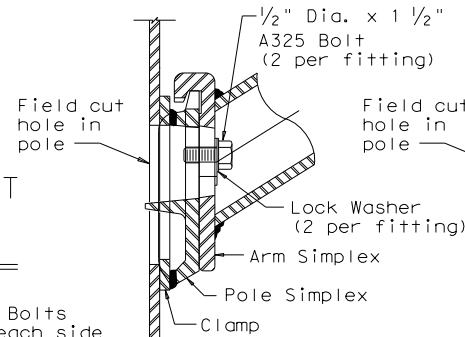
CLAMP ATTACHMENT
DETAIL NO. 1
(HALF SECTION)

CLAMP ATTACHMENT
DETAIL NO. 2
(HALF SECTION)

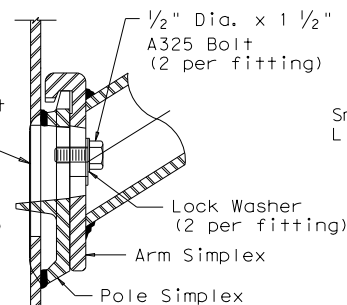


CLAMP ATTACHMENT
DETAIL NO. 3
(HALF SECTION)

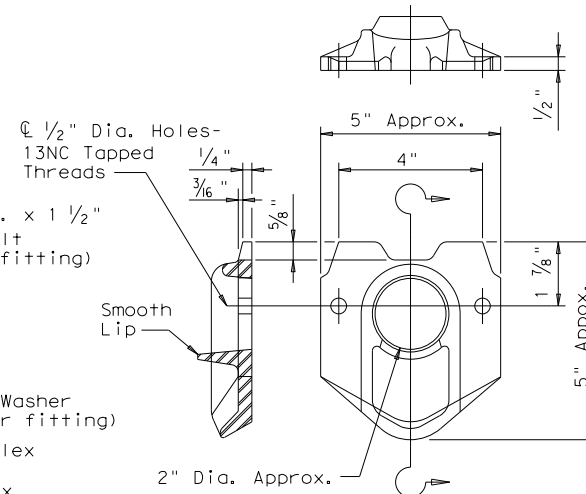
CLAMP ATTACHMENT
DETAIL NO. 4
(HALF SECTION)



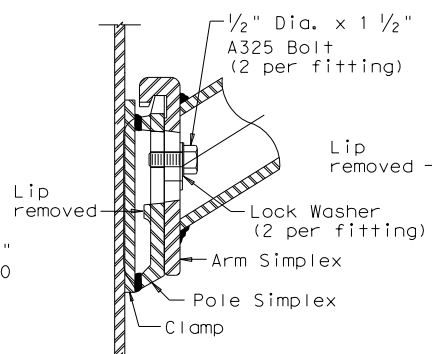
UPPER SIMPLEX FITTING



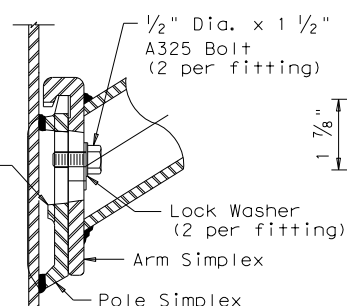
UPPER SIMPLEX FITTING



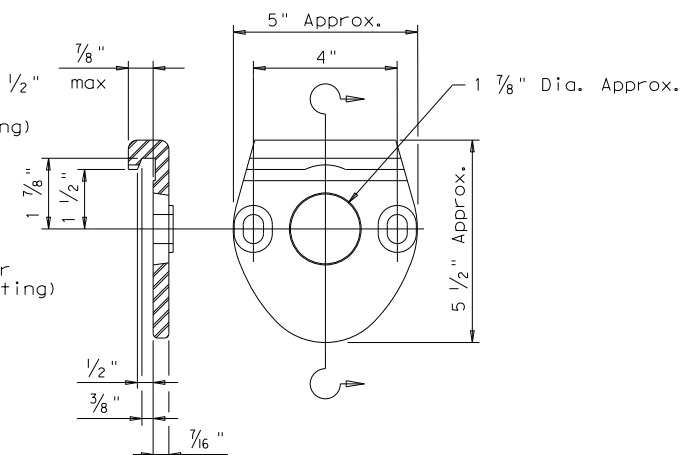
POLE SIMPLEX DETAIL



LOWER SIMPLEX FITTING



LOWER SIMPLEX FITTING



ARM SIMPLEX DETAIL

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr. 65-35 or A148 Gr. 80-50, A576 Gr. 1021 ③, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr. 50 ④, or A1011 HSLAS-F Gr. 50 ④
Arm Strut Plates ②	ASTM A36, A572 Gr. 50 ④, or A588
Misc.	ASTM designations as noted

- ① Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- ② Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- ③ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- ④ ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" 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. In the absence of specified Fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY
DRAWINGS FOR LUMINAIRE
SUPPORT STRUCTURES

ARM DETAILS

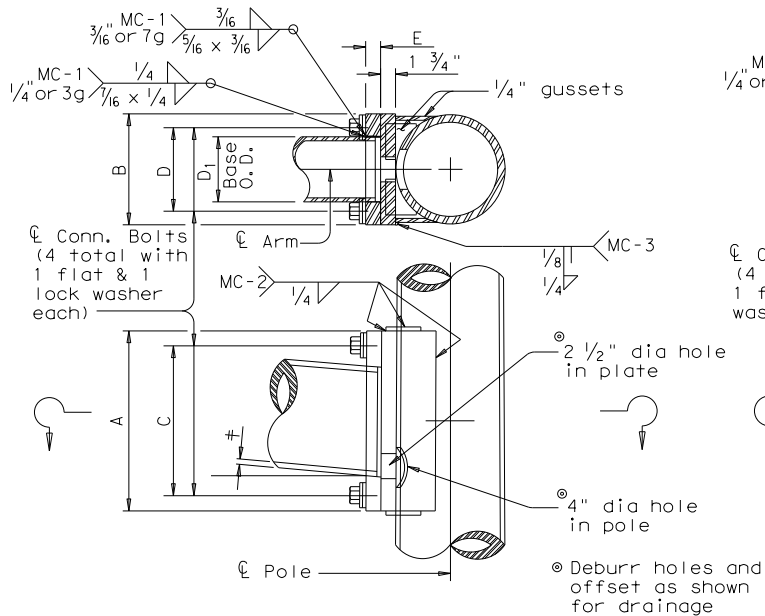
LUM-A-12

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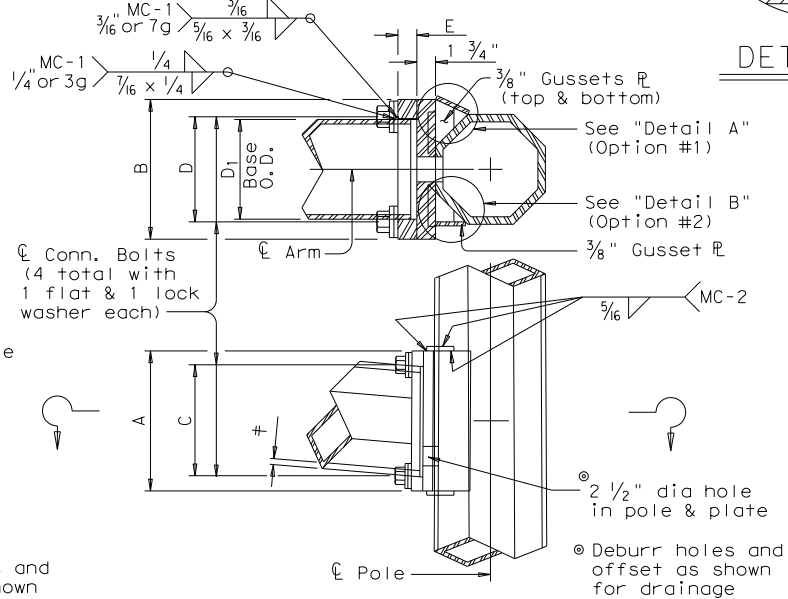
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ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	#	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



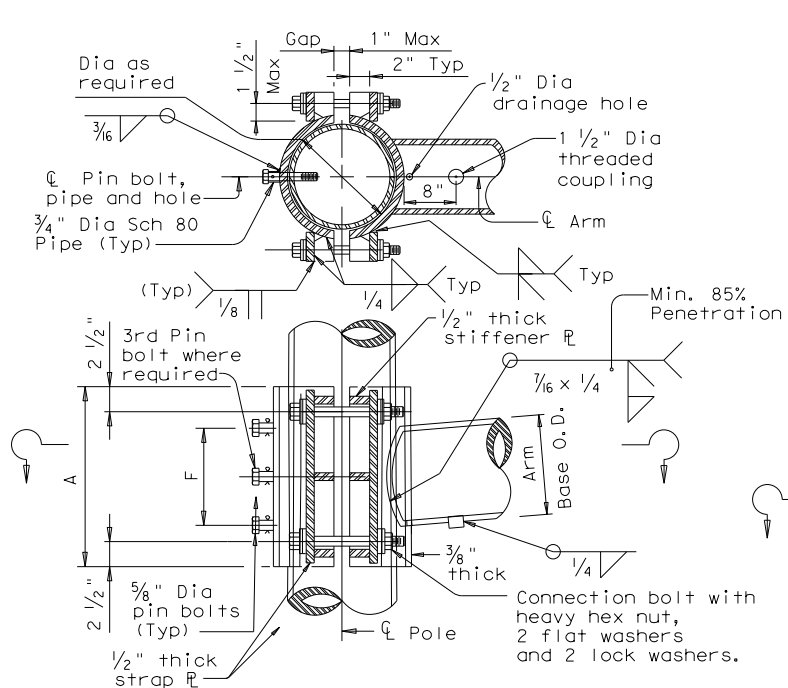
FIXED MOUNT DETAIL 1

ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	#	in.	in.	in.	in.	in.	in.
7.0	.179	11	11	8	8	1 3/4	1 1/4
7.5	.179	11	11	8	8	1 3/4	1 1/4
8.0	.179	11	11	8	8	2	1 1/4
9.0	.179	13	13	10	10	2	1 1/4
10.0	.179	13	13	10	10	2	1 1/4
9.5	.239	13	13	10	10	2	1 1/4
10.0	.239	14	14	11	11	2	1 1/2
11.0	.239	14	14	11	11	3	1 1/2
11.5	.239	14	14	11	11	3	1 1/2



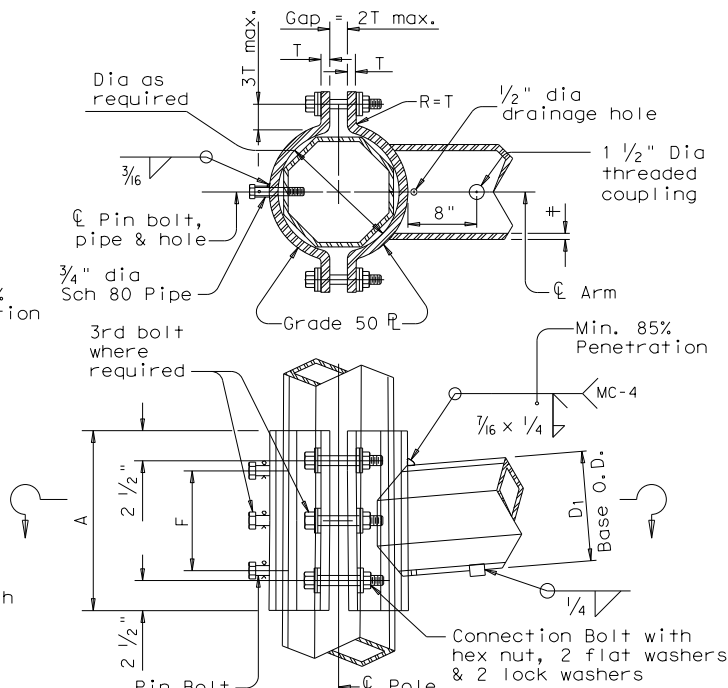
FIXED MOUNT DETAIL 2

ARM SIZE		A	F	CONN. BOLTS		PIN BOLTS	
D ₁	#	in.	in.	No.	Dia	No.	Dia
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8



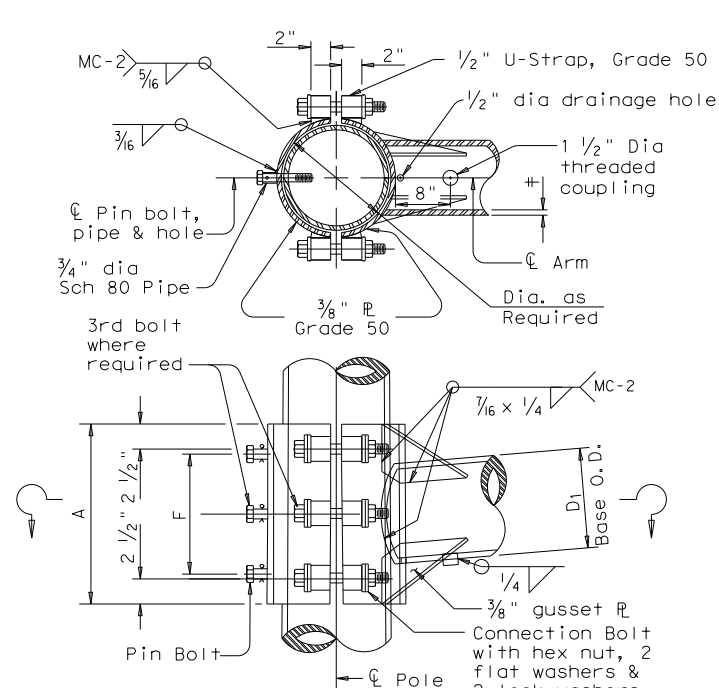
CLAMP-ON DETAIL 1

ARM SIZE		A	F	T	CONN. BOLTS		PIN BOLTS	
D ₁	#	in.	in.	in.	No.	Dia	No.	Dia
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8



CLAMP-ON DETAIL 2

ARM SIZE		A	F	CONN. BOLTS		PIN BOLTS	
D ₁	#	in.	in.	No.	Dia	No.	Dia
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

MATERIALS	
Round Shafts or Polygonal Shafts ^①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ^②
Plates ^①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ^①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

- ① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.
- ② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

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 shall be cut in the front clamp plate to facilitate drainage under A1011 SS 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 a 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.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 1/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

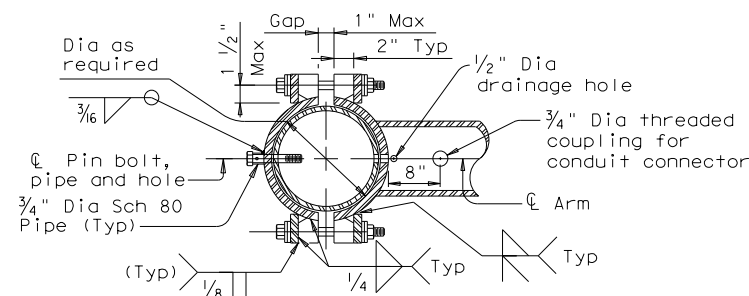
MA-C-12

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REVISIONS		CONT	SECT	JOB	HIGHWAY
5-96 5-09 1-12		DIST		COUNTY	SHEET NO.
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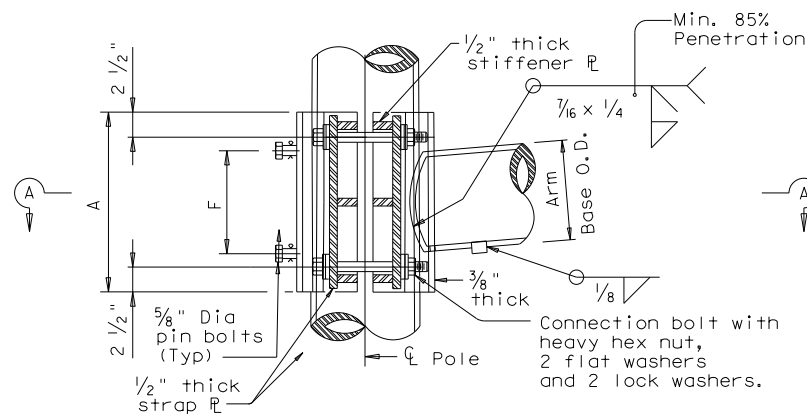
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TABLE OF DIMENSIONS for ILSN Support Arm Clamp-on Details 1, 2 and 3						
ILSN ARM SIZE			CONN. BOLTS		PIN BOLTS	
	A	F	No.	Dia	No.	Dia
	in.	in.	ea.	in.	ea.	in.
3 in. dia Schedule 40 Pipe	10	4	4	3/4	2	5/8



SECTION A-A



ILSN CLAMP-ON DETAIL 1

GENERAL NOTES:

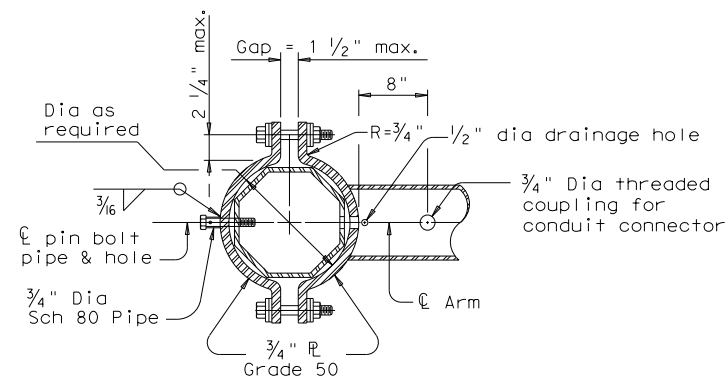
Clamp-on details shall be used for ILSN support arm assemblies. A 1 1/2" inch diameter hole shall be cut in the front clamp plate for wiring access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the details.

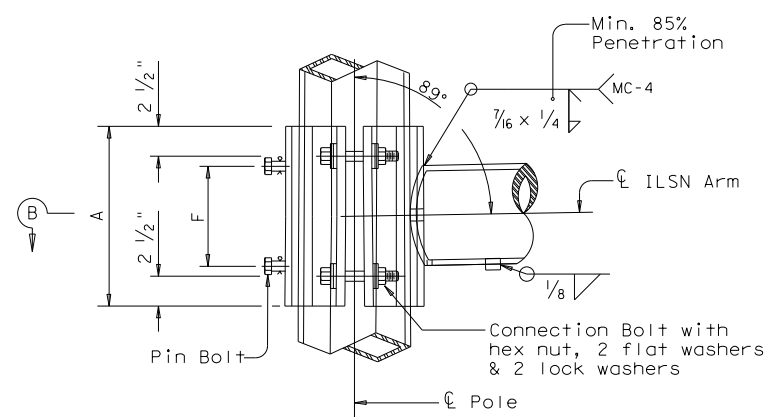
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

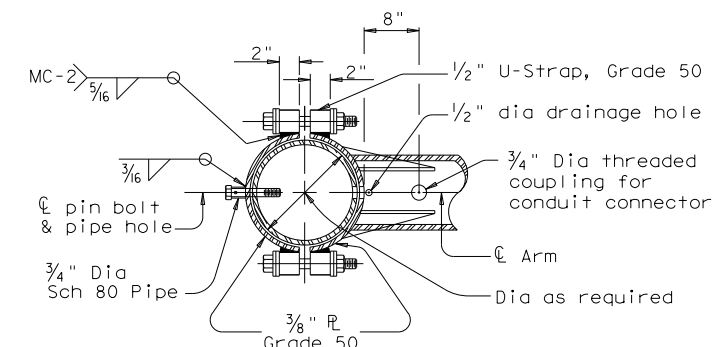
Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and $\frac{3}{4}$ " dia pipe shall have $\frac{7}{16}$ " dia holes for a $\frac{1}{8}$ " dia galvanized cotter pin. Back clamp plate shall be furnished with a $\frac{3}{4}$ " dia hole for each pin bolt. An $\frac{1}{16}$ " dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



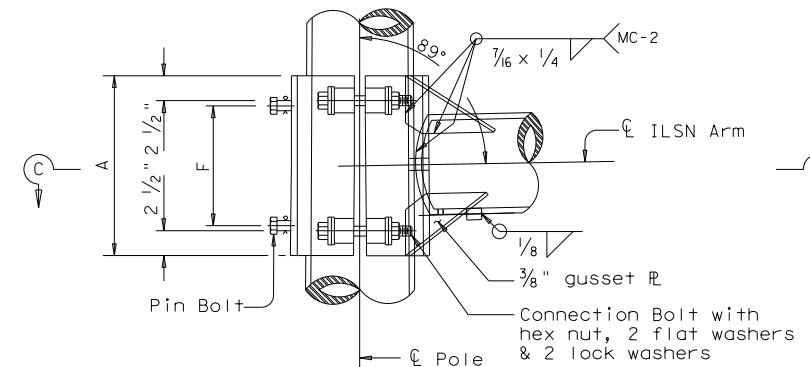
SECTION B-B



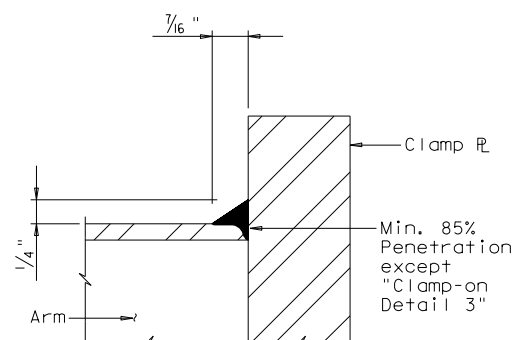
ILSN CLAMP-ON DETAIL 2



SECTION C-C

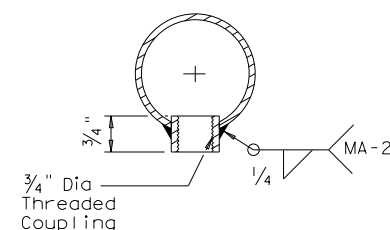


ILSN CLAMP-ON DETAIL 3



CLAMP-ON ARM

ARM BASE WELD DETAILS



ILSN ARM COUPLING DETAIL



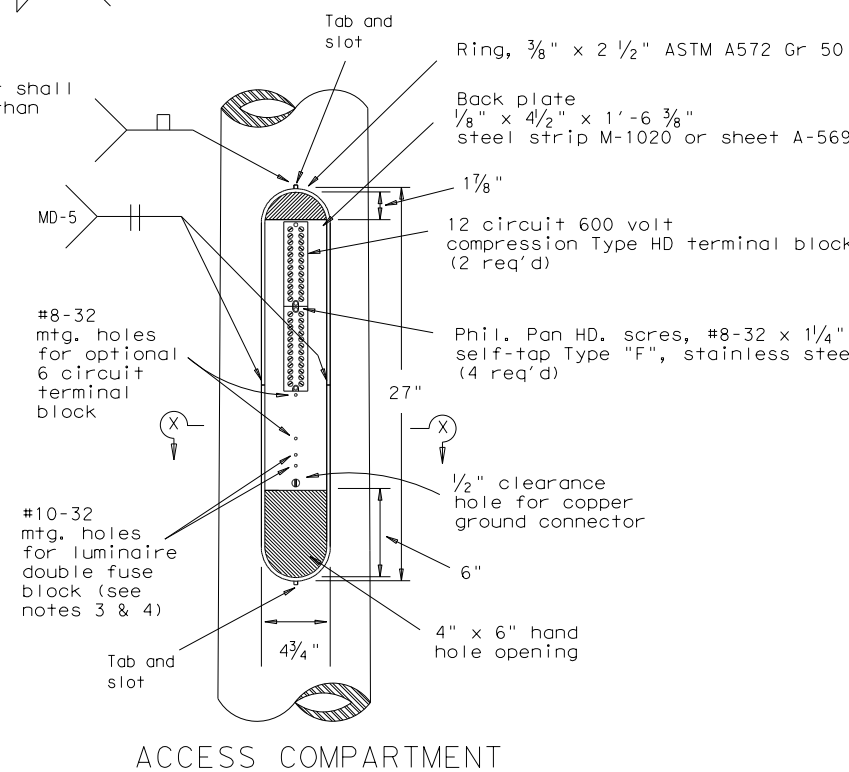
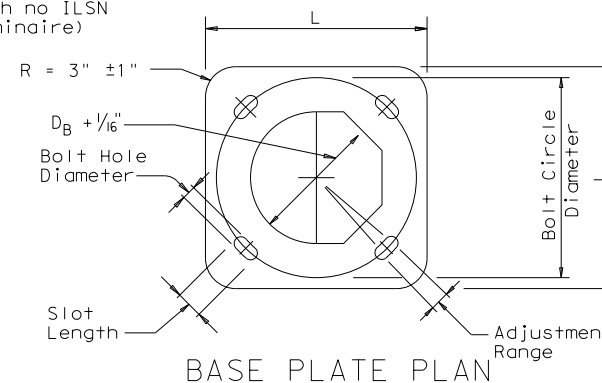
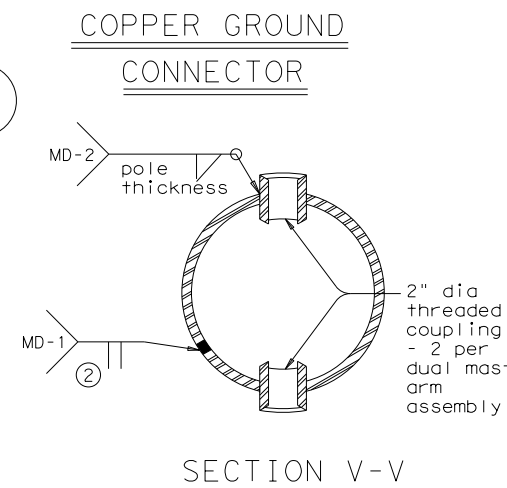
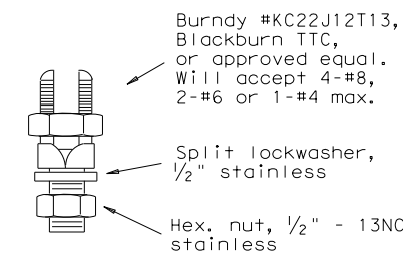
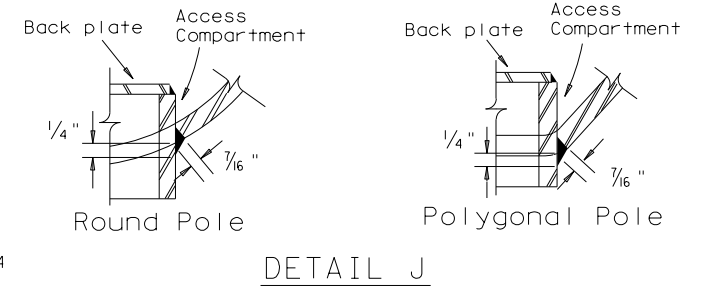
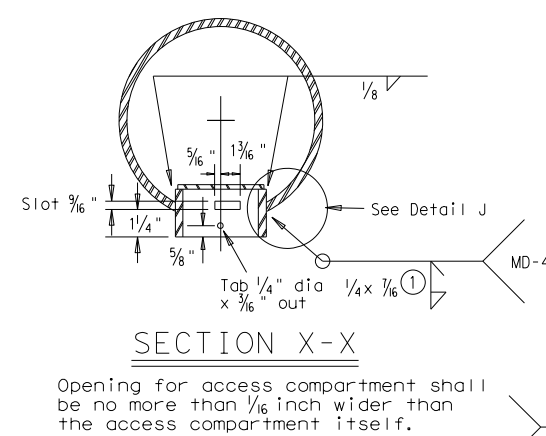
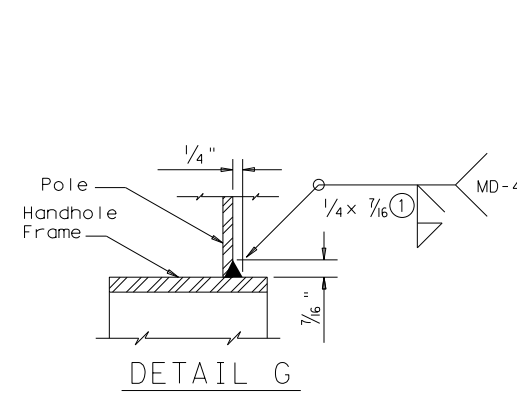
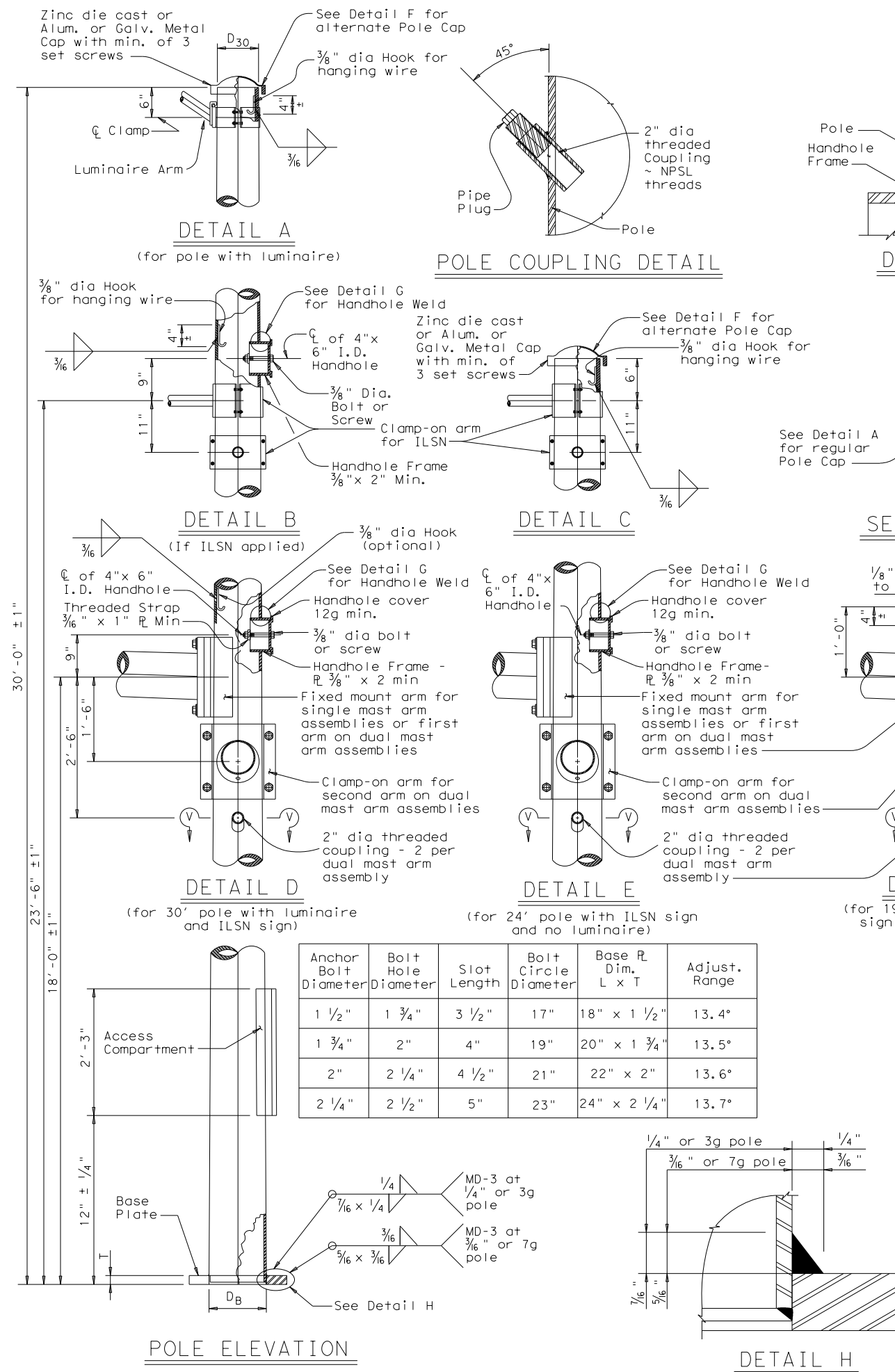
STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST-ARM CONNECTIONS

MA-C (ILSN) - 12

© TxDOT August 1995 REVISIONS 5-96 1-12		DN: MS	CK: JSY	DW: MMF	CK: JSY
		CONT	SECT	JOB	HIGHWAY
		DIST	COUNTY		SHEET NO
					27

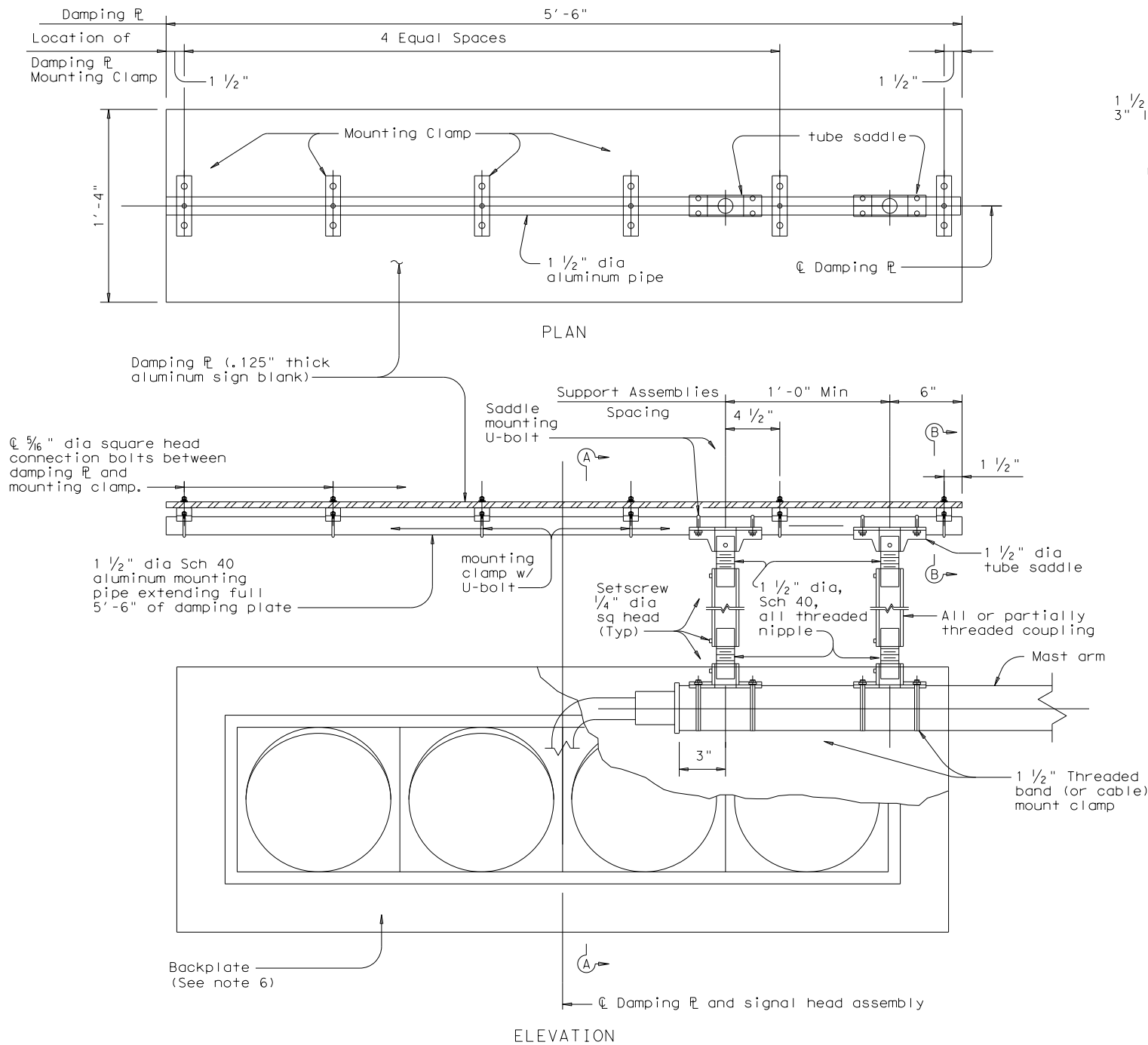
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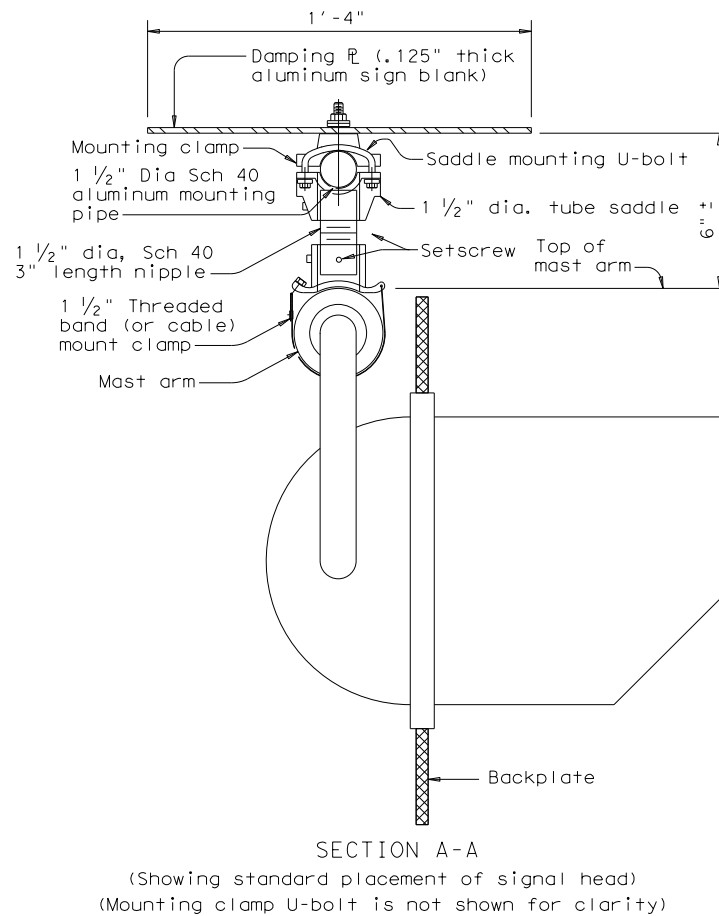
- NOTES:
1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
 2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilco SSS-5). The traffic signal contractor shall install the kit items in the field.
 3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
 4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

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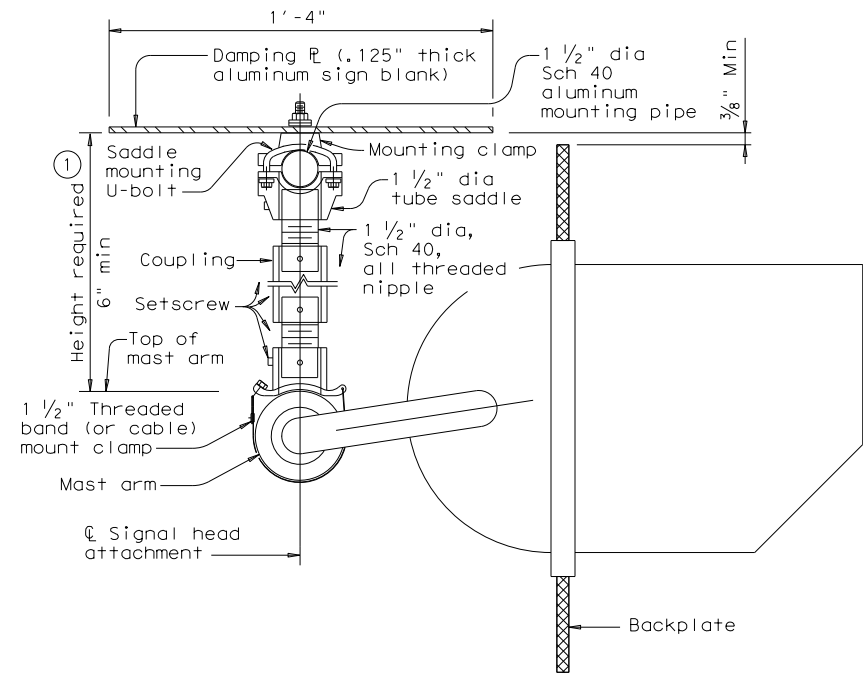
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DAMPING PLATE MOUNTING DETAILS
(Showing alternate placement of signal head)



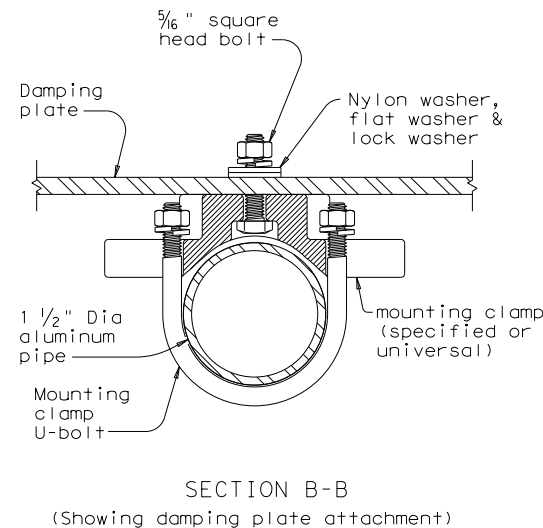
SECTION A-A
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



SECTION A-A
(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 3/4"	3"	-	-
7"-8 1/2"	4"	-	-
9"-10 1/2"	6"	-	-
11"-15 1/2"	-	4"	5"
16"-24"	-	6"	10"

- GENERAL NOTES:
1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
 2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and U-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
 3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
 4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
 5. Contractor will verify applicable field dimensions before the installation.
 6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type BFL or CFL retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.



Texas Department of Transportation

Traffic Safety Division Standard

MA-DPD-20

FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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6-20	DIST	COUNTY	SHEET NO. 29	

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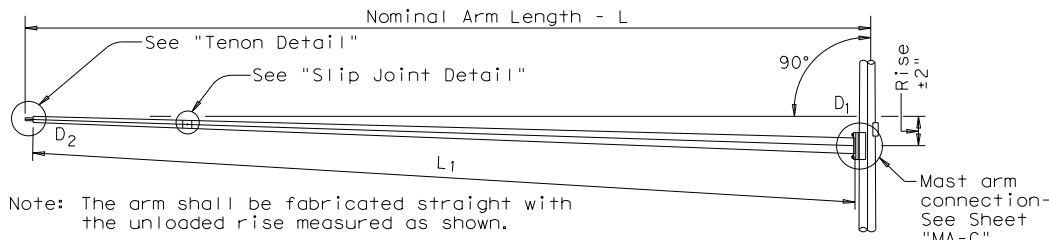
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Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D _B	D ₁₉	D ₂₄	D ₃₀	① thk	D _B	D ₁₉	D ₂₄	D ₃₀	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L ₁	D ₁	D ₂	① thk	Rise	L ₁	D ₁	② D ₂	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

D_B = Pole Base O.D.
D₁₉ = Pole Top O.D. with no Luminaire and no ILSN
D₂₄ = Pole Top O.D. with ILSN w/out Luminaire
D₃₀ = Pole Top O.D. with Luminaire
D₁ = Arm Base O.D.
D₂ = Arm End O.D.
L₁ = Shaft Length
L = Nominal Arm Length

- ① Thickness shown are minimums, thicker materials may be used.
② D₂ may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

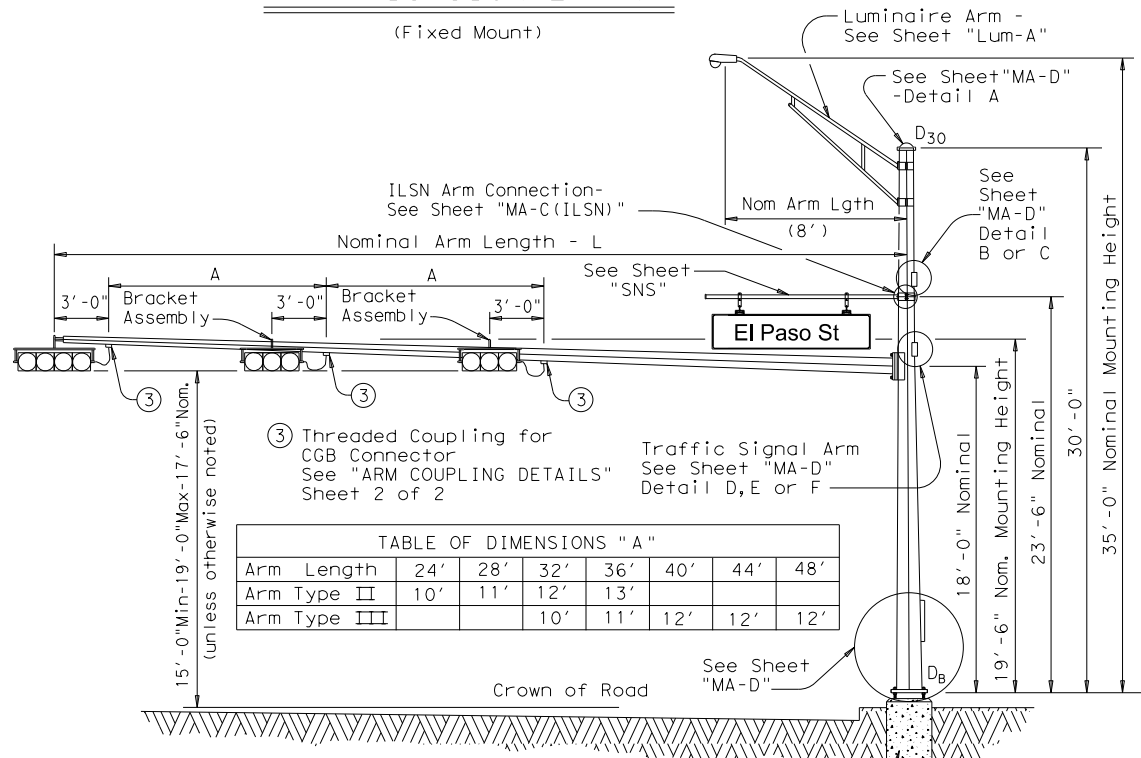


TABLE OF DIMENSIONS "A"							
Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
	ft	Designation	Quantity	Designation	Quantity	Designation
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80	3	44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole)

Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	3
48					48III-80	

Luminaire Arms (1 per 30' pole)

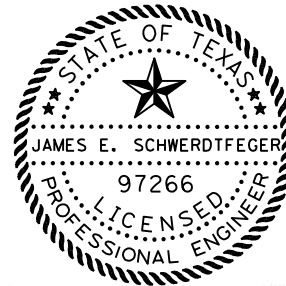
Nominal Arm Length	Quantity
8' Arm	2

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	3

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity	Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".
1 1/2"	3'-4"		
1 3/4"	3'-10"	3	
			Templates may be removed for shipment.



James Schwerdtfeger

12/21/2023

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

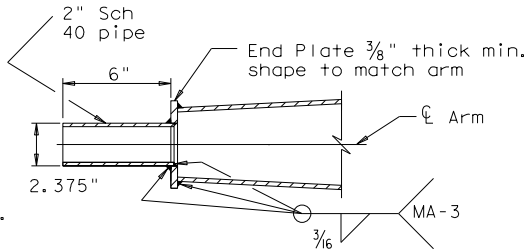
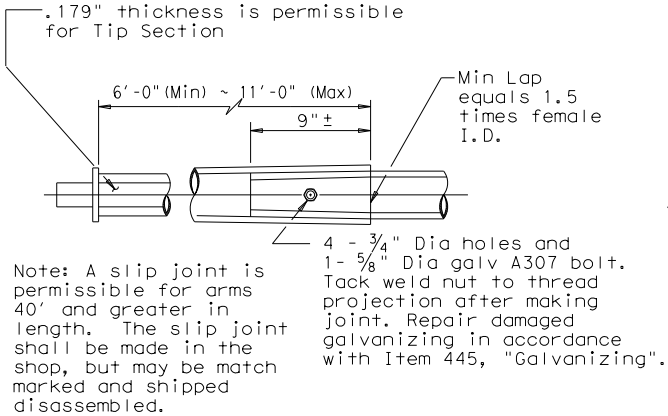
TRAFFIC SIGNAL
SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)

SMA-80(1)-12

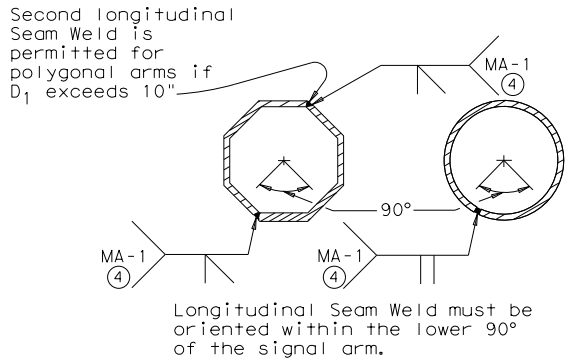
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5-96 11-99 1-12	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.
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122A

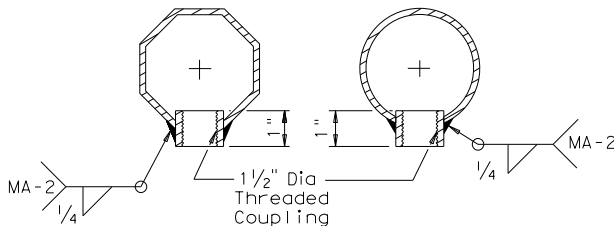


Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2" Dia Threaded Coupling.

BRACKET ASSEMBLY



④ 60% Min. penetration
100% penetration within 6" of circumferential base welds.



VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backplates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 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.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 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).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" 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. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

SHEET 2 OF 2



TRAFFIC SIGNAL SUPPORT STRUCTURES SINGLE MAST ARM ASSEMBLY (80 MPH WIND ZONE)

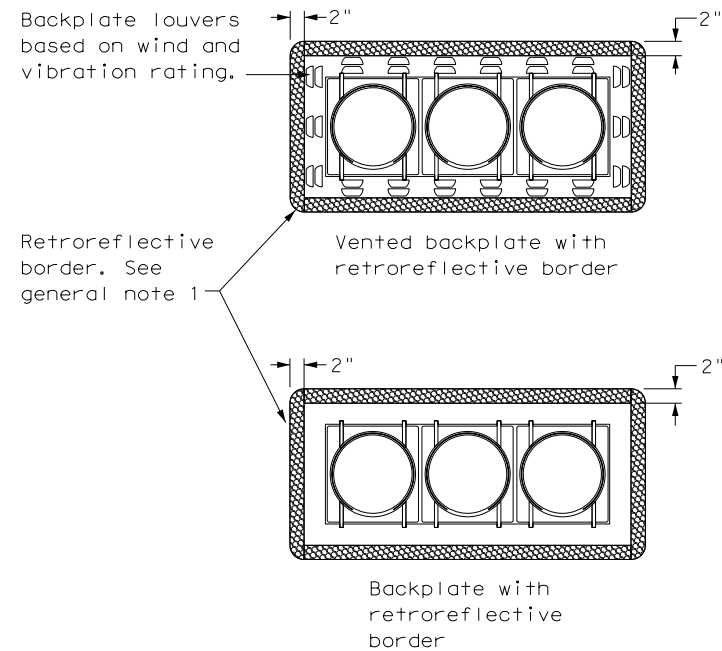
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5-96 1-12	REVISIONS		CONT	SECT	JOB			HIGHWAY	
			DIST			COUNTY			SHEET NO.
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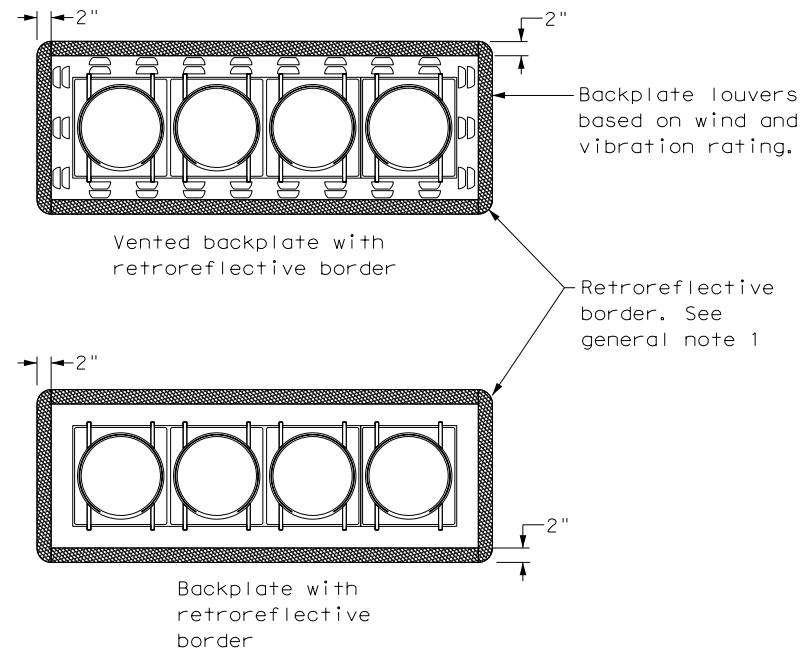
122B

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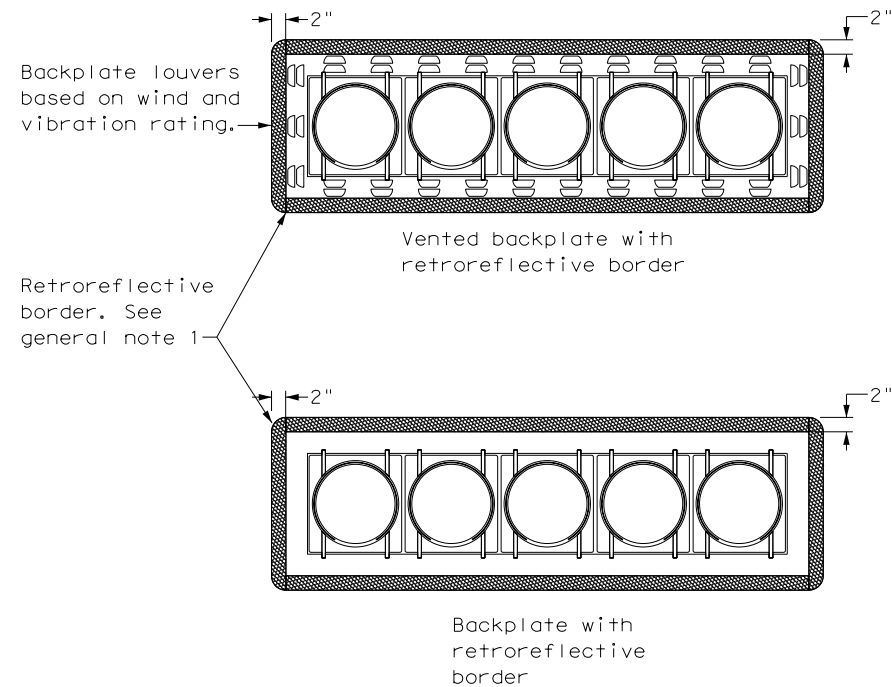
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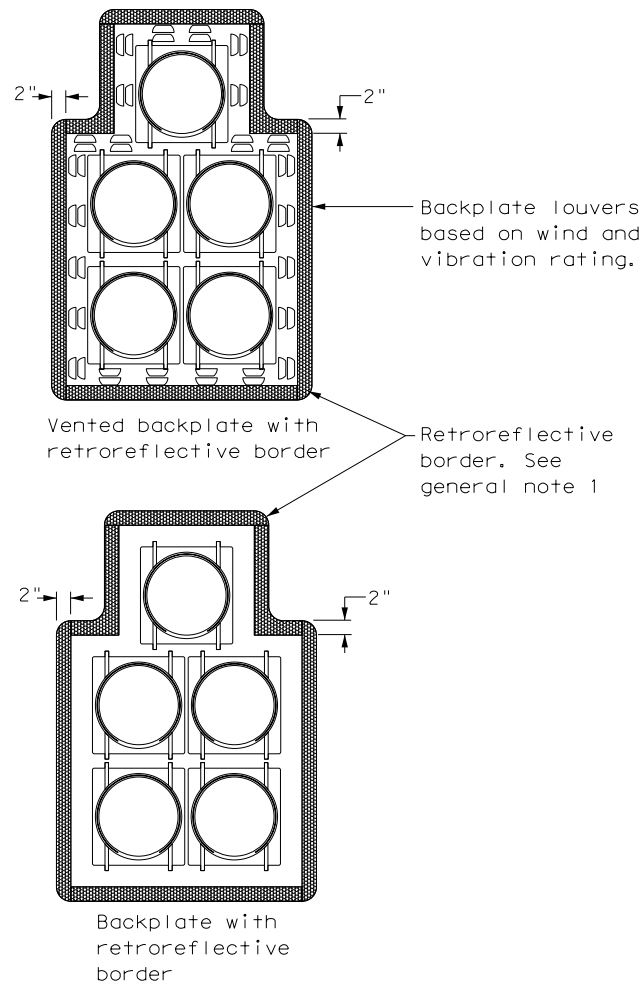
THREE-SECTION HEAD
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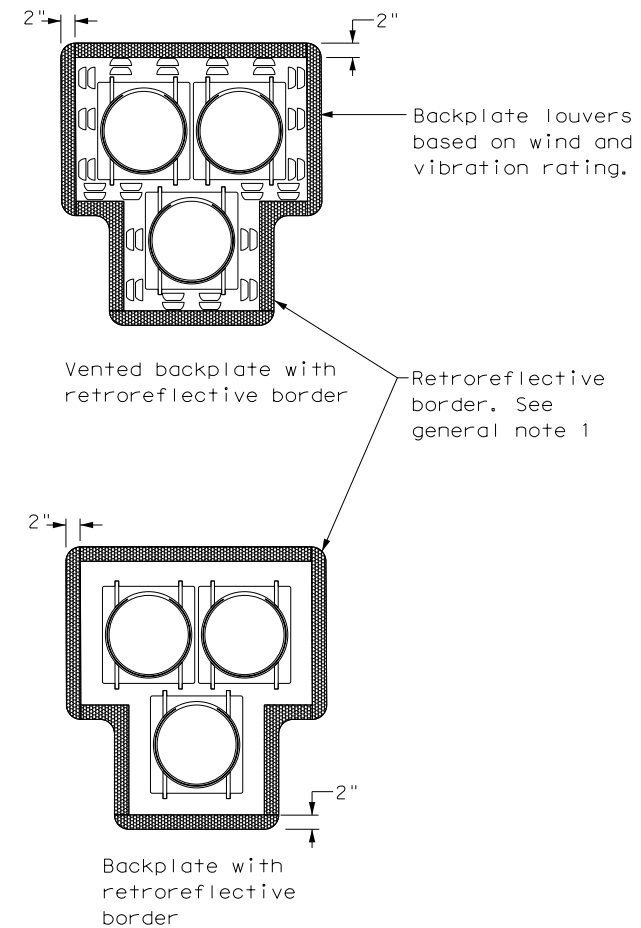
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL




FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatibility must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
 - Pole mounted
 - Overhead mounted
 - Span wire mounted
 - Mast arm mounted
 - Vertical signal heads
 - Horizontal signal heads
 - Clustered signal heads
 - Pedestrian hybrid beacons

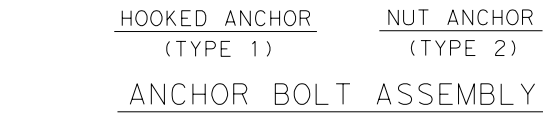
 <i>Texas Department of Transportation</i>				<i>Traffic Safety Division Standard</i>	
<div>TRAFFIC SIGNAL HEAD WITH BACKPLATE TS-BP-20</div>					
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
	DIST	COUNTY			SHEET NO.
					32

DISCIPLINE:

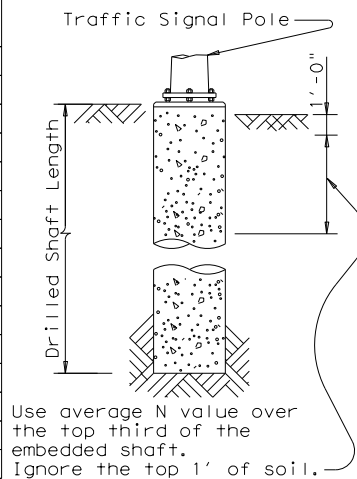
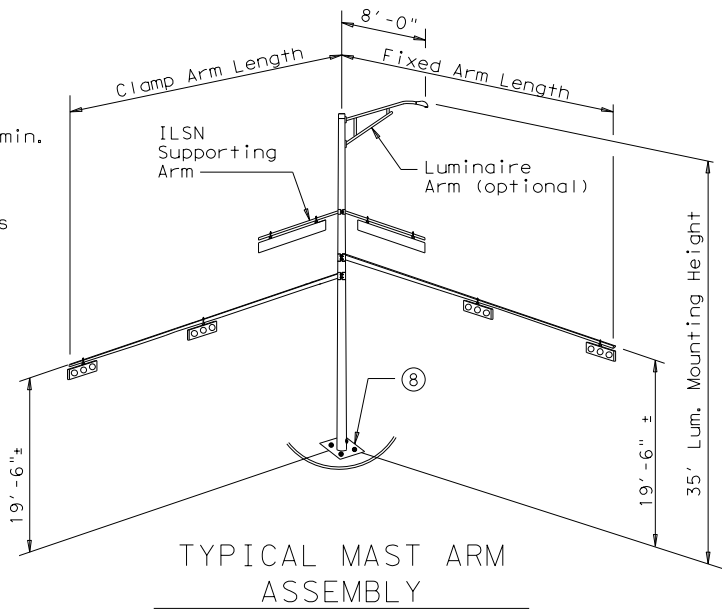
DATE: 12/21/2011
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FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)					
		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'

2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.

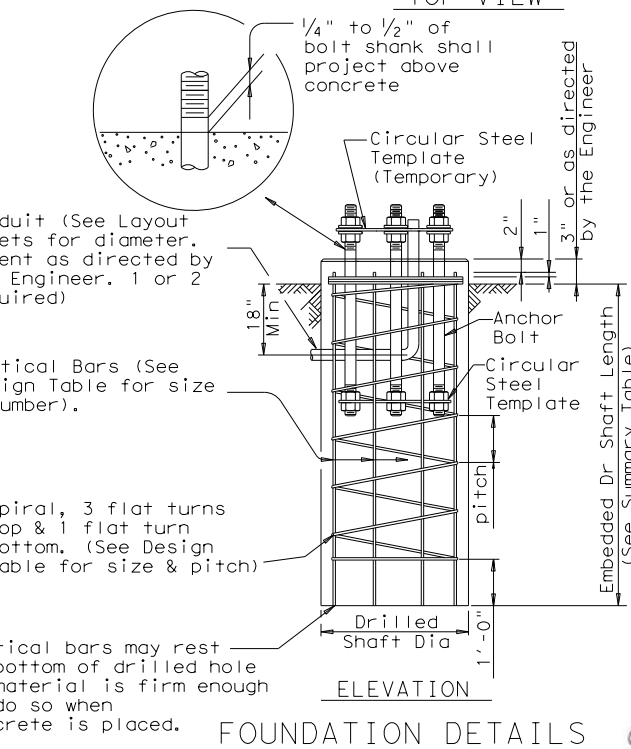


⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



ANCHOR BOLT & TEMPLATE SIZES						
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1' - 6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3' - 4"	6"	4"	17"	10"	7"
1 ¾"	3' - 10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4' - 3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4' - 9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given,
longer bolts are acceptable.



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.

FOUNDATION SUMMARY TABLE ③								
LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A	30-A	36-A	36-B	42-A
POLE 1, 2, 3	10	36-A	3			42		
POLE 4, 5, 6, 7	10	24-A	4	24				
TOTAL DRILLED SHAFT LENGTHS				24		42		

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

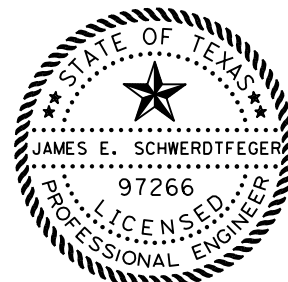
Reinforcing steel shall conform to Item 440,
"Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".



James Schwerdtfeger
12/21/2023

 Texas Department of Transportation
Traffic Operations Division

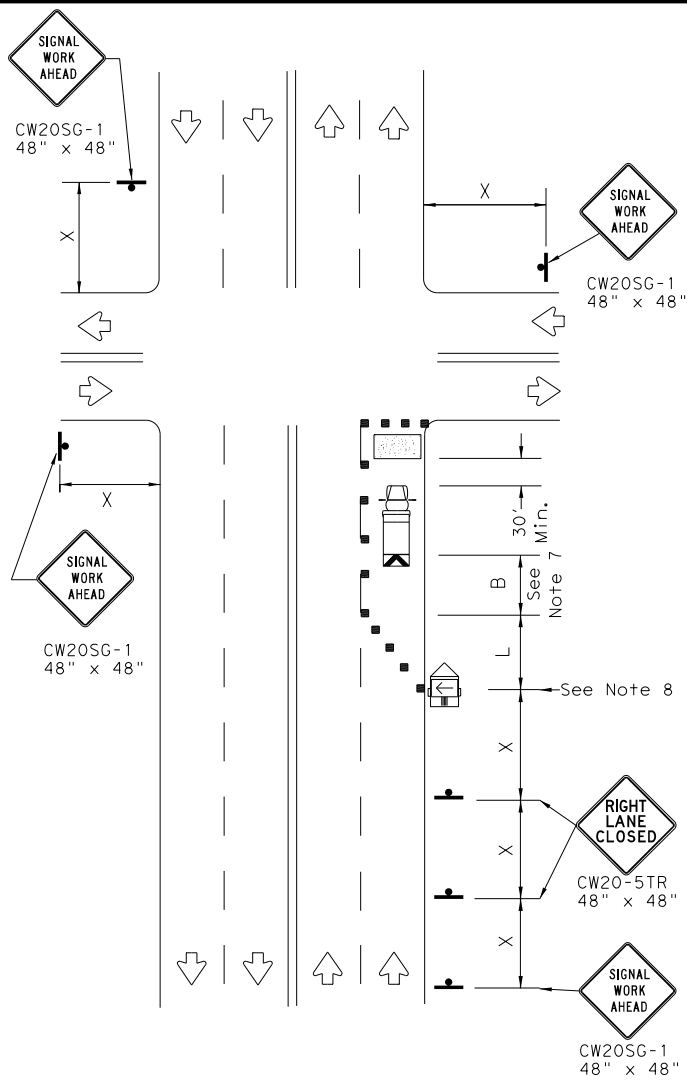
TRAFFIC SIGNAL
POLE FOUNDATION

TS-FD-12

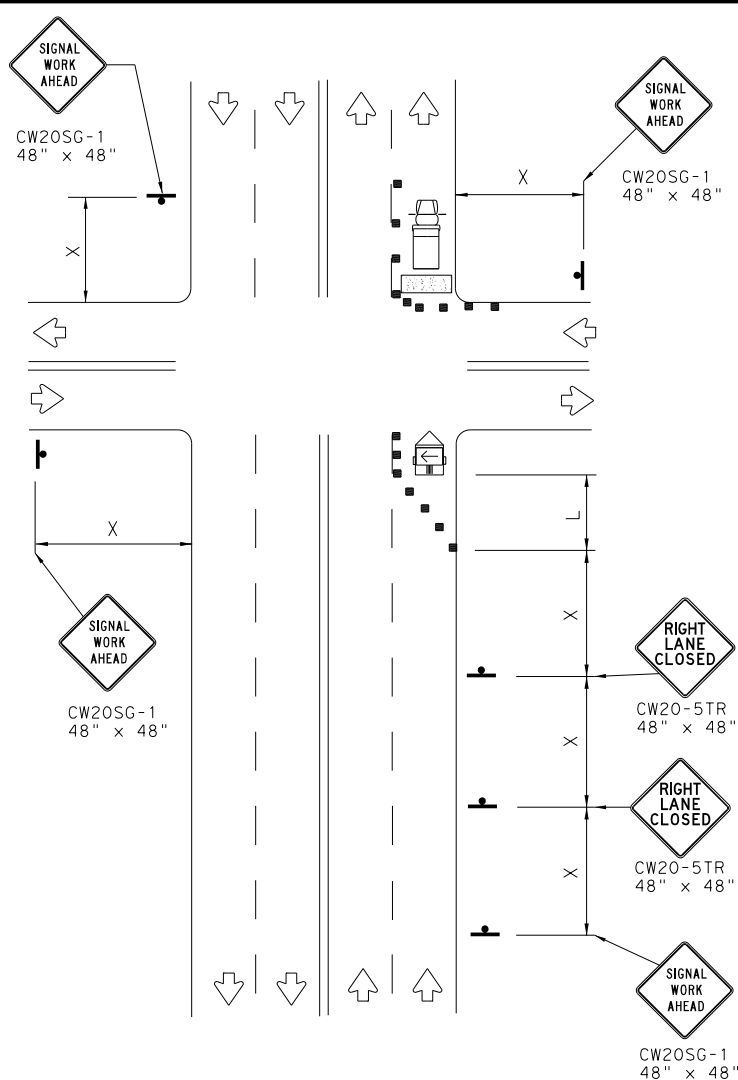
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		CONT	SECT	JOB		HIGHWAY	
		DIST	COUNTY			SHEET NO.	
					33		

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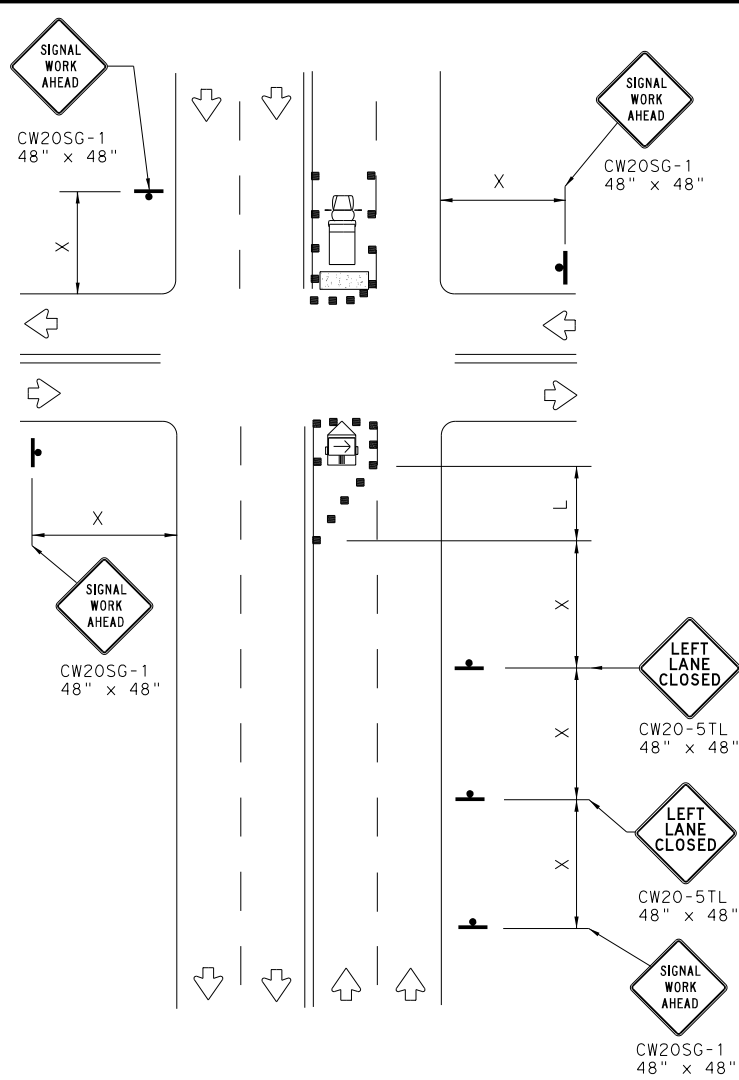
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NEAR SIDE LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY



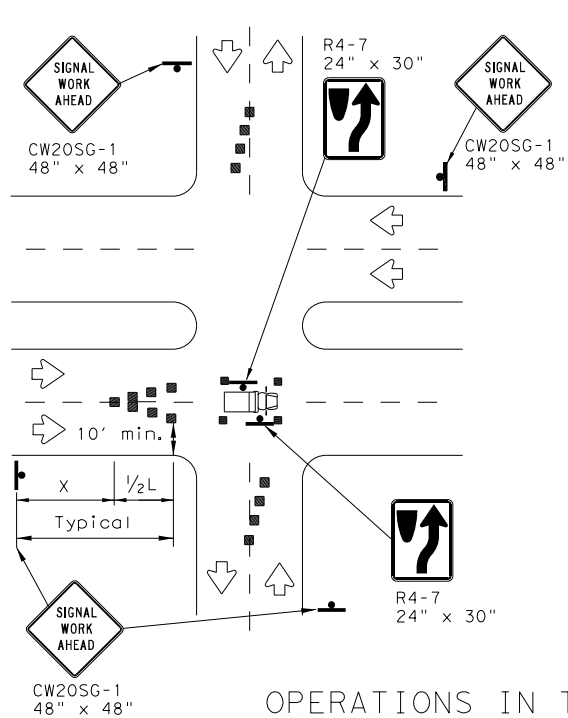
FAR SIDE LEFT LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

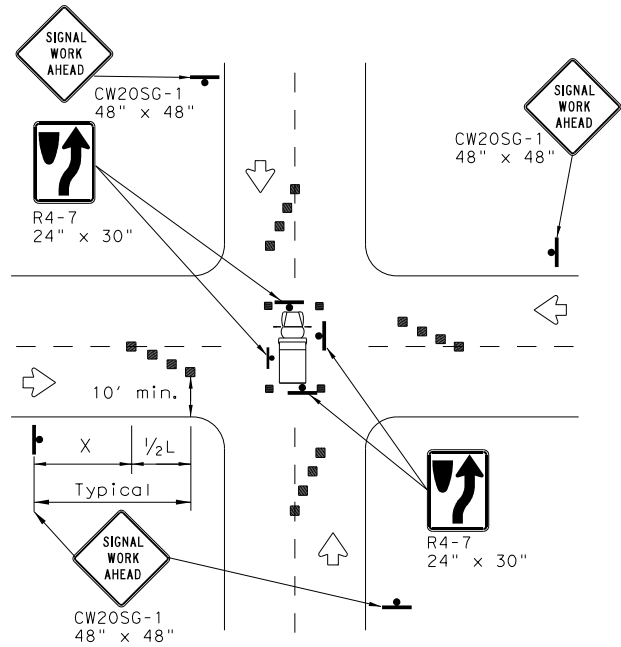
Posted Speed *	Formula	Minimum Desirable Taper Lengths * X			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper (FT) W=Width of Offset (FT) S=Posted Speed (MPH)

WORKERS IN BUCKET TRUCKS SHALL NOT
WORK ABOVE OPEN LANES OF TRAFFIC.




OPERATIONS IN THE INTERSECTION
SHORT DURATION



GENERAL NOTES

- The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
- Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
- Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
- Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
- High level warning devices (flag trees) may be used at corners of the vehicle.
- When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
- For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
- The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
- Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

SHEET 1 OF 2



Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK

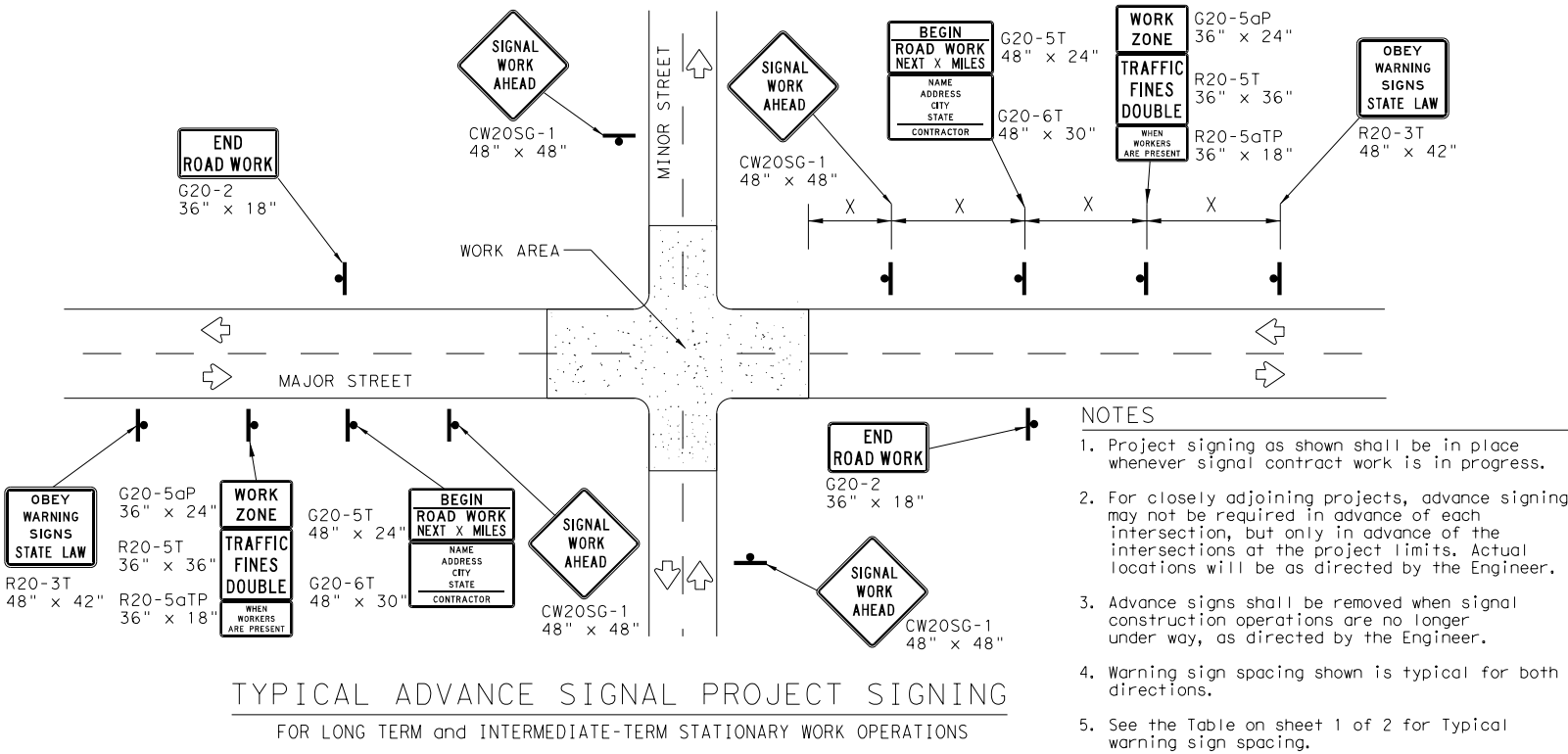
TYPICAL DETAILS

WZ (BTS-1) - 13

FILE: wzbtts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03				34

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TYPICAL ADVANCE SIGNAL PROJECT SIGNING
FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

GENERAL NOTES FOR WORK ZONE SIGNS

- Signs shall be installed and maintained in a straight and plumb condition.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- Nails shall NOT be used to attach signs to any support.
- All signs shall be installed in accordance with the plans or as directed by the Engineer.
- The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
- The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
- Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
- Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

- Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

- Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
- Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

- All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

- Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

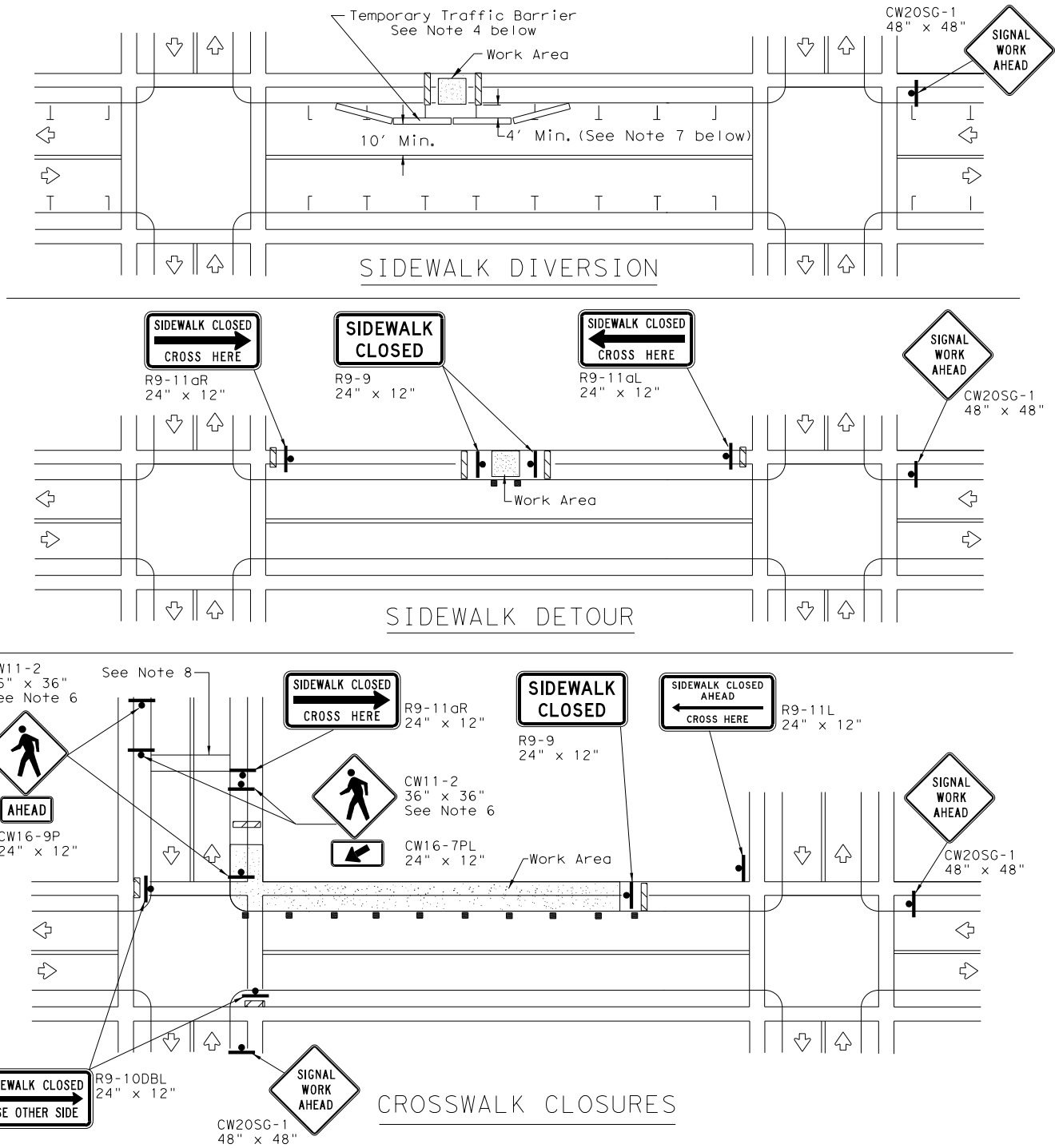
LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B _{FL} OR TYPE C _{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



PEDESTRIAN CONTROL

- Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
- "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
- R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
- For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
- Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
- Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
- The width of existing sidewalk should be maintained if practical.
- Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
- When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

SHEET 2 OF 2

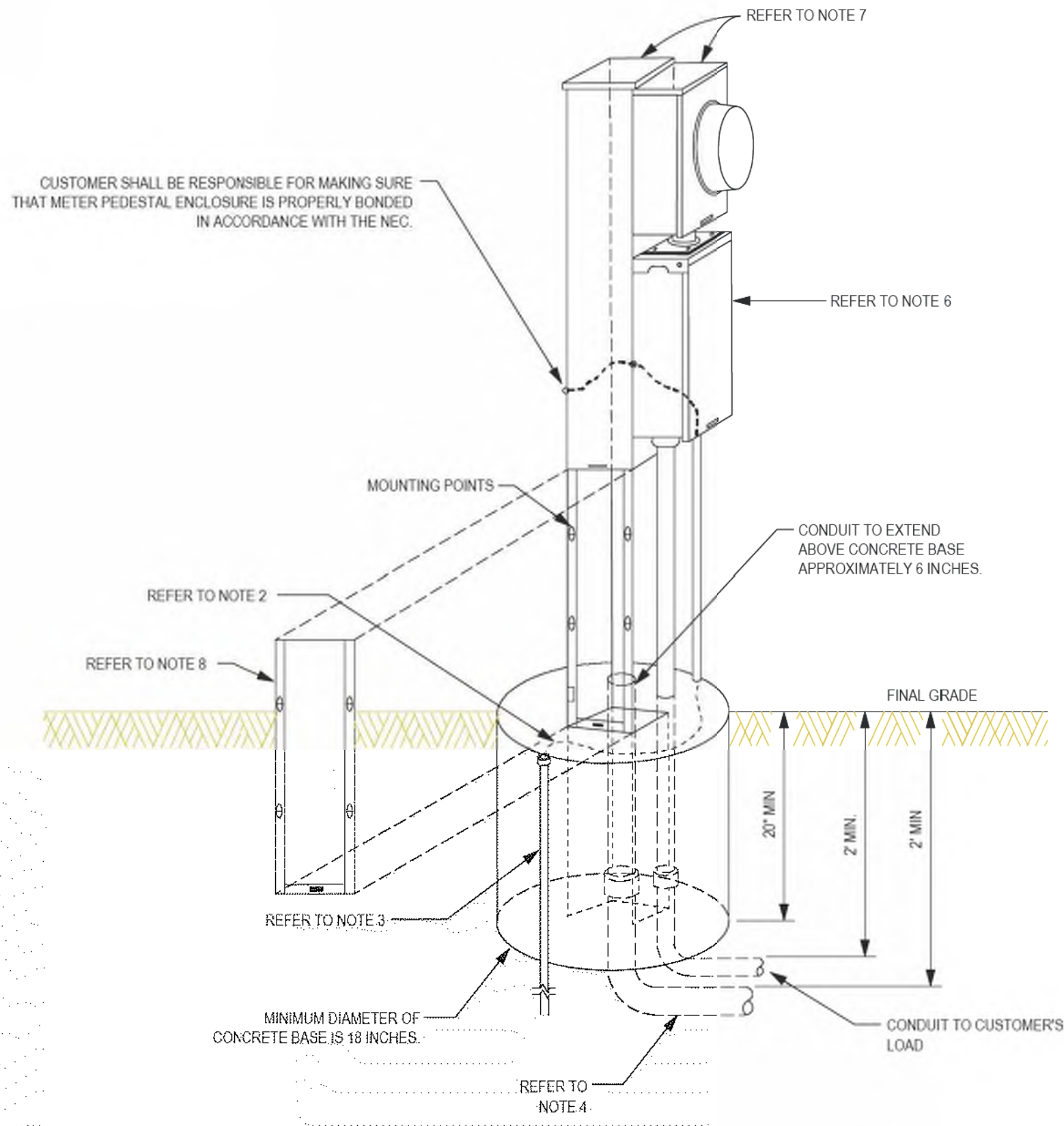
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK
BARRICADES AND SIGNS

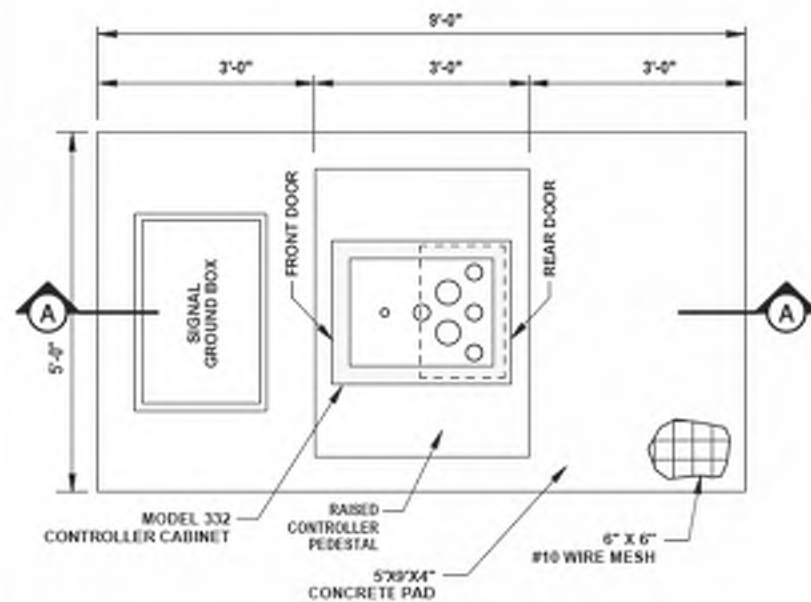
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4-98 3-03				35

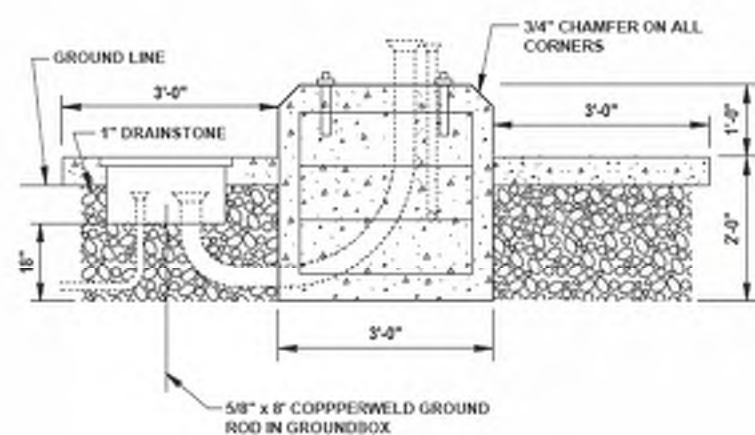


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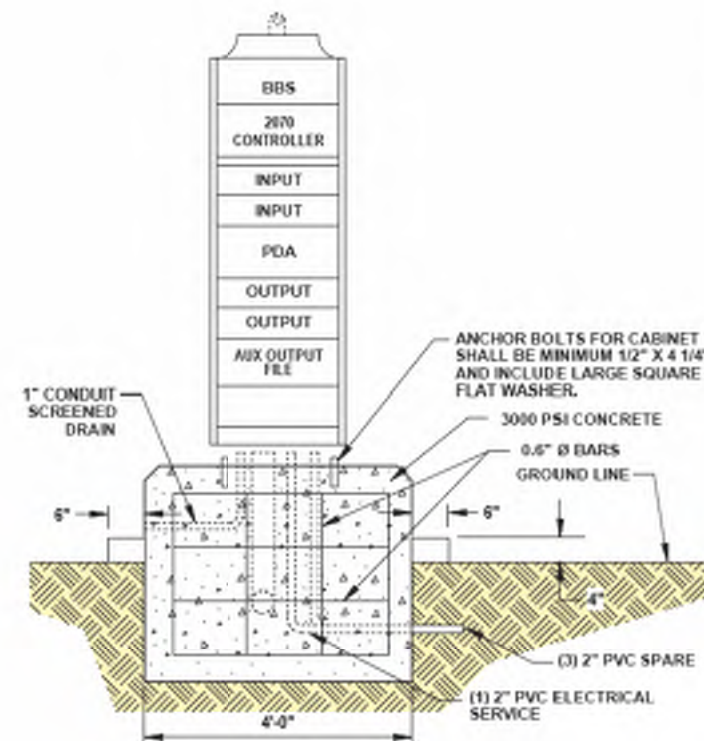
1. CUSTOMER TO INSTALL ALL CONDUIT AND CHANNEL SUPPORT TO CORRECT DEPTH, AND POUR CONCRETE. PEDESTAL MOUNTING HOLES MUST LINE UP WITH CHANNEL MOUNTING SLOTS. PEDESTAL SHALL EXTEND ABOVE CONCRETE 60 INCHES.
2. COPPER GROUNDING ELECTRODE CONDUCTOR AND CONDUIT SHALL BE INSTALLED ON THE OUTSIDE OF METER PEDESTAL. WHERE TWO-METER PEDESTALS OR TOTALLY ENCLOSED, SELF-CONTAINED METER PEDESTALS ARE PRE-APPROVED BY CPS ENERGY, THE GROUNDING ELECTRODE CONDUCTOR MAY BE ROUTED WITHIN THE PEDESTAL AND BE BONDED TO THE GROUNDED CONDUCTOR WITHIN THE PEDESTAL. PENETRATION INTO PEDESTAL SHALL BE AT OR NEAR THE BASE AND DONE SO AS TO NOT INTERFERE WITH ACCESS PANELS.
3. MINIMUM 5/8- INCH BY 8- FOOT GROUND ROD FURNISHED AND INSTALLED BY CUSTOMER IS REQUIRED BY CPS ENERGY AT ALL CUSTOMER SERVICE LOCATIONS. GROUNDING ELECTRODE SYSTEM MAY ALSO INCLUDE OTHER ELECTRODES AS REQUIRED BY THE NEC AND OTHER APPLICABLE CODES (REFER TO SECTION 1700).
4. THREE-INCH CONDUIT ELBOW FOR RECEIVING CPS ENERGY SERVICE LATERAL CONDUCTORS, FURNISHED AND INSTALLED BY CUSTOMER. IT MAY BE SCHEDULE 40 OR 80 PVC, OR GALVANIZED RMC OR IMC CORROSION PROTECTED.
5. LOAD-SIDE CONDUIT SHALL BE INSTALLED OUTSIDE OF THE PEDESTAL. LOAD CONDUIT SHALL NOT INTERFERE WITH THE REMOVAL OF ALL ACCESS PANELS AND SHALL NOT INTERFERE WITH WORK TO BE PERFORMED INTERNAL TO THE PEDESTAL COMPARTMENT. REMOVABLE ACCESS PANELS SHALL BE LOCKABLE AND SEALABLE BY CPS ENERGY.
6. CUSTOMER TO FURNISH AND INSTALL WEATHERPROOF SERVICE EQUIPMENT, MAINTENANCE OF THIS EQUIPMENT WILL BE CUSTOMERS RESPONSIBILITY.
7. CUSTOMER SHALL FURNISH AND INSTALL HUBLESS METER SOCKET. CUSTOMER TO FURNISH AND INSTALL METER PEDESTAL IN ACCORDANCE WITH CPS ENERGY ELECTRIC SERVICE STANDARDS.
8. THREE-FOOT MINIMUM WORKING CLEARANCE SHALL BE MAINTAINED IN FRONT OF METER PEDESTAL AND ACCESS PANELS WHERE CPS ENERGY SERVICE CONDUCTORS ARE ROUTED/INSTALLED WITHIN SUCH COMPARTMENTS.
9. METER PEDESTALS MAY BE MOUNTED ON OR EMBEDDED IN A MINIMUM 18-INCH DIAMETER BY 20-INCH DEPTH CONCRETE BASE. THE METER PEDESTAL MUST BE PRE-APPROVED BY CPS ENERGY AND BE SUITABLE FOR THE CONDITION AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS (REFER TO SECTION 1500).



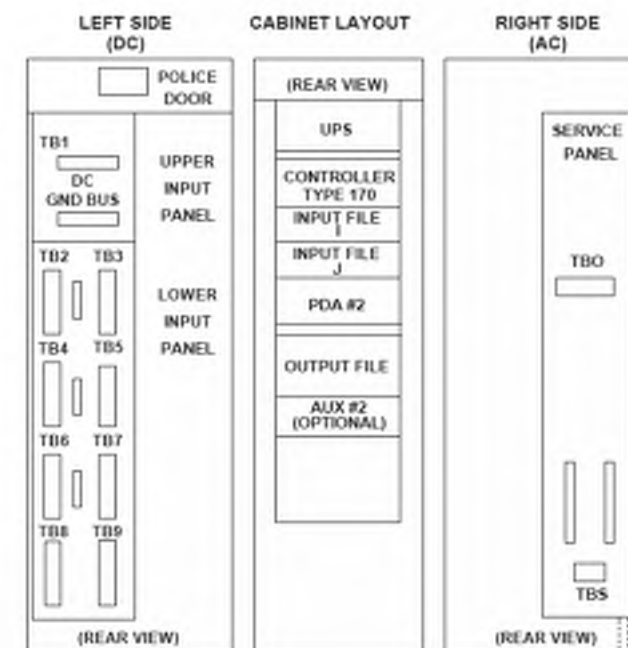
TOP VIEW
(NEW FOUNDATION)



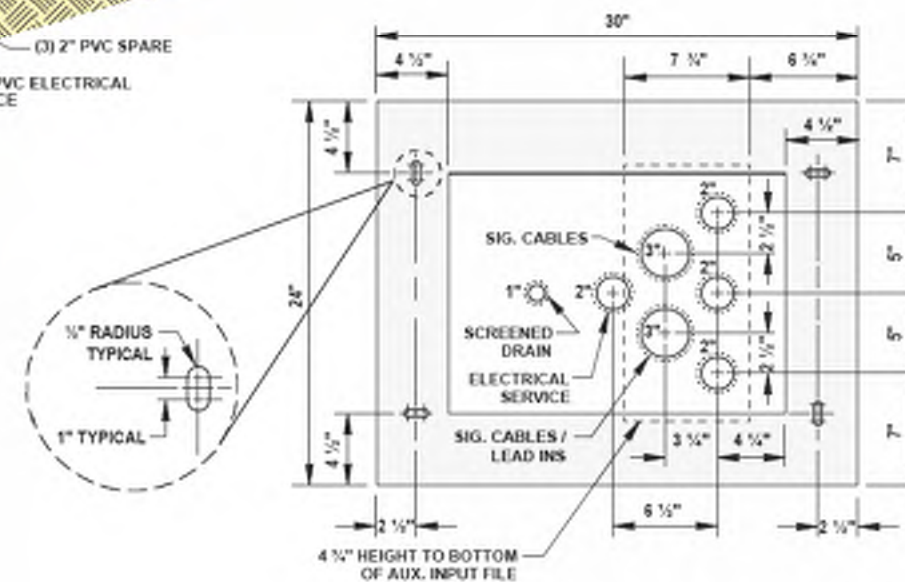
SECTION A-A



REAR VIEW



REAR VIEW SCHEMATIC



BASE PLATE TEMPLATE

NOTES:

1. CONTRACTOR TO INSTALL GROUND BOX, CONDUIT, CONTROLLER FOUNDATION, CONCRETE SLAB AND CONDUIT FROM GROUND BOX TO CABINET.

TRAFFIC SIGNAL
GROUND BOX IN FOUNDATION



46.00"

BATTERY PACKS

BATTERY PACK

BATTERY PACK


10.00"

10.00"

EXISTING TYPE 332 CABINET

EXISTING TYPE 332 CONTROLLER FOUNDATION

RIGHT SIDE

REV NO	DATE	DESCRIPTION		BY
		3463 MAGIC DR., SUITE 250 SAN ANTONIO, TEXAS 78229 210-582-5870 FAX 210-582-5872 WWW.GKW-INC.COM FIRM No. TX - 4532		
CITY OF SAN ANTONIO DEPARTMENT OF TRANSPORTATION & CAPITAL IMPROVEMENTS BANDERA ROAD AT MAINLAND DRIVE IMPROVEMENTS BATTERY BACKUP DETAIL				
			SHEET NO: 1 OF 1	
DATE: 1/27/2015				
DRWN BY: MAIL	CHKD BY: MAIL	DATE: 1/27/2015	SHEET: 38	

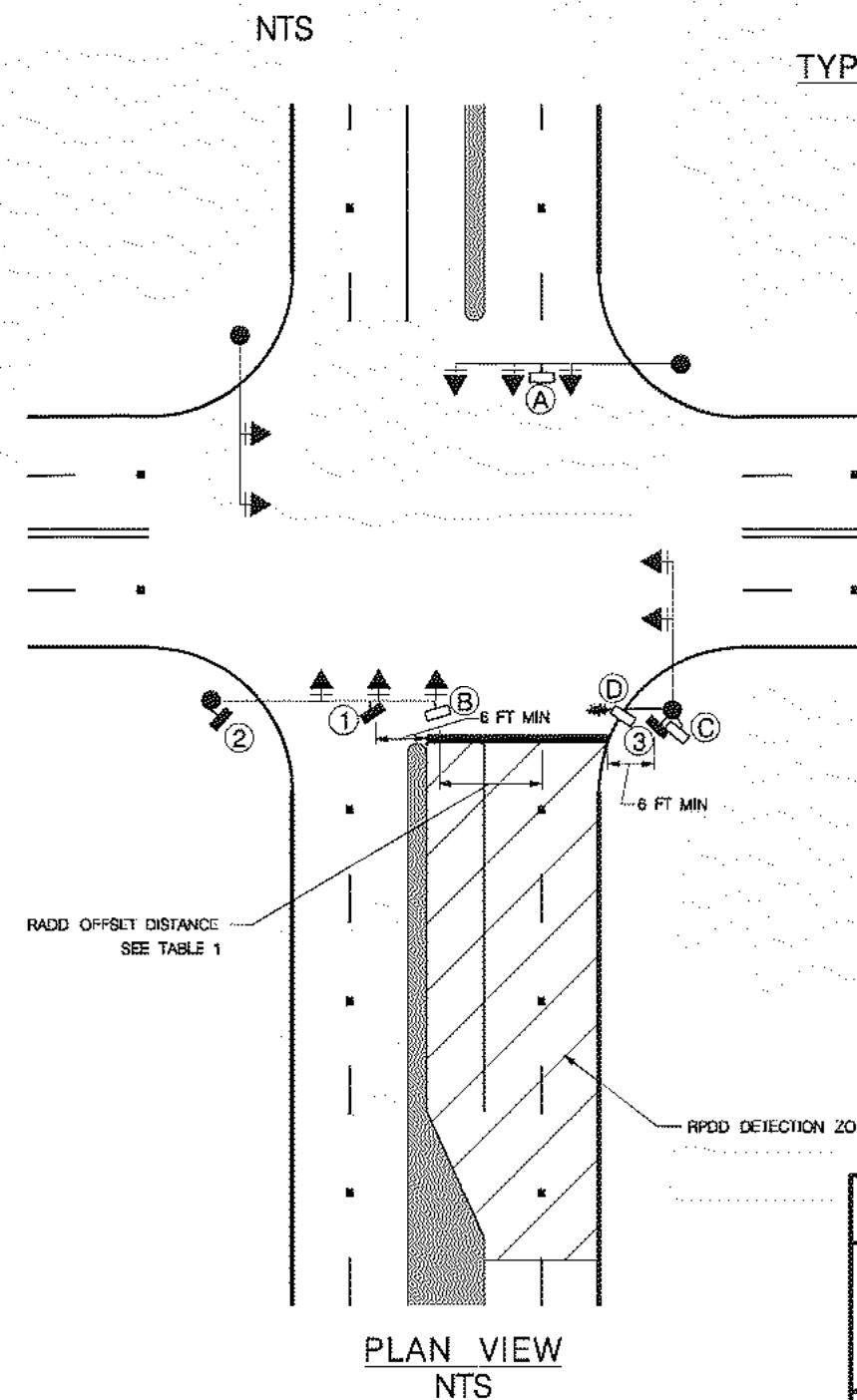
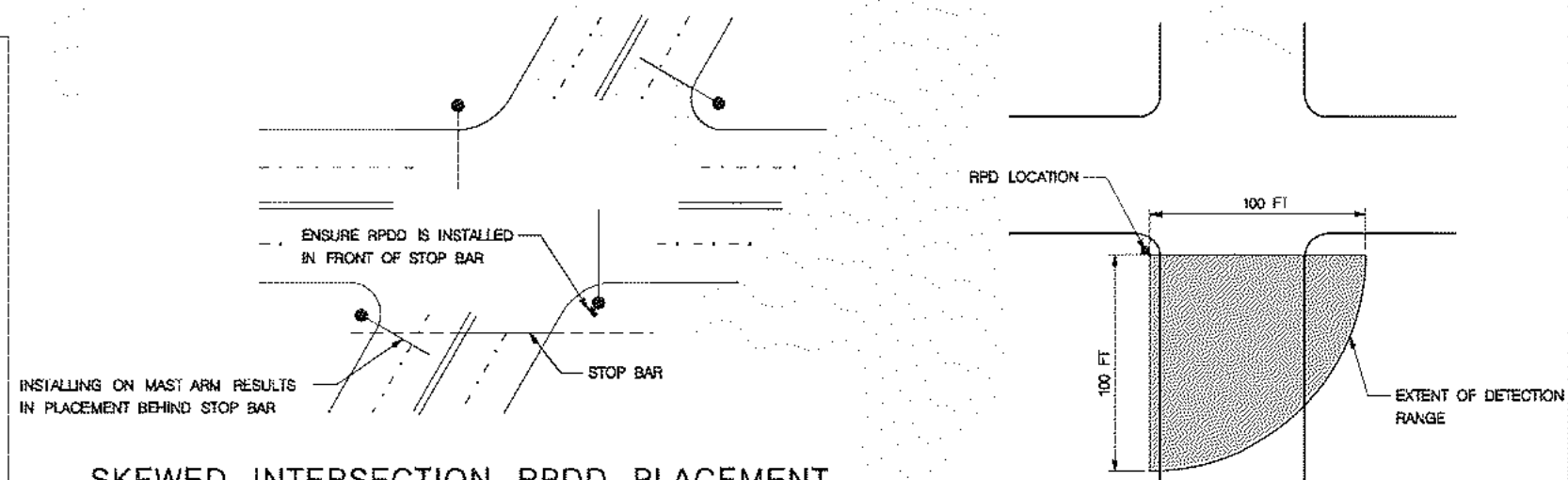
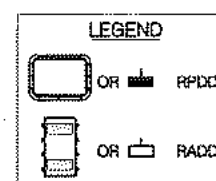
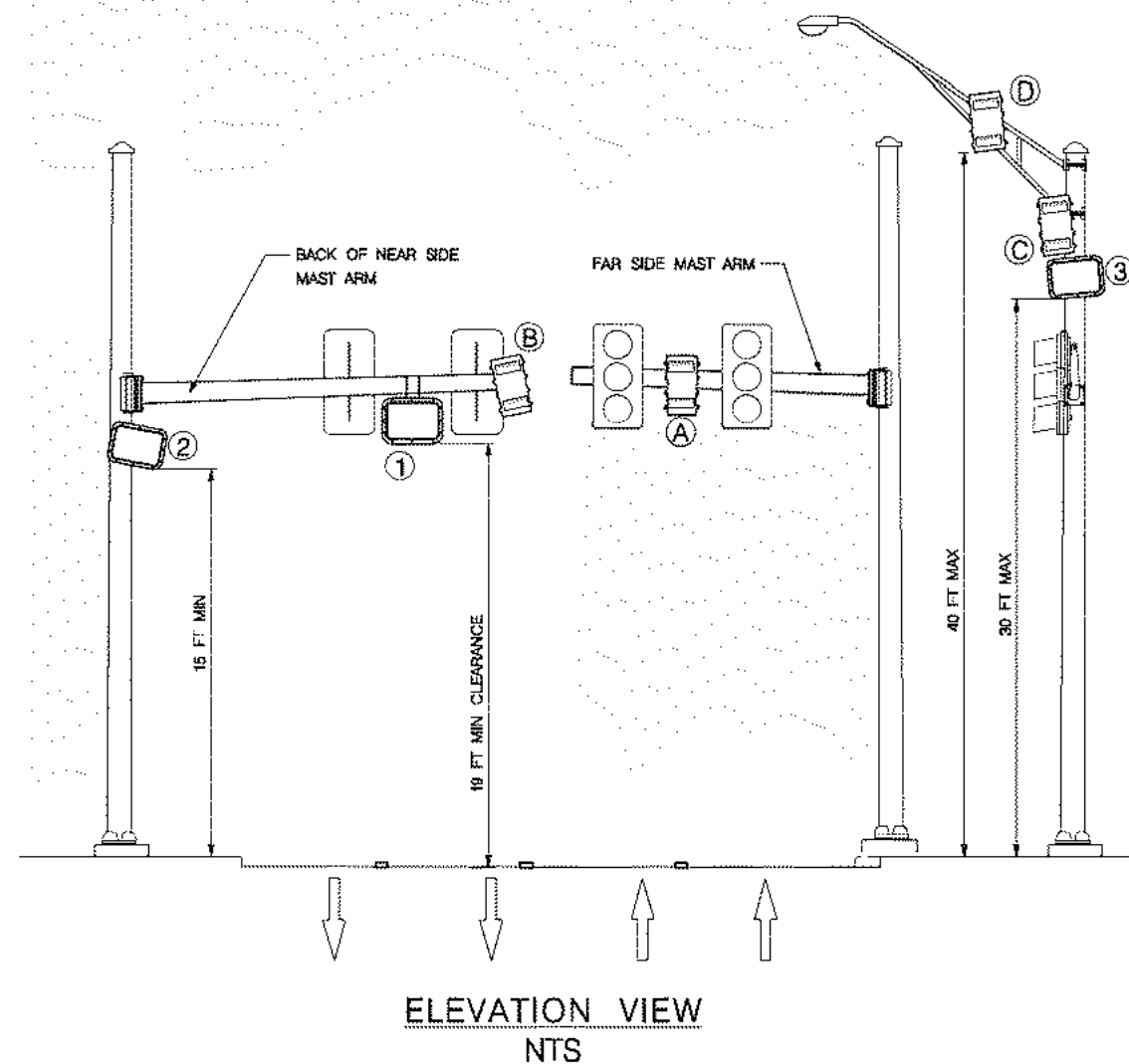
MOUNTING LOCATIONS

PRESENCE (RPDD)

- ① PREFERRED PLACEMENT FOR MAST ARMS. MOUNT ON AND BELOW MAST ARM ON NEAR SIDE OF STREET.
- ② PREFERRED PLACEMENT FOR TIMBER POLE OR STRAIN POLE INSTALLATIONS. MOUNT AS HIGH AS POSSIBLE TO A MAXIMUM OF 30 FT ON TIMBER OR SPAN WIRE POLES. ON MAST ARM POLES, MOUNT BELOW CONNECTION OF MAST ARM TO A MINIMUM OF 15 FT.
- ③ ALTERNATE PLACEMENT LOCATION. MOUNT AS HIGH AS POSSIBLE TO A MAXIMUM OF 30 FT TO PREVENT OCCLUSION OF THE LEFT TURN LANES. THIS PLACEMENT TO BE USED ONLY IF RPDD CANNOT BE MOUNTED IN THE PREFERRED PLACEMENT LOCATIONS.

ADVANCE (RADD)

- A) PREFERRED PLACEMENT FOR MAST ARMS. ALIGN RADD WITH CENTER OF TRAVEL LANES.
- B) ALTERNATE PLACEMENT FOR MAST ARMS. MOUNT ON BACK SIDE OF OPPOSING MAST ARM.
- C) TIMBER OR STRAIN POLE PLACEMENT. MOUNT ON NEAR SIDE POLE.
- D) ALTERNATE TIMBER OR STRAIN POLE PLACEMENT. MOUNT LUMINAIRE ARM ON NEAR SIDE POLE WITH A MAXIMUM 40 FT MOUNTING HEIGHT.



NOTES:

- 1) A MINIMUM 6 FT HORIZONTAL OFFSET MUST BE MAINTAINED BETWEEN THE RPDD AND THE DETECTION ZONE
- 2) THE RPDD SHALL BE MOUNTED SUCH THAT AT LEAST 20 FT ALONG THE FARTHEST LANE TO BE MONITORED IS WITHIN THE FIELD OF VIEW OF THE RPDD
- 3) AIM RPDD AT THE CENTER OF THE LANES TO BE MONITORED, APPROXIMATELY 50 FT FROM THE RPDD UNIT
- 4) MOUNT RPDD SO THAT ITS FIELD OF VIEW IS NOT OCCLUDED BY POLES, SIGNS, OR OTHER STRUCTURES
- 5) RADD MOUNTING HEIGHT SHALL NOT BE LESS THAN 17 FT OR GREATER THAN 40 FT. RADD MOUNTING LOCATION SHALL HAVE A MAXIMUM 50 FT LATERAL OFFSET FROM CENTER OF TRAVEL LANES TO BE MONITORED

APRIL 2010

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

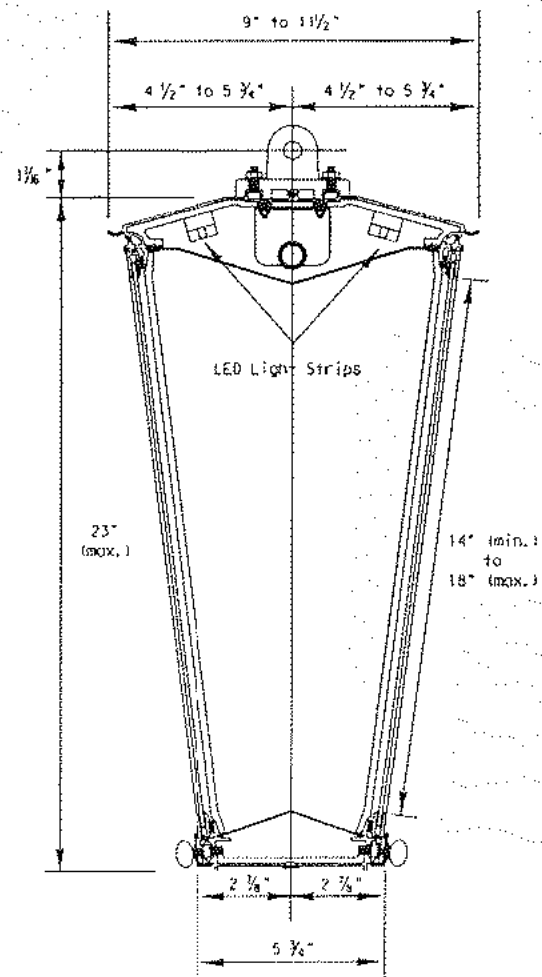
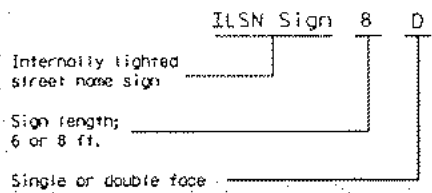
TRAFFIC SIGNAL STANDARDS
**RADAR PRESENCE DETECTOR (RPDD)
AND RADAR ADVANCE DETECTOR (RADD)
PLACEMENT**
SHEET 1 OF 1

DATE:	SHEET NO: 39
DESIGNED BY: DWM	CHECKED BY: GGG
DRAWN BY: DWM	DATE:

SINGLE • DOUBLE SIDED ILSN SIGN NOTES:

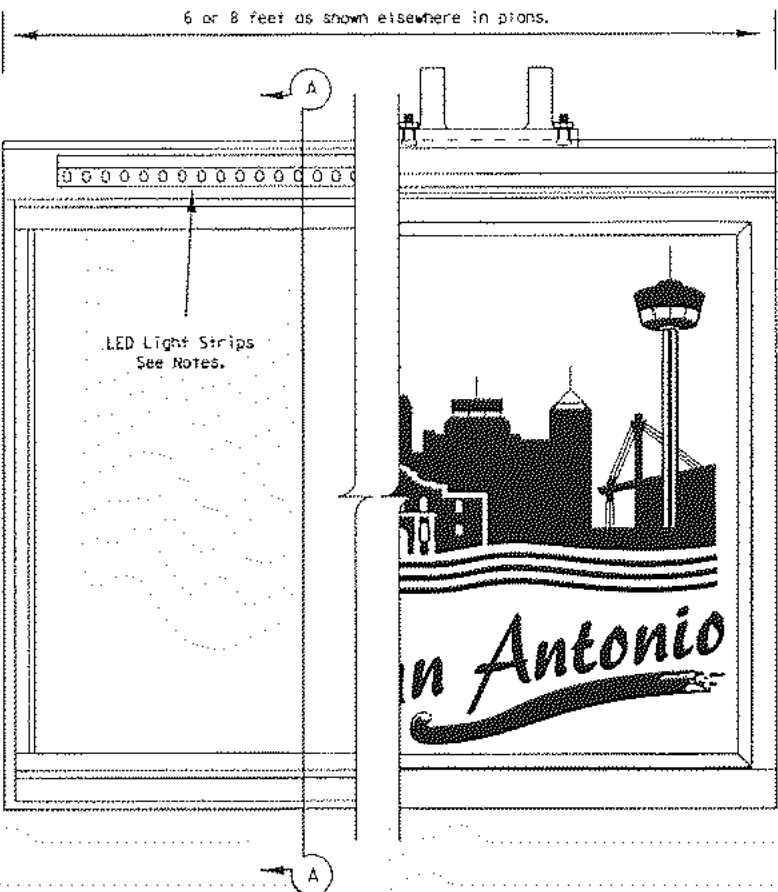
1. Eight foot ILSN sign shall not exceed 16 sq. ft. effective projected area (EPA) and shall not exceed a weight of 85 lbs.
Six foot ILSN sign shall not exceed 12 sq. ft. EPA and shall not exceed a weight of 70 lbs.
2. Sign message shall be as shown elsewhere in the plans.
3. See Special Specification, "Internally Lighted Street Name Signs" for additional details.
4. Actual sign housing may change with vendor.
5. LED light Source locations may vary by manufacturer. Power requirements and light output levels of specification shall be satisfied.

EXPLANATION OF DESCRIPTION



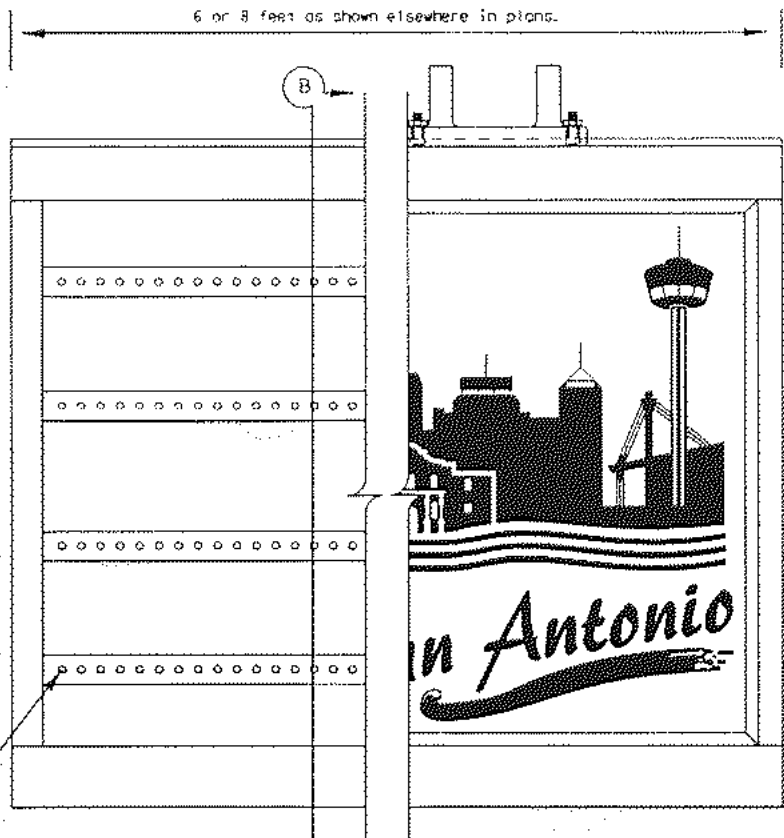
INTERNALLY LIGHTED STREET NAME SIGN
WITH LIGHT EMITTING DIODE LAMPS

DOUBLE SIDED ILSN SIGN

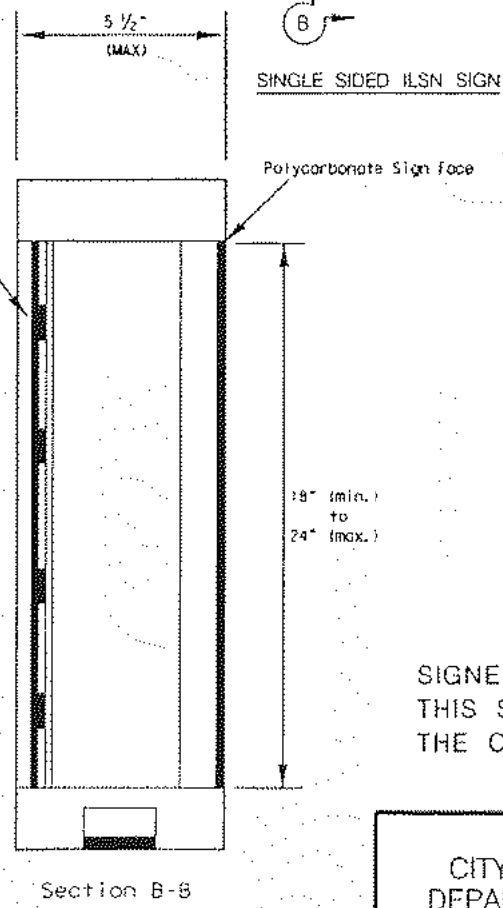


DOUBLE SIDED ILSN SIGN

NO.	DATE	REVISION	DRAWN	CHECKED	APPR.



LED Light Engine See Notes



SINGLE SIDED ILSN SIGN

SIGNED AND SEALED COPIES OF
THIS STANDARD IS ON FILE WITH
THE CITY OF SAN ANTONIO.

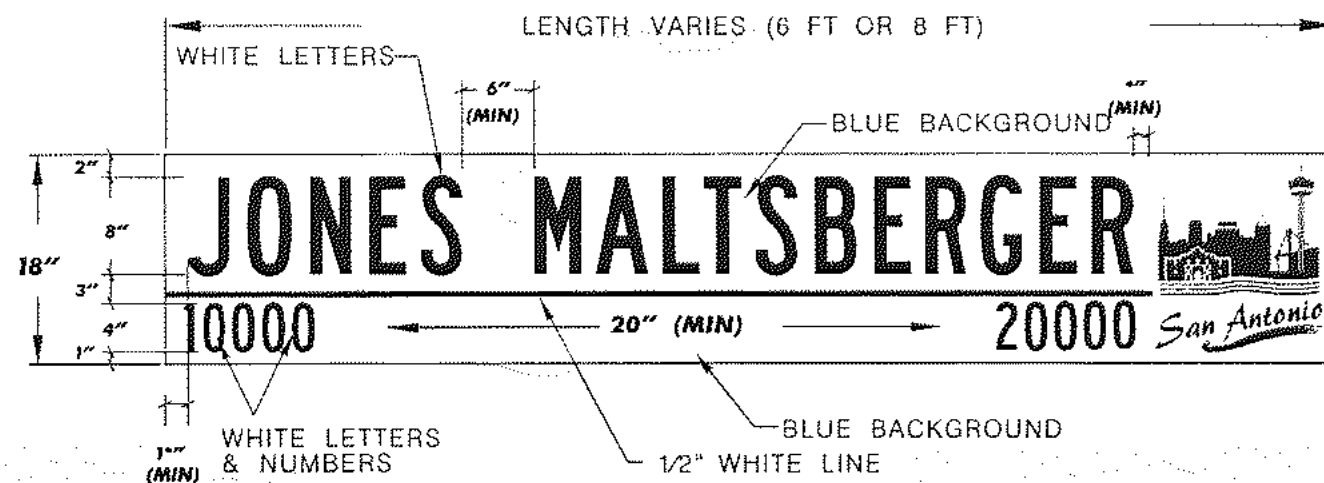
STANDARD PLANS
CITY OF SAN ANTONIO, TEXAS
DEPARTMENT OF PUBLIC WORKS

ILSN SIGN DETAILS
(ILSN--1)

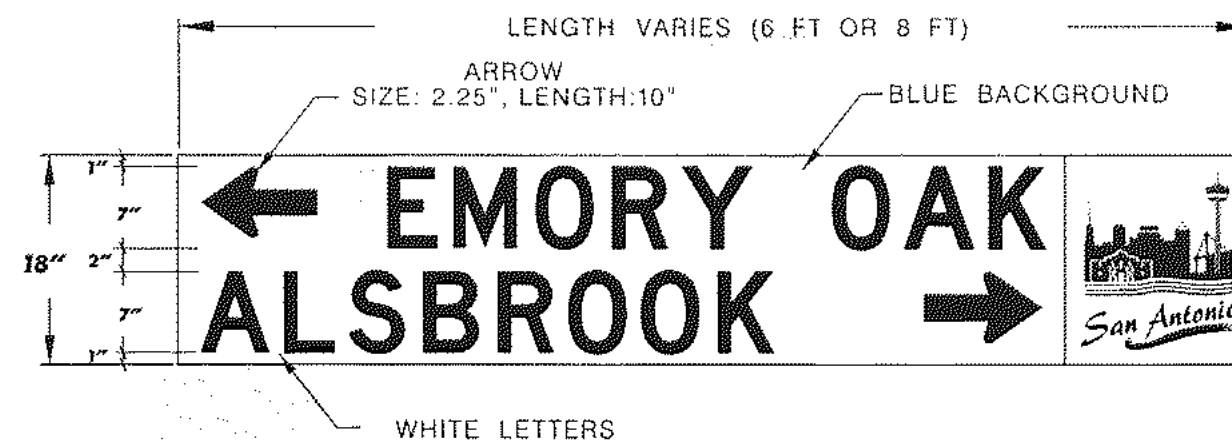
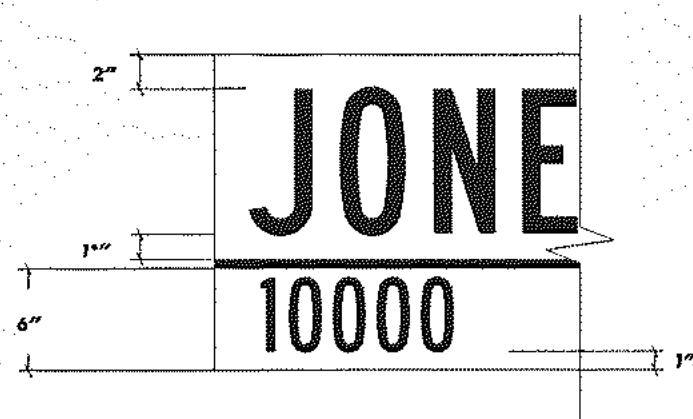
DRAWN BY	DATE	REVISIONS	SHEET	NTS
M. GAGNER				
CHECKED BY	DATE			
OLIVER EASTON, P.E., P.T.C.E.			SHEET	40

8/30/2007

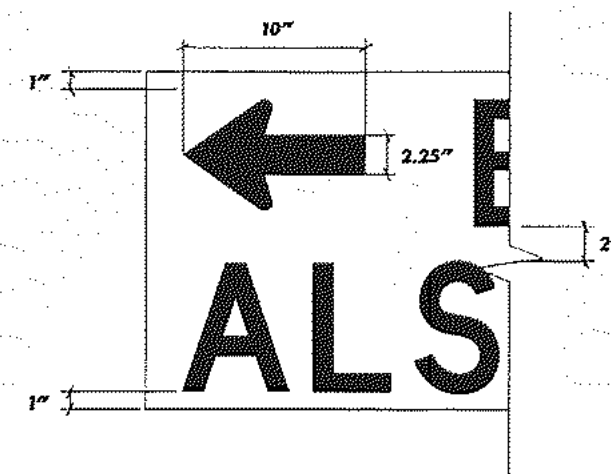
p:\62101\24\Modified-COSA-SI.BM.dgn



TYPICAL METRO ILSN SIGN

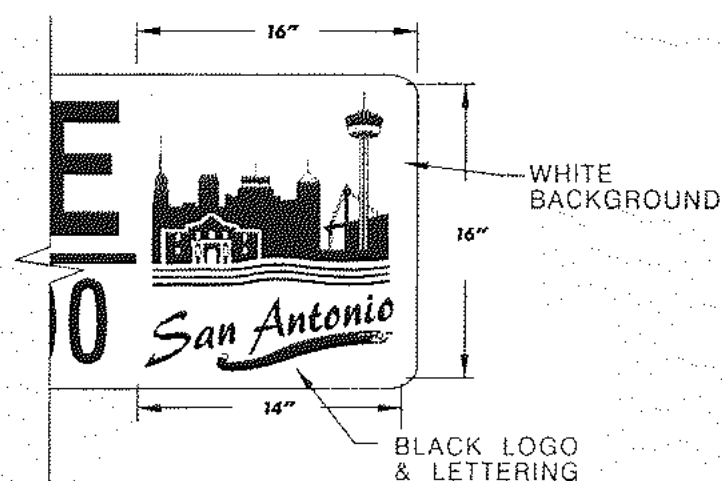


TYPICAL DOUBLE STREET NAME ILSN SIGN



HEIGHT	18"
LENGTH	72" (6 FT) OR 96" (8 FT)
SUBSTRATE	POLYCARBONATE, TRANSLUCENT WHITE
THICKNESS	0.120"
SIGN FACE MATERIALS	BLUE FILM OVER WHITE POLYCARBONATE LOGO-A AS REQUIRED BY CITY
BLOCK NUMBERS	FONT: 4" SERIES D
LEGEND	SERIES D (USUAL) SERIES C OR B FOR MAXIMUM LENGTH 8 FT SIGN, AS NEEDED
COLOR	WHITE LEGEND ON BLUE BACKGROUND

LOGO A



SIGN LOGO PLAQUE
OTHER LOGO PLAQUES
MAY BE SPECIFIED

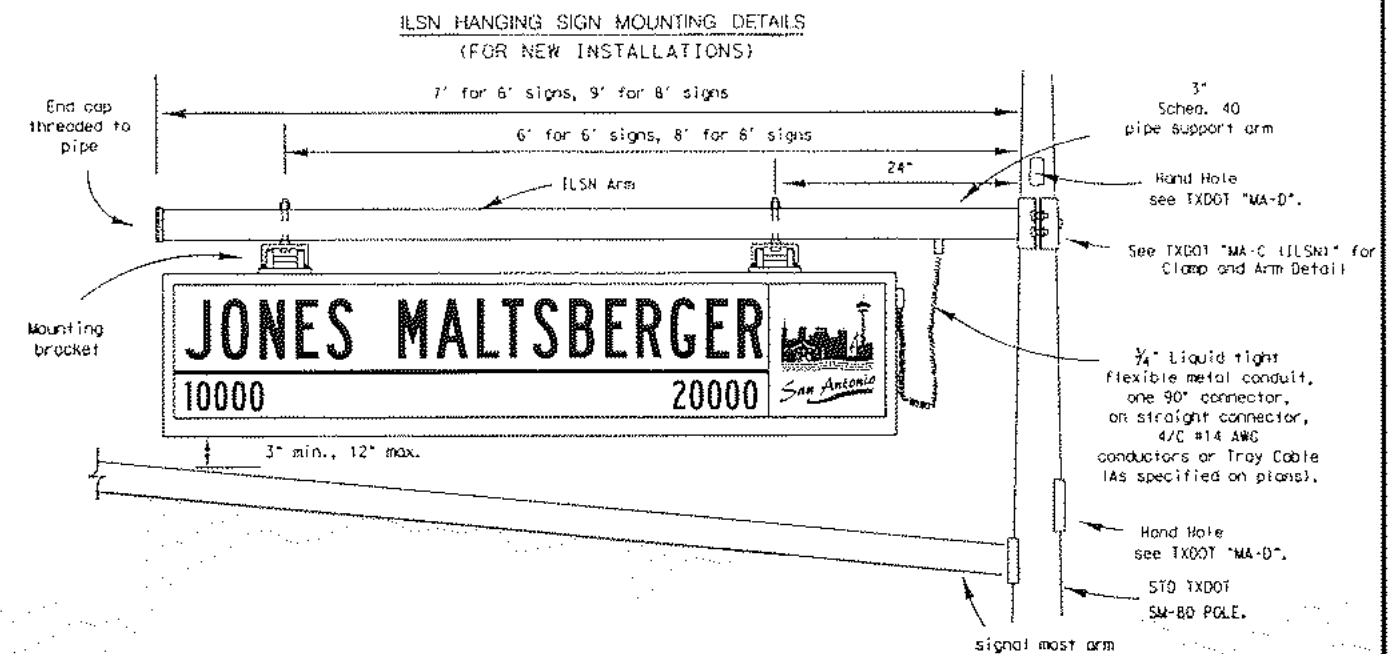
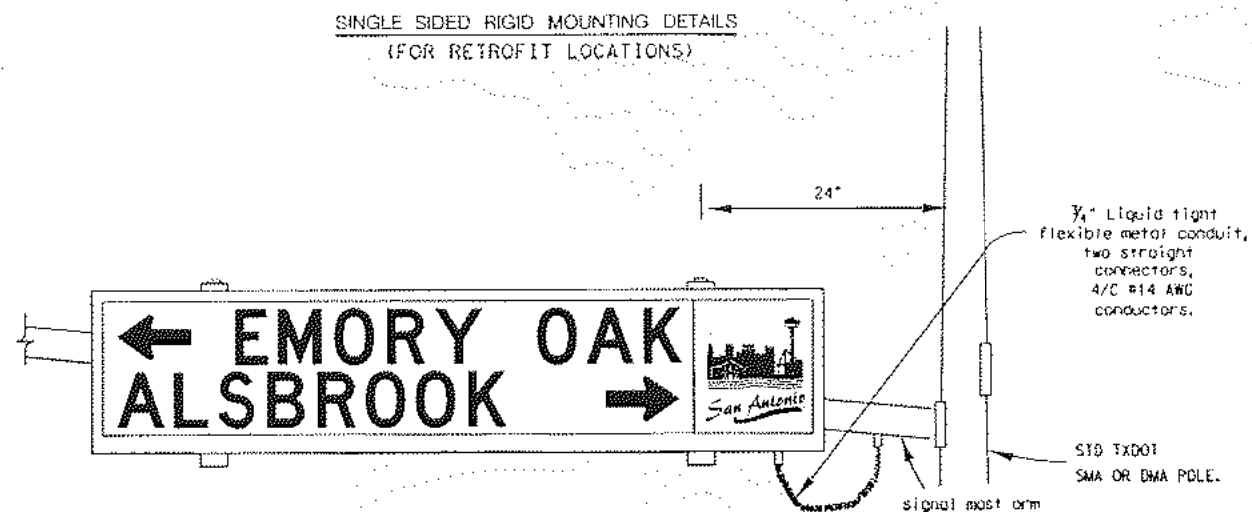
NO.	DATE	REVISION	DRAWN	CHECKED	APPROVED

SIGNED AND SEALED COPIES OF
THIS STANDARD IS ON FILE WITH
THE CITY OF SAN ANTONIO.

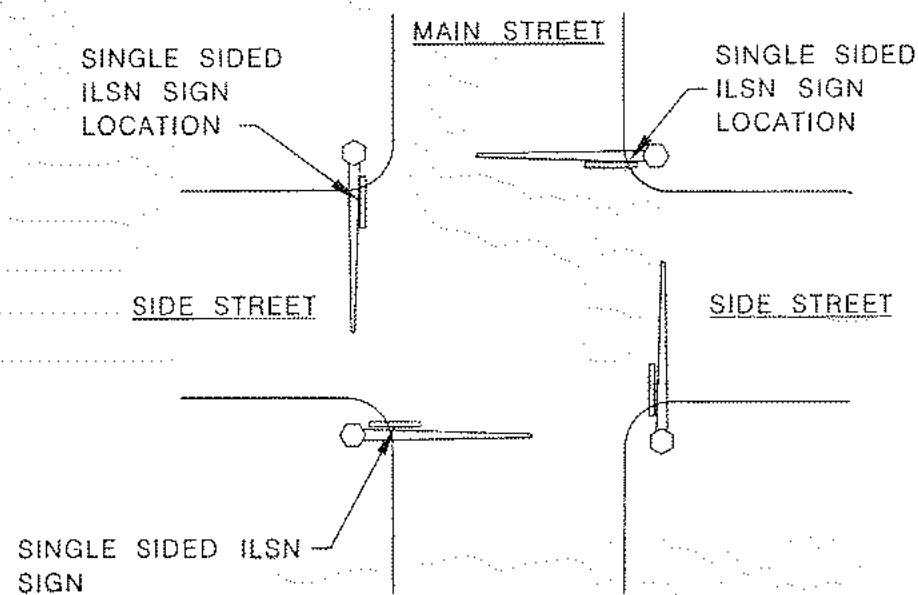
STANDARD PLANS
CITY OF SAN ANTONIO, TEXAS
DEPARTMENT OF PUBLIC WORKS

ILSN SIGN DETAILS
(ILSN-2)

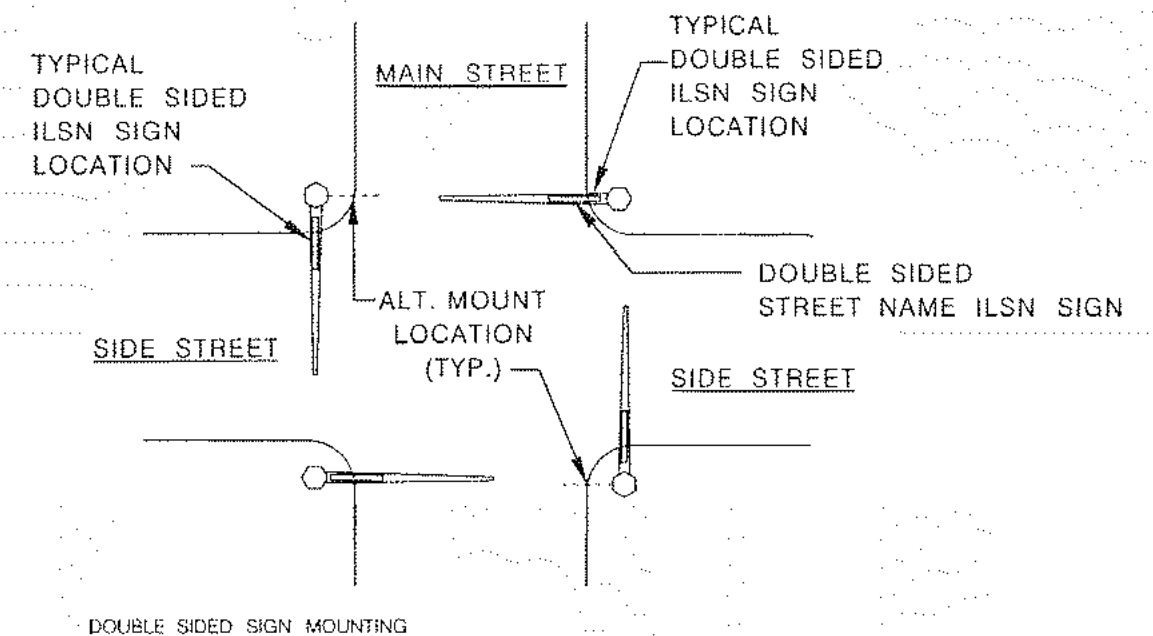
DRAWN BY	DATE	REVISIONS	SCALE	NTS
M. BLASER				
CHECKED BY	DATE			
DEMER GASTON PE, P.T.O.E.				
			SHEET	41



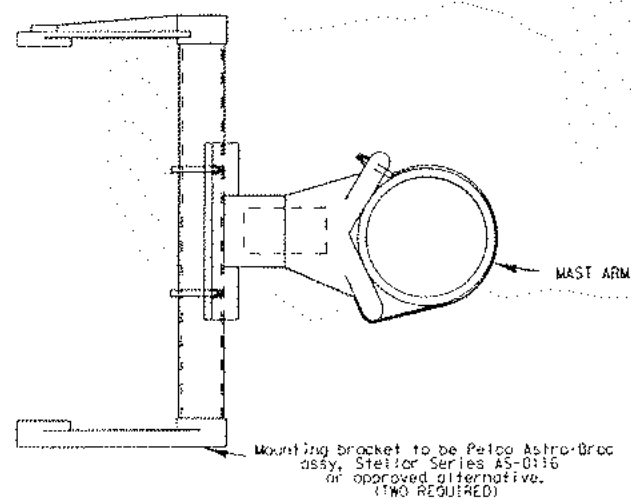
TYPICAL SINGLE SIDED ILSN SIGN PLACEMENT



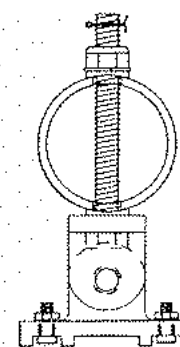
TYPICAL DOUBLE SIDED ILSN SIGN PLACEMENT



SINGLE SIDED SIGN MOUNTING BRACKET

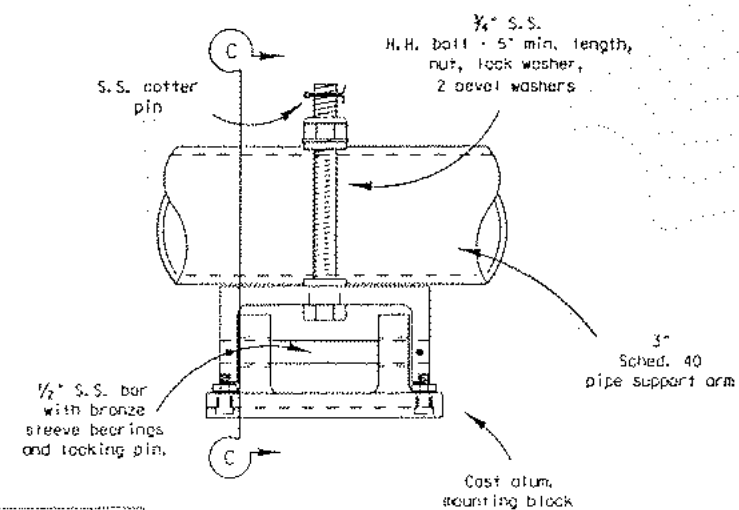


MOUNTING BRACKET



Slide track fixture attachment.

DOUBLE SIDED SIGN MOUNTING



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STANDARD PLANS
CITY OF SAN ANTONIO, TEXAS
DEPARTMENT OF PUBLIC WORKS

ILSN SIGN DETAILS
(ILSN-3)

DRAWN BY	DATE	REVISIONS	SCALE	N.T.S.
MA GRASER				
CHECKED BY	DATE			
OLIVER GASTON, P.E., P.T.O.E.				
			SHEET:	42

TRAFFIC NOTES

TRENCHING / EXCAVATING

- The following notes shall apply to excavations of trenches or pits that are located in the pavement or are within six (6) feet of the edge of roadway:
- 1.) Trench walls shall not be closer than three (3) feet from the edge of the traveled way at any stage of construction.
 - 2.) Traffic control devices shall be in place before starting any excavation.
 - 3.) Trenches or pits will not be permitted to be bridged by steel plates and open to traffic unless they are temporarily backfilled to finished street grade.
 - 4.) For pits or trenches along or in a roadway that are going to be left open over night that are zero to fifty (0 – 50) feet in length, the following applies. GUARD RAIL OR CONCRETE BARRIER SHALL BE USED.
 - 5.) For pits or trenches along or in roadway that are going to be left open over night and are longer than 50 feet in length. CONCRETE BARRIERS MUST BE USED.
 - 6.) Plastic construction fencing shall be required for any trench or pit left open over night.
 - 7.) When using any guardrail or concrete barrier, protected end must be used as per the TEXAS–M.U.T.C.D.
 - 8.) For vertical drop-offs greater than two (2) feet along roadway, low profile concrete with appropriate end protection must be installed.
 - 9.) All concrete barriers placed on City R.O.W shall be low profile. No high profile barriers will be allowed.

REFLECTIVE SHEETING

The reflectorized white and reflectorized orange stripes for channelizing devices such as barricade drums and vertical panels shall be constructed of reflective sheeting meeting the color and retro-reflectivity requirements of high intensity, unless otherwise specified in the plans.

MAINTENANCE

- 1.) All traffic signs shall be kept in proper position, clean and legible at all times. Damaged barricades, signs, and other traffic control devices shall be replaced without undue delay.
- 2.) To ensure adequate maintenance, a suitable schedule for inspection, cleaning, and replacement of barricades, lights, and signs shall be established.
- 3.) Special attention and necessary action shall be taken to see that weeds, trees, shrubbery and construction materials do not obscure the face of any sign or barricades.

TRAINING

Each person whose actions affect maintenance and construction zone safety, from the upper-level management personnel through construction and maintenance field personnel, should receive training appropriate to the job decision each individual is required to make. Only those individuals who are qualified by means of adequate training in safe traffic control practices and have a basic understanding of the principles established by applicable standards and regulations, including those of the TEXAS M.U.T.C.D. should supervise the selection, placement, and maintenance of traffic control devices in maintenance and construction areas.

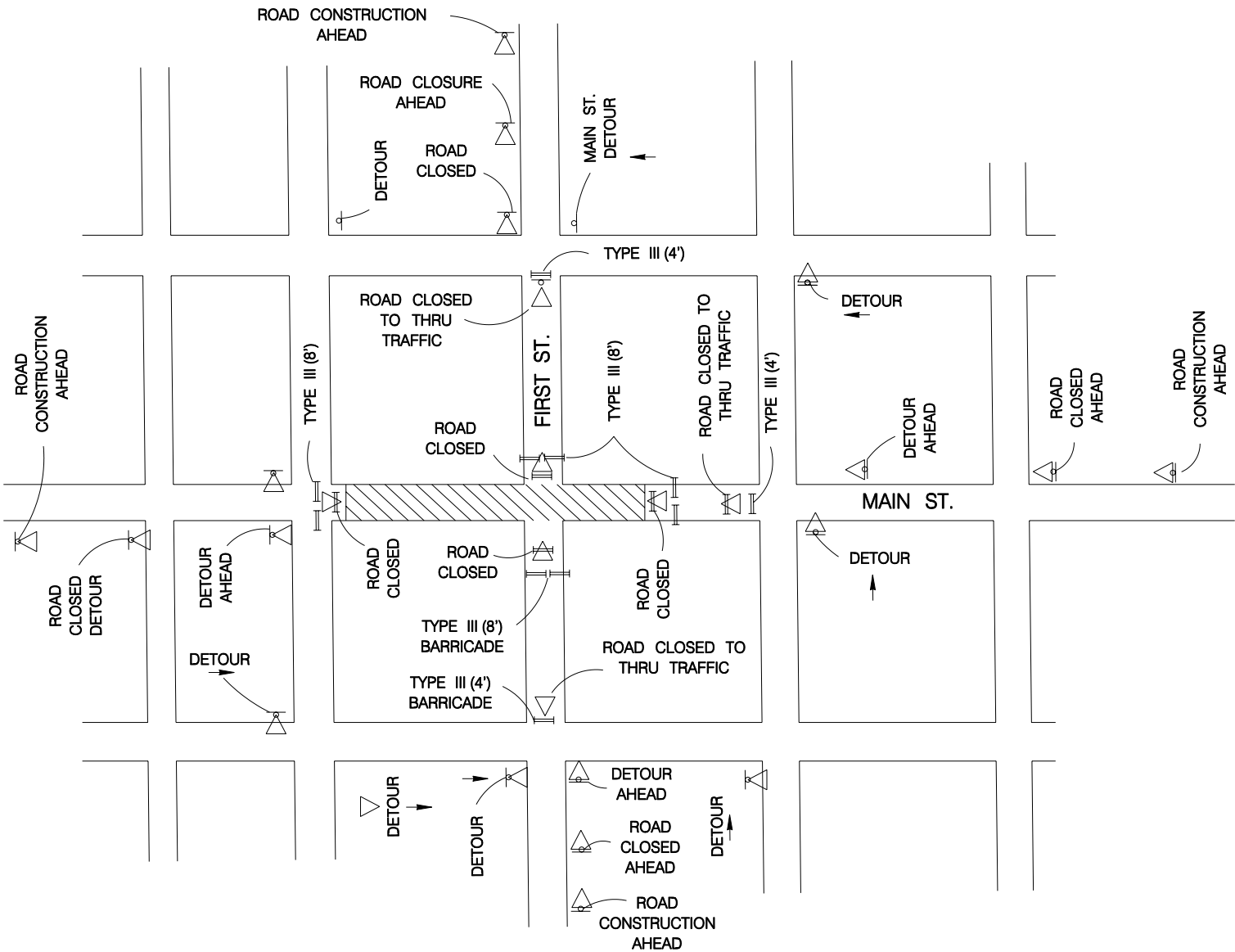
SPECIAL EVENTS BARRICADING

All Type I, (8') barricades used for special events (Dome, Runs, Walks, Parades etc.) shall be a minimum of 42" high and 96" wide. Any necessary signs will require proper sign stands.

USE OF CITY R.O.W.

The City of San Antonio reserves the right to allow contracting and barricading sub-contractors to use the City's R.O.W. The City also reserves the right to advise contractors and barricading sub-contractors to remove stored or unused traffic control devices from the City of San Antonio R.O.W. It is the barricading sub-contractor's responsibility to remove any traffic control device from City's R.O.W. when instructed to do so by a City representative.

CLOSURE DIAGRAMS

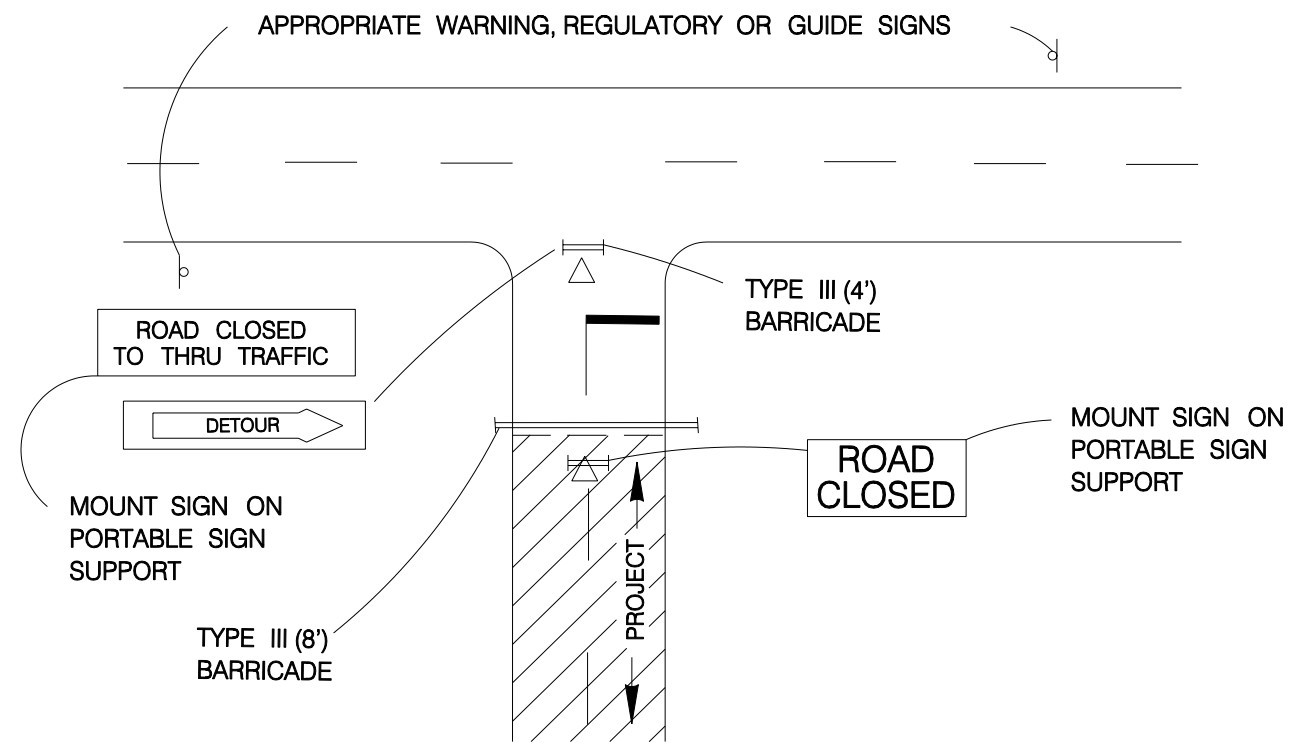


TYPICAL INTERSECTING STREET CLOSURE
FOR TWO LANE STREETS

NOTE:
ALL SIGNS WILL BE
MOUNTED ON SIGN
SUPPORTS ONLY

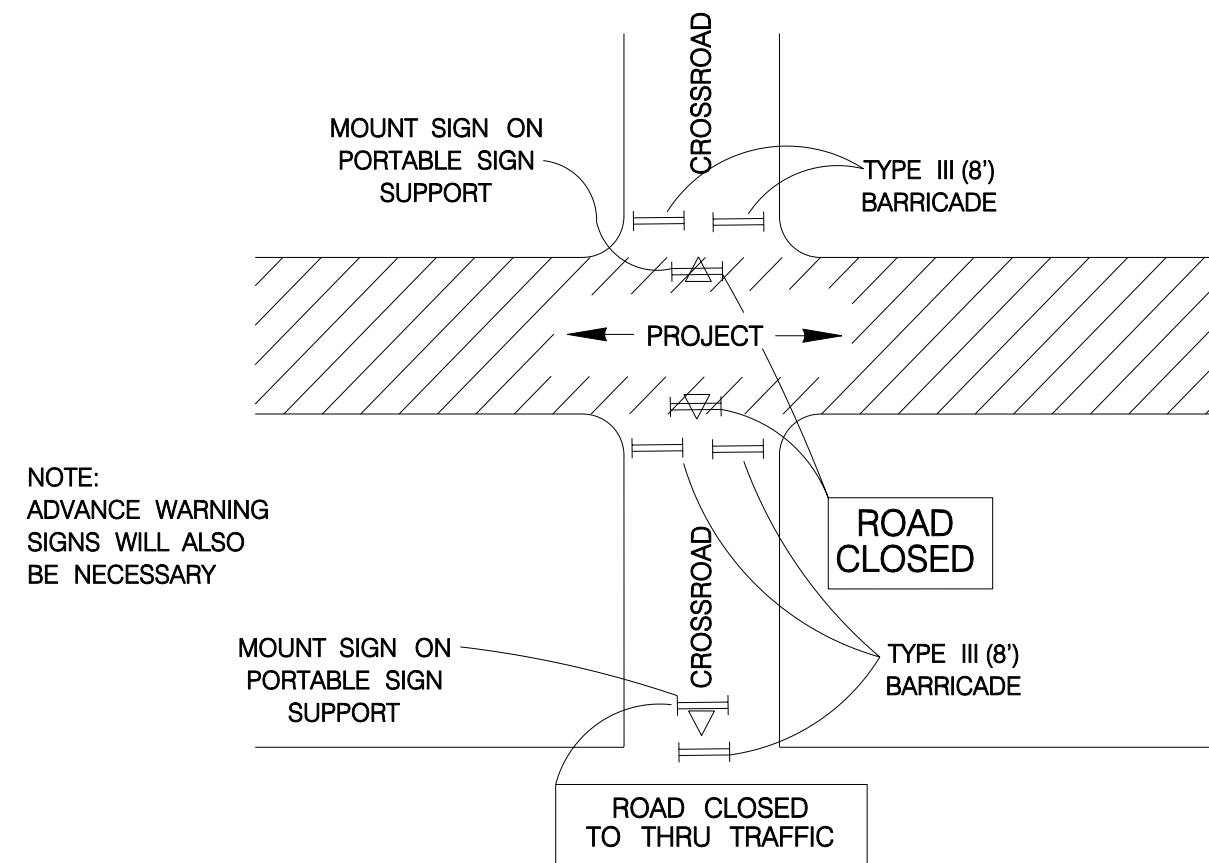
THE ORIGINAL OF THIS DRAWING WAS SIGNED AND SEALED BY JOHN D. FRIEBELE, #46394 ON 06-20-05 AND IS ON FILE WITH THE TRAFFIC ENGINEERING DIVISION OF THE PUBLIC WORKS DEPARTMENT, CITY OF SAN ANTONIO.

JUNE 2005		
CITY OF SAN ANTONIO		
DEPARTMENT OF PUBLIC WORKS		
TRAFFIC STANDARDS		
BARRICADE AND CONSTRUCTION		
STANDARDS		
SHEET 1 OF 4		
% SUBMITTAL	PROJECT NO.:	DATE:
DRWN. BY: A.F.G.	DSGN. BY: E.N.M.	CHKD. BY: J.D.F./E.N.M.
SHEET NO.:		43 OF 65

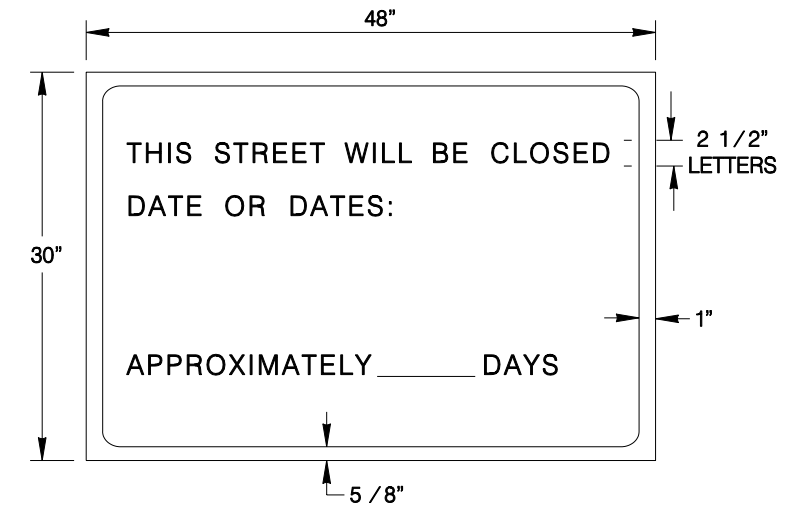


PROJECT LIMITS FOR CLOSED ROADWAY

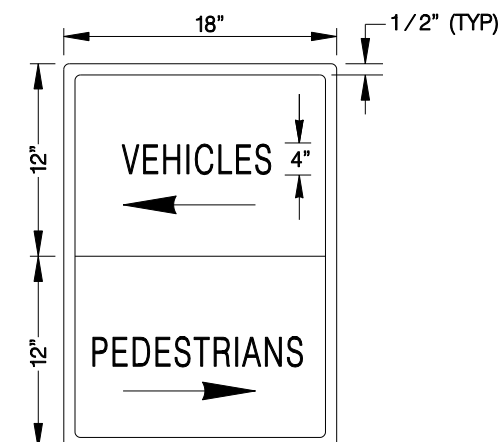
BARRICADES SHALL BE ERECTED COMPLETELY ACROSS ROADWAY. CHANNELIZING DEVICES MAY BE DRUMS, VERTICAL PANELS OR CONES AS SPECIFIED IN THE PLANS



CROSS STREET SIGNING AND BARRICADING TOTALLY CLOSED

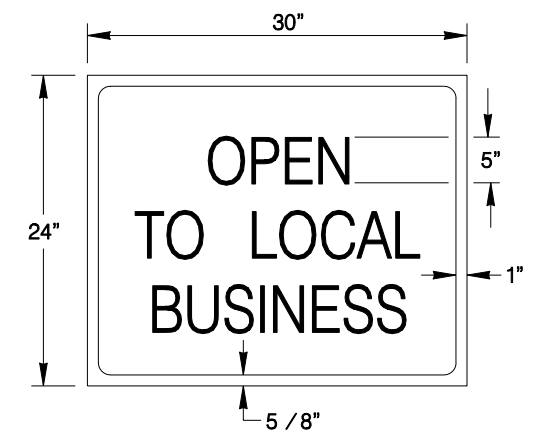


LETTERS- BLACK
BORDER- BLACK
BACKGROUND- ORANGE



LETTERS- BLACK
BORDER- BLACK
BACKGROUND- ORANGE
SPACING-3 SIGNS PER BLOCK

DIRECTION OF ARROWS
ARE REVERSIBLE



LETTERS- WHITE
BORDER- WHITE
BACKGROUND- BLUE REFLECTIVE

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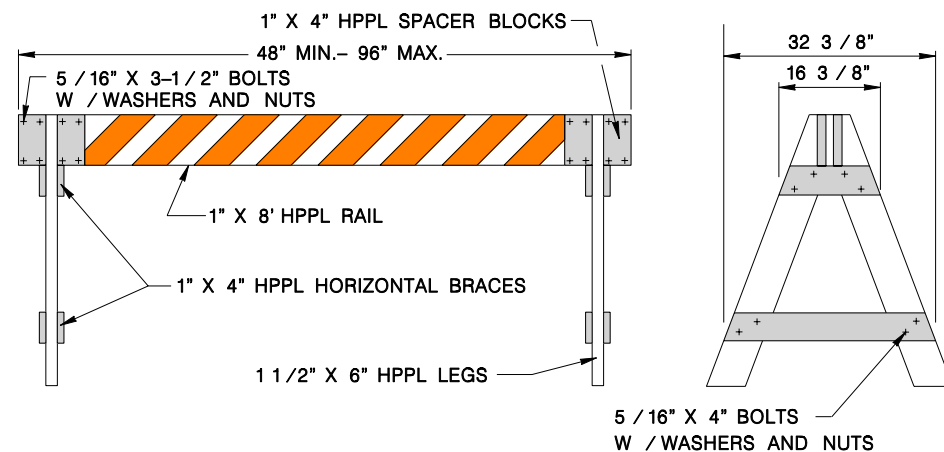
JUNE 2005

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

TRAFFIC STANDARDS
BARRICADE AND CONSTRUCTION STANDARDS
SHEET 2 OF 4

% SUBMITTAL	PROJECT NO.:	DATE:
DRWN. BY: A.F.G.	DSGN. BY: E.N.M.	CHKD. BY: J.D.F./E.N.M.
SHEET NO. 44		OF 65

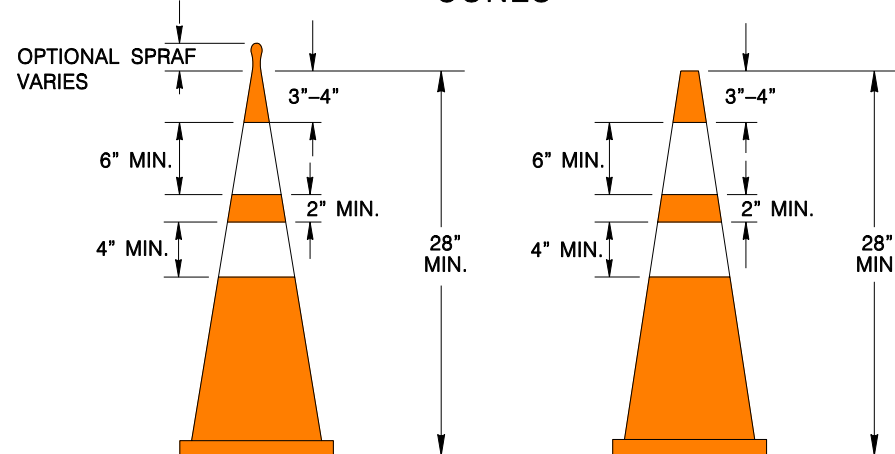
TYPE I BARRICADE



- Only the following Type I barricade shall be used in the City of San Antonio Right-Of-Way:
 - 1" x 8" plastic rail with 2" x 6" wooden legs.
 - 1" x 8" wooden rail with plastic legs.
 - 1" x 8" wooden rail with 2" x 6" wood legs.
 - No screws allowed for assembly of A-legs or rail.
 - Warning lights will be used as directed by the Traffic Engineer.
 - All Type I (4') barricades will be a minimum of 36" high and 60" wide. (For Construction Use Only)
 - All Type I (8') barricades with wooden legs shall be 2" X 6" wood only.
 - All Type I (4') barricades with wooden legs shall be 1" X 8" wood only.
- Type I Barricades shall not be used for partial and total street closures in construction work zones. Only Type III barricades shall be used for this purpose.
- Warning lights shall not be mounted on Type I barricades.

(See TxDOT BC-03 Sheets for specific construction information)

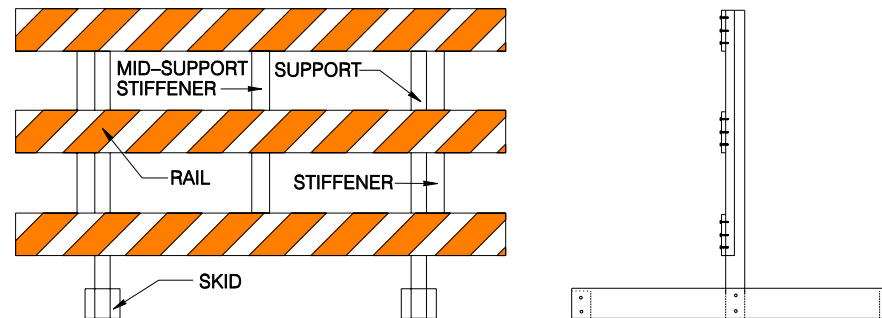
CONES



- Base for 28" high cones must weigh at least 9.5 lbs.
- Night time cones must have reflective collars.

(See TxDOT BC-03 Sheets for specific construction information)

Type III BARRICADE



- Only the following Type III barricade shall be used in the City of San Antonio Right-Of-Way.
 - Hollow polyvinyl or fiberglass tubing post with 1" X 8" wooden rails.
 - Hollow polyvinyl or fiberglass tubing post with plastic rails.
 - Skids must be wood or solid plastic only.
 - Warning lights shall not be mounted on Type III barricades.

(See TxDOT BC-03 Sheets for specific construction information)

TEMPORARY MARKINGS

- Solid double yellow painted lines shall be installed for temporary division of traffic or construction duration longer than five (5) days, with repainting to occur once monthly or at the discretion of the Traffic Engineer. (All cost of upkeep will be at the contractor's expense.)
- Solid double yellow tabs, or V/P panels shall be installed for temporary division of traffic for construction duration less than five (5) days, with re-tapping to occur at the discretion of the Traffic Engineer. NAILS SHALL NOT BE USED TO FIX TABS TO CEMENT OR BASE (All cost of upkeep will be at the contractor's expense.)

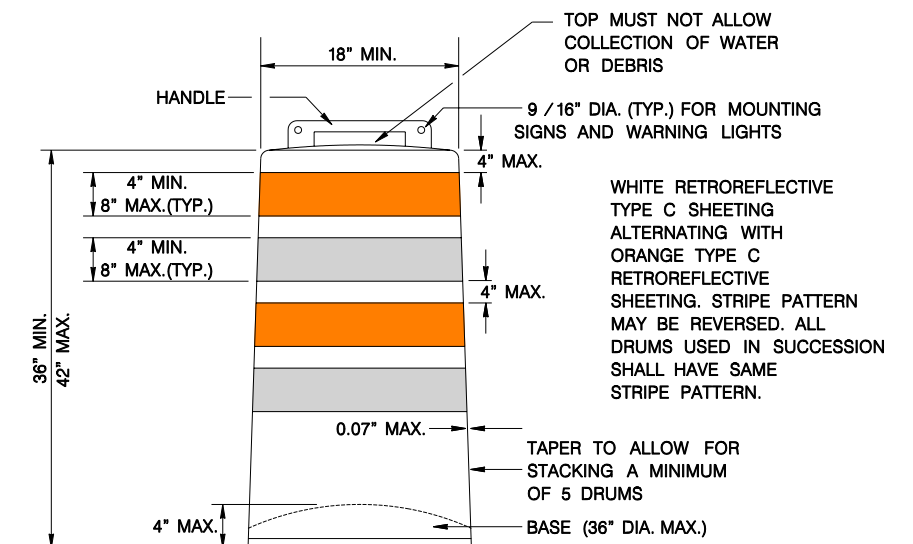
(See TxDOT BC-03 Sheets for specific construction information.)

TEMPORARY CONCRETE BARRIER

- All concrete barriers placed on City R.O.W. shall be low profile.
- No high profile barriers will be allowed.
- Reflectors will be required on each concrete barrier.

(See TxDOT BC-03 Sheets for specific construction information)

PLASTIC DRUMS



- Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
- The Engineer/Inspector shall provide written notice to the Contractor regarding the replacement of drums or other traffic control devices. The Contractor shall have a maximum of 24 hours to replace any plastic drums or other traffic control devices identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.
- Each drum must have a 40 lb. rubber or plastic snap on.
- No signs larger than 18" X 24" will be allowed to be mounted on plastic drums.
- No warning lights will be allowed to be mounted on plastic barrels.
- In lieu of a warning light, a yellow reflector will be acceptable.

(See TxDOT BC-03 Sheets for specific construction information)

JUNE 2005

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

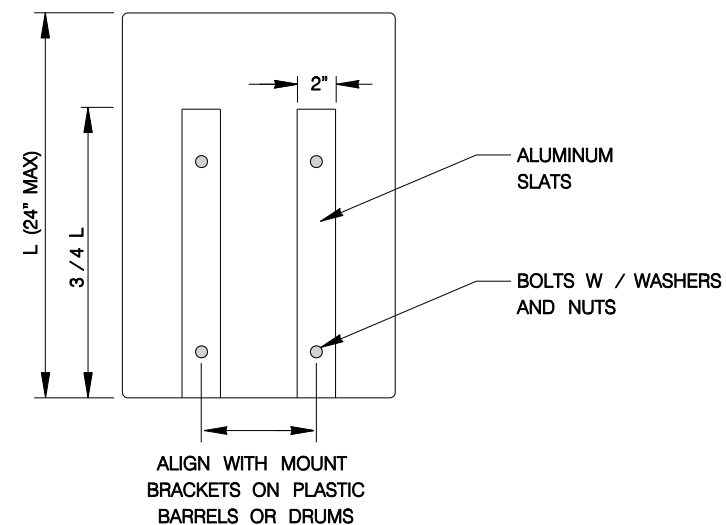
TRAFFIC STANDARDS
BARRICADE AND CONSTRUCTION
STANDARDS
SHEET 3 OF 4

DRWN. BY: A.F.G.	DSGN. BY: E.N.M.	CHKD. BY: J.D.F./E.N.M.	DATE:
% SUBMITTAL PROJECT NO.:			SHEET NO.: 45 OF 65

THE ORIGINAL OF THIS DRAWING WAS SIGNED AND SEALED BY JOHN D. FRIEBELE, #46394 ON 06-20-05 AND IS ON FILE WITH THE TRAFFIC ENGINEERING DIVISION OF THE PUBLIC WORKS DEPARTMENT, CITY OF SAN ANTONIO.

SIGNS

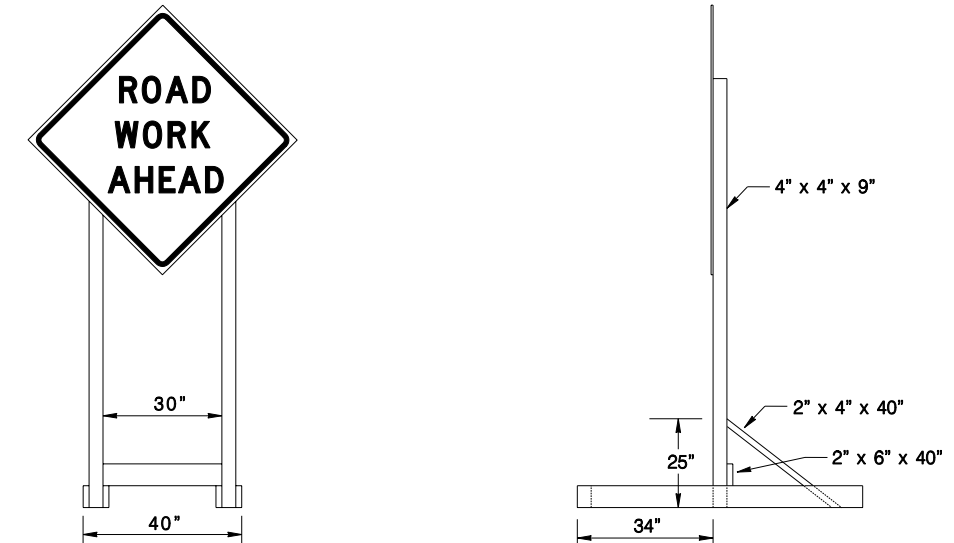
- 1.) A maximum of two signs can be mounted on any one Long / Intermediate Term Stationary Portable Sign Support.
- 2.) 48" X 48" signs shall be mounted separately on the Long / Intermediate Term Stationary Portable Sign Support.
- 3.) For Short Term Stationary Portable Sign Support the distance from the bottom of the vinyl sign to the exiting ground must be one (1) foot.
- 4.) Long / Intermediate Term Stationary Portable Signs must be made of wood or plastic only.
- 5.) No signs shall be mounted to any Type I, Type III, or folding barricades.
- 6.) Signs shall be mounted only on TxDOT approved sign supports.
- 7.) Detour signs will be mounted on single "D" legs w / 7' clearance from the bottom of the sign.
- 8.) WORK DURATION TERMINOLOGY
Long Term Stationary = occupies a location 3 or more days.
Intermediate-Term Stationary = occupies a location for overnight to 3 days.
Short Term Stationary = daylight work that occupies a location from 1 to 12 hours.
Short Duration = occupies a location up to 1 hour.
- 9.) Signs shall adhere to the following requirements:
 - Signs placed on plastic barrels or drums shall be made of ABS plastic or plywood.
 - Signs placed on skids shall be made of plywood or aluminum.
 - Aluminum signs shall have a minimum thickness of 0.08".
 - Plywood signs shall have a minimum thickness of 1 / 2".
 - ABS Plastic signs shall have a minimum thickness of 0.13".
Plastic signs cannot exceed 18" by 24" in size and shall be reinforced with 2" wide, 0.08" thick aluminum slats, as depicted below:



- No other material shall be accepted without the express written approval of the Traffic Engineer.

(See TxDOT BC-03 Sheets for specific construction information.)

LONG TERM / INTERMEDIATE TERM SIGN SUPPORT



- 1.) 48" X48" signs must be mounted independently.
- 2.) A maximum of two signs can be mounted on any one long term / intermediate sign support.
- 3.) Sand bag all sign supports.
- 4.) Distance from the bottom of the sign to the existing ground shall be 7'.
- 5.) Distance from the header barricade rail to the face of the sign panel shall be 2' min. and 10' max.
- 6.) Steel tripods shall not be allowed.

(See TxDOT BC-03 Sheets for specific construction information)

JUNE 2005

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

TRAFFIC STANDARDS
**BARRICADE AND CONSTRUCTION
STANDARDS**
SHEET 4 OF 4

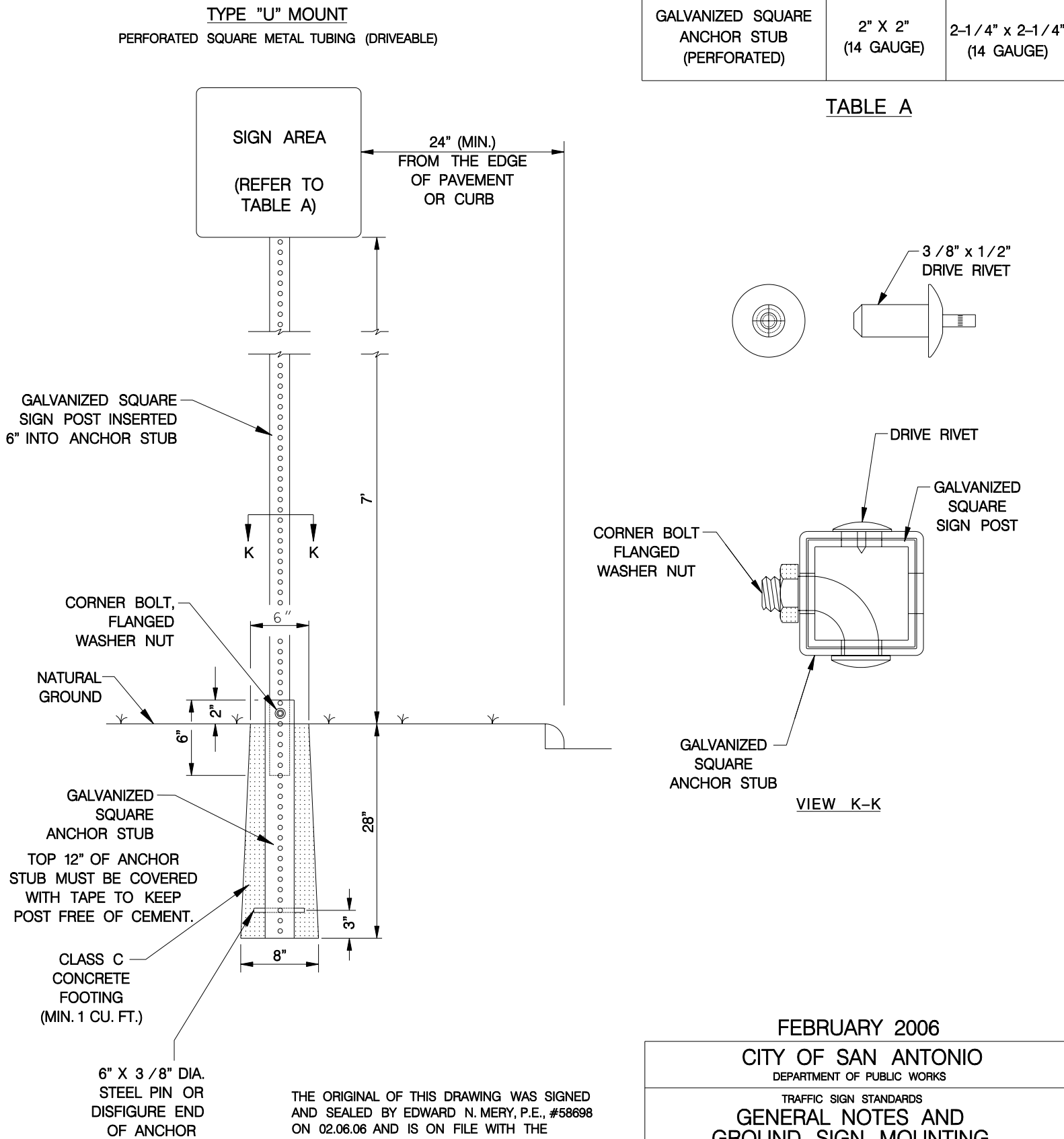
THE ORIGINAL OF THIS DRAWING WAS SIGNED AND
SEALED BY JOHN D. FRIEBELE, #46394 ON 06-20-05
AND IS ON FILE WITH THE TRAFFIC ENGINEERING
DIVISION OF THE PUBLIC WORKS DEPARTMENT, CITY
OF SAN ANTONIO.

DRWN. BY: A.F.G.	DSGN. BY: E.N.M.	CHKD. BY: J.D.F./E.N.M.	DATE:
SHEET NO. 46 OF 65			

GENERAL NOTES

- 1.) THE EXISTING SIGNS LOCATED ON THE JOBSITE ARE THE PROPERTY OF THE CITY OF SAN ANTONIO. THROUGHOUT THE PERIOD OF THE CONTRACT, THE CONTRACTOR SHALL PROTECT THESE SIGNS SUCH THAT THEY ARE NOT DAMAGED IN THE COURSE OF CONSTRUCTION ACTIVITY. SUCH PROTECTION SHALL INCLUDE THE PERIOD AFTER SIGNS ARE REMOVED FROM INSTALLATION AND STORED BY THE CONTRACTOR OR DELIVERED TO TRAFFIC OPERATIONS. THE ASSISTANT TRAFFIC SUPERINTENDENT (207-7765) MUST BE NOTIFIED 48 HOURS IN ADVANCE PRIOR TO DELIVERY.
- 2.) AFTER SIGNS ARE REMOVED FROM INSTALLATION AND ARE BEING STORED BY THE CONTRACTOR, THE CONTRACTOR SHALL CONTACT THE TRAFFIC OPERATIONS SECTION OF THE PUBLIC WORKS DEPARTMENT (207-7765) AND ARRANGE FOR A CONVENIENT TIME TO DELIVER CITY SIGNS AND POLES.
- 3.) PRIOR TO THE START OF CONSTRUCTION, ALL EXISTING SIGNS WITHIN THE AREA OF CONSTRUCTION WILL BE INVENTORIED AND DOCUMENTED JOINTLY BY THE TRAFFIC ENGINEERING (207-7720) CONSTRUCTION INSPECTION AND THE CONTRACTOR. THIS DOCUMENT WILL BE JOINTLY SIGNED BY BOTH PARTIES REFLECTING THE SIGN TYPE, SIGN SIZE, SIGN CONDITION, SIGN LOCATION, REFLECTIVITY ADEQUACY, ETC. THE CONTRACTOR IS HELD ACCOUNTABLE FOR THESE SIGNS THROUGHOUT THE PROJECT AND AT THE PROJECTS COMPLETION.
- 4.) ALL GROUND MOUNTED SIGNS SHALL USE HIGH INTENSITY REFLECTIVE SHEETING.
- 5.) ALL OVERHEAD SIGNS SHALL USE DIAMOND GRADE REFLECTIVE SHEETING.
- 6.) ALL BLANKS TO BE ALUMINUM ALLOY NO. 5052-H38.
- 7.) "T" DENOTES THICKNESS OF SIGN BLANKS.
- 8.) ALL HOLES SHALL BE 3/8" DIAMETER DRILLED OR PUNCHED AS SHOWN ON EACH BLANK DETAIL AND SHALL BE FREE OF BURRS AND /OR ROUGH EDGES.
- 9.) SIGN BLANK CORNERS TO BE ROUNDED AS SHOWN ON EACH DETAIL.
- 10.) ALL SIGN BLANK TO BE ETCHED, DEGREASED, AND HAVE AN ALODINE FINISH PRIOR TO APPLICATION OF LEGENDS.
- 11.) ALL DETAILS ARE NOT TO SCALE.
- 12.) ALL DIMENSIONS ARE IN INCHES.
- 13.) ALL SIGNS SHALL BE MANUFACTURED AND INSTALLED IN CONFORMANCE TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND STANDARD HIGHWAY SIGNS (FHWA) LATEST EDITION.
- 14.) REINSTALLATION OF PREVIOUSLY EXISTING SIGNS, WHERE REQUIRED BY THE CITY TRAFFIC ENGINEER, SHALL BE AT THE CONTRACTOR'S EXPENSE.

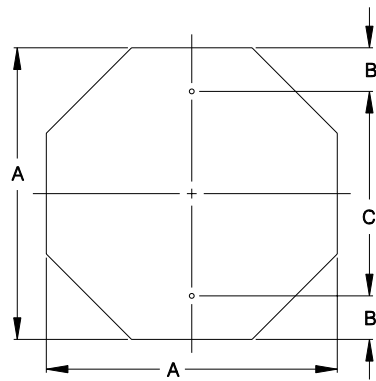
TYPICAL GROUND SIGN INSTALLATION



METAL TUBING	SIGN AREA	
	≤ 10 SQ. FT.	> 10 SQ. FT.
GALVANIZED SQUARE SIGN POST (PERFORATED)	1-3/4" x 1-3/4" (14 GAUGE)	2" x 2" (12 GAUGE)
GALVANIZED SQUARE ANCHOR STUB (PERFORATED)	2" X 2" (14 GAUGE)	2-1/4" x 2-1/4" (14 GAUGE)

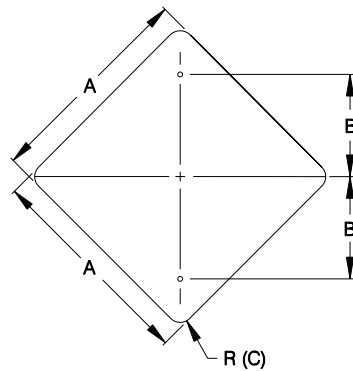
TABLE A

THE ORIGINAL OF THIS DRAWING WAS SIGNED AND SEALED BY EDWARD N. MERY, P.E., #58698 ON 02.06.06 AND IS ON FILE WITH THE TRAFFIC ENGINEERING DIVISION OF THE PUBLIC WORKS DEPARTMENT, CITY OF SAN ANTONIO.



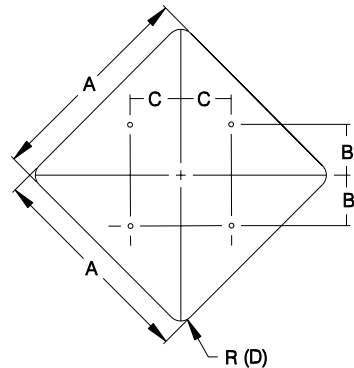
OCTAGONAL

A	B	C	T
24	3	18	0.080
30	3	24	0.080
36	3	30	0.100



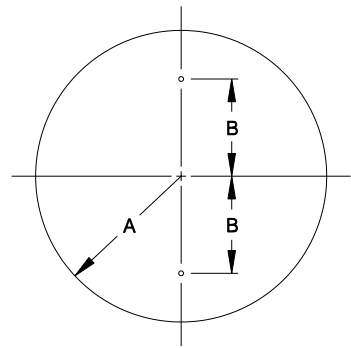
DIAMOND (A)

A	B	C	T
18	9	1 1/2	0.080
24	12	1 1/2	0.080
30	15	1 7/8	0.080
36	18	2 1/4	0.100



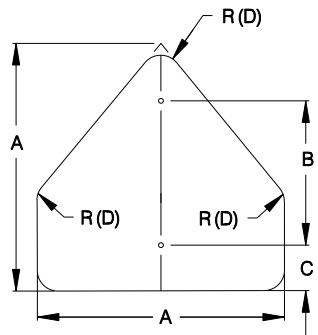
DIAMOND (B)

A	B	C	D	T
48	15	15	3	0.100



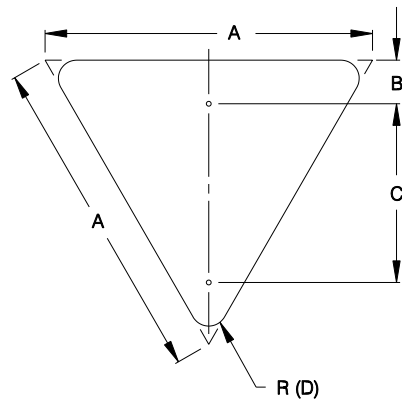
CIRCLE

A	B	T
18	15	0.100



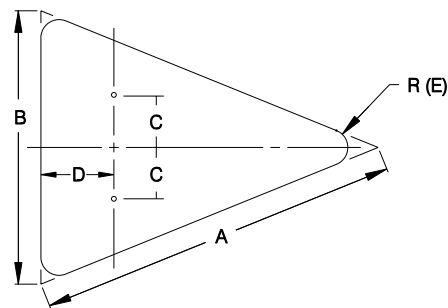
PENTAGON (SCHOOL)

A	B	C	D	T
36	24	3	2 1/4	0.100



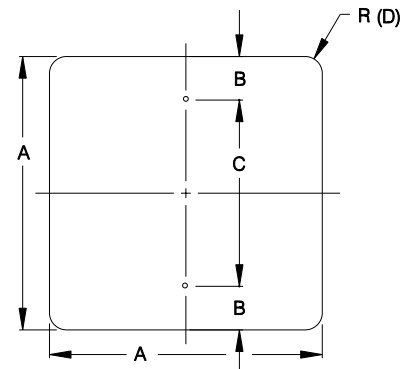
EQUILATERAL TRIANGLE

A	B	C	D	T
36	2	24	2	0.100



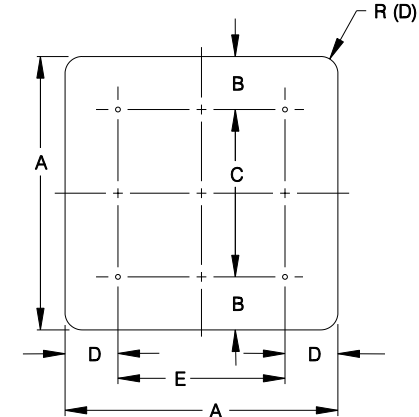
ISOSCELES TRIANGLE

A	B	C	D	E	T
40	30	7 1/2	12	1 7/8	0.100
48	36	9	15	2 1/4	0.100



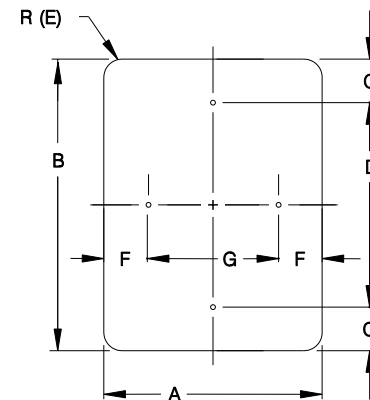
SQUARE (A)

A	B	C	D	T
18	1 1/2	15	1 1/2	0.080
24	3	18	1 1/2	0.080
30	3	24	1 7/8	0.080



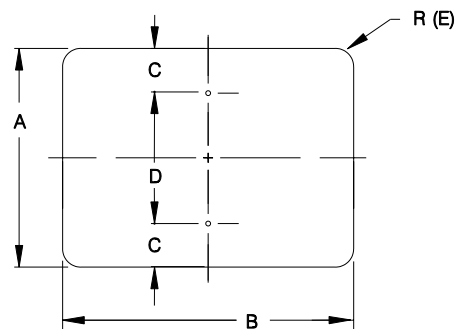
SQUARE (B)

A	B	C	D	E	F	T
48	6	36	9	30	3	0.100



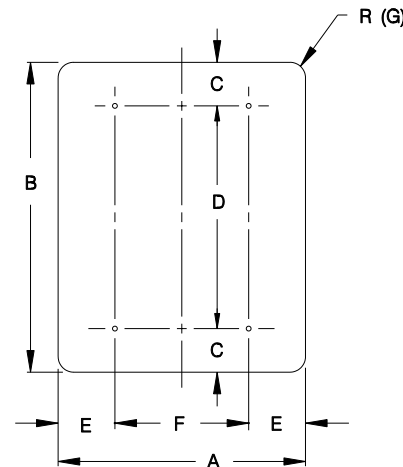
VERTICAL / HORIZONTAL RECTANGLE

A	B	C	D	E	F	G	T
12	18	1 1/2	15	1 1/2	1 1/2	9	0.080
12	36	3	30	1 1/2	1 1/2	9	0.080
18	24	1 1/2	21	1 1/2	1 1/2	15	0.080
24	30	3	24	1 1/2	3	18	0.080
24	36	3	30	1 1/2	3	18	0.080
24	48	6	36	1 7/8	3	18	0.080
30	36	3	30	1 7/8	3	24	0.080



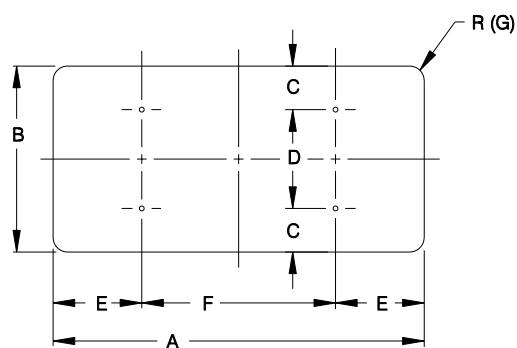
HORIZONTAL RECTANGLE

A	B	C	D	E	T
6	12	1	4	1/4	0.080
6	18	1	4	1/4	0.080
20	36	1 1/2	17	1 1/2	0.080



VERTICAL RECTANGLE

A	B	C	D	E	F	G	T
5	7 3/4	1/2	6 3/4	1/2	4	1/4	0.100
48	60	6	48	9	30	3	0.100



HORIZONTAL RECTANGLE

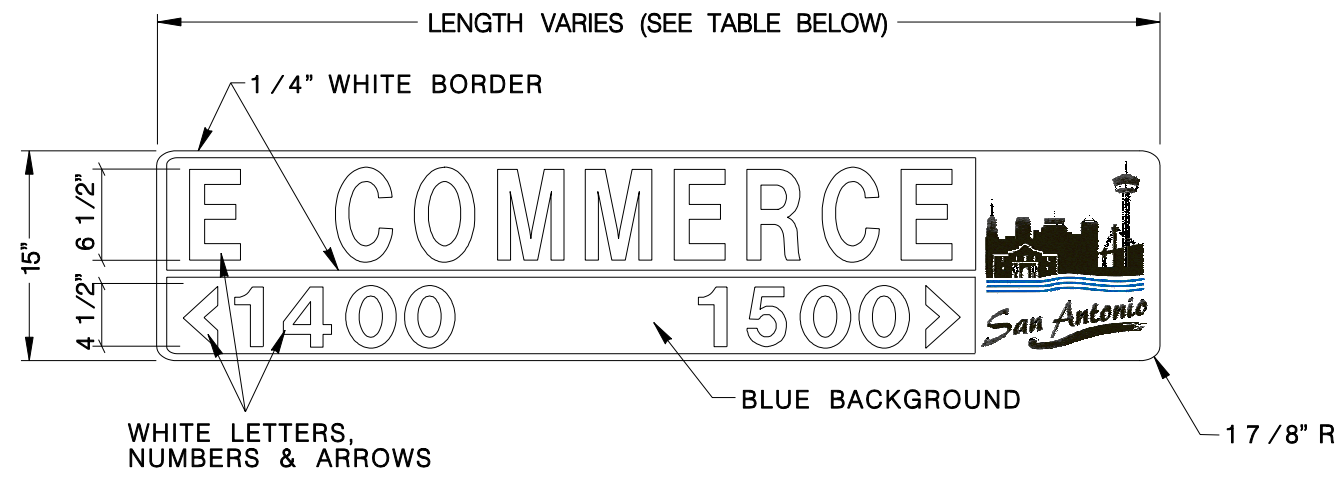
A	B	C	D	E	F	G	T
48	24	2	20	2	44	1 7/8	0.100
48	36	3	30	3	42	2 1/4	0.100
60	24	2	20	2	56	1 1/2	0.100
60	36	3	30	3	54	2 1/4	0.100
48	30	3	24	3	42	1 7/8	0.100
60	30	3	24	3	54	1 7/8	0.100

THE ORIGINAL OF THIS DRAWING WAS SIGNED
AND SEALED BY EDWARD N. MERY, P.E., #58698
ON 02.06.06 AND IS ON FILE WITH THE
TRAFFIC ENGINEERING DIVISION OF THE PUBLIC
WORKS DEPARTMENT, CITY OF SAN ANTONIO.

FEBRUARY 2006

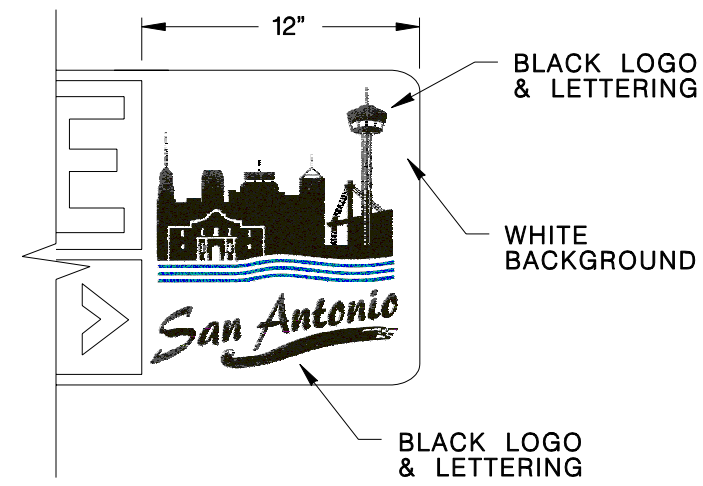
CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

TRAFFIC SIGN STANDARDS
GROUND MOUNTED
SIGN SIZES
SHEET 3 OF 4



15" METRO – STREET NAME SIGNS

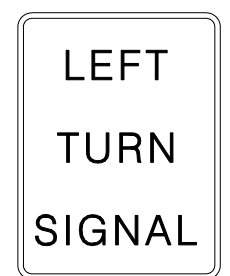
15" METRO w/CITY SKY LINE



HEIGHT	15" (381 MM)
LENGTH	48" (1200 MM) MIN. 72" (1800 MM) MAX.** 1' (300 MM) INCREMENTS OF LENGTH
THICKNESS	0.125" (3 MM)
SUBSTRATE	ALUMINUM ALLOY, 5052-H38 (ASTM B-209) GOLD CHROMATE FINISH
SIGN FACE MATERIALS	BLUE FILM OVER DIAMOND GRADE FP-85, SECTION 718 AND L-S-300C
LEGENDS AND SYMBOLS	SERIES D (USUAL) SERIES C OR B FOR MAXIMUM LENGTH SIGN BLANK, IF NECESSARY
COLOR	WHITE LEGEND ON BLUE BACKGROUND
LETTER TRACKING	17% (USUAL) 10% (MIN.)

** SIGN PLATE LONGER THAN 72" MUST BE APPROVED BY THE CITY TRAFFIC ENGINEER

* DIAMOND GRADE SHEETING 5052-H38 ALUMINUM SUBSTRATE



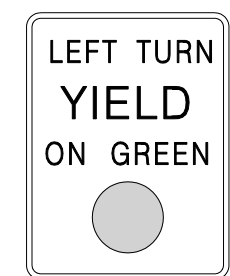
R10-10
*(30" X 36")



R3-5L
*(30" X 36")



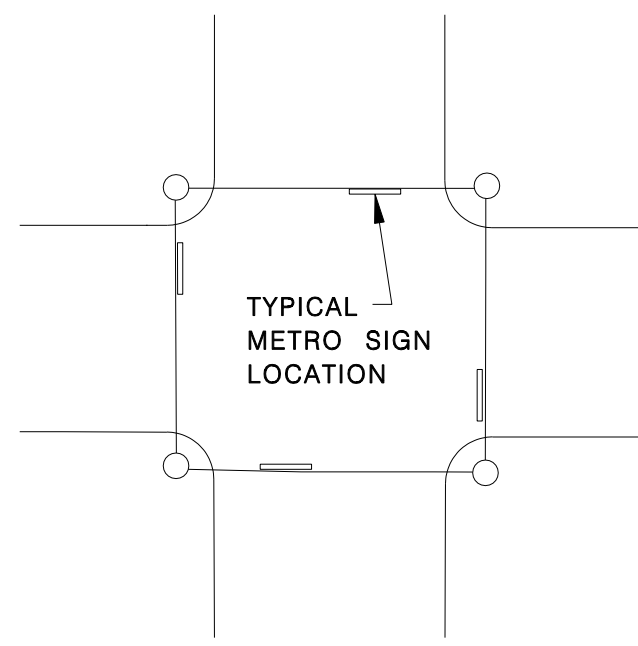
R10-9
*(30" X 24")



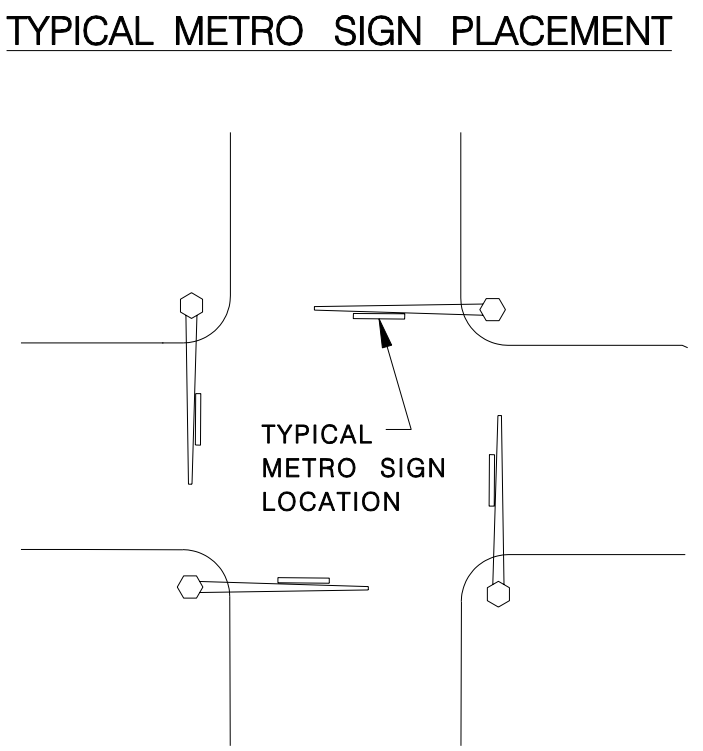
R10-12
*(30" X 36")

LEFT TURN SIGNS

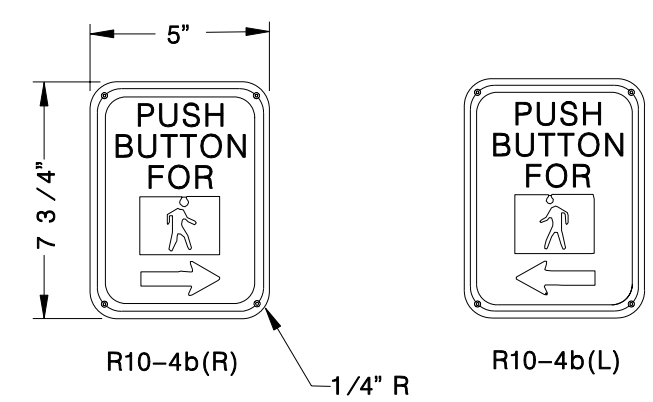
TYPICAL METRO SIGN PLACEMENT



SPAN WIRE INSTALLATION



MAST ARM INSTALLATION



PEDESTRIAN PUSHBUTTON SIGNS

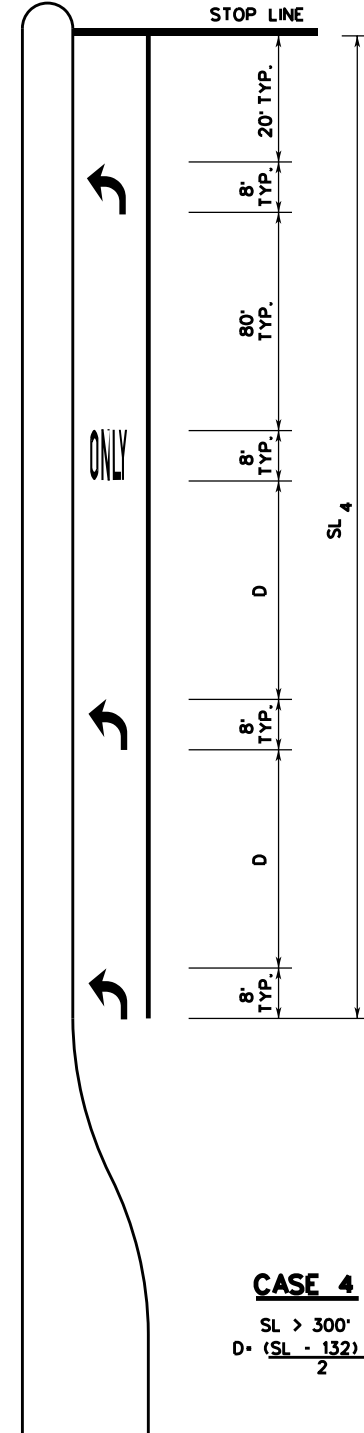
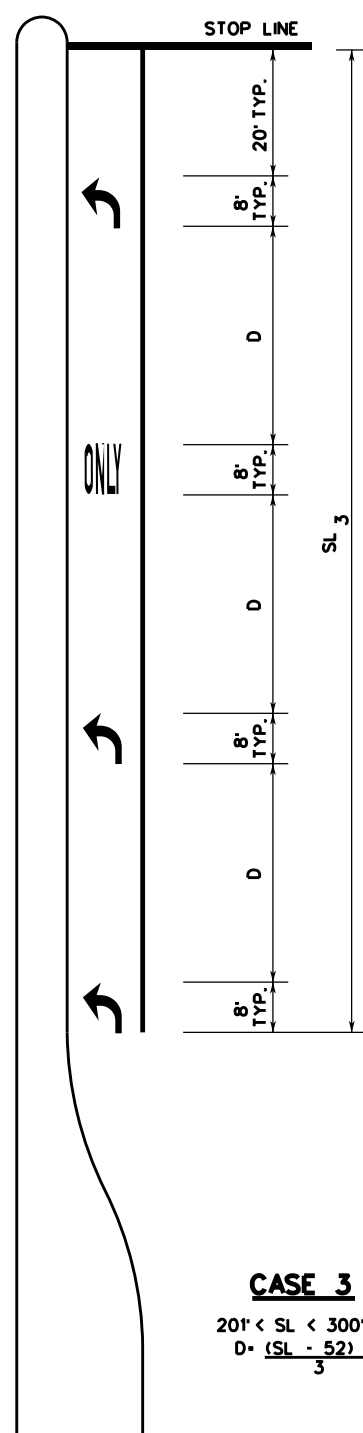
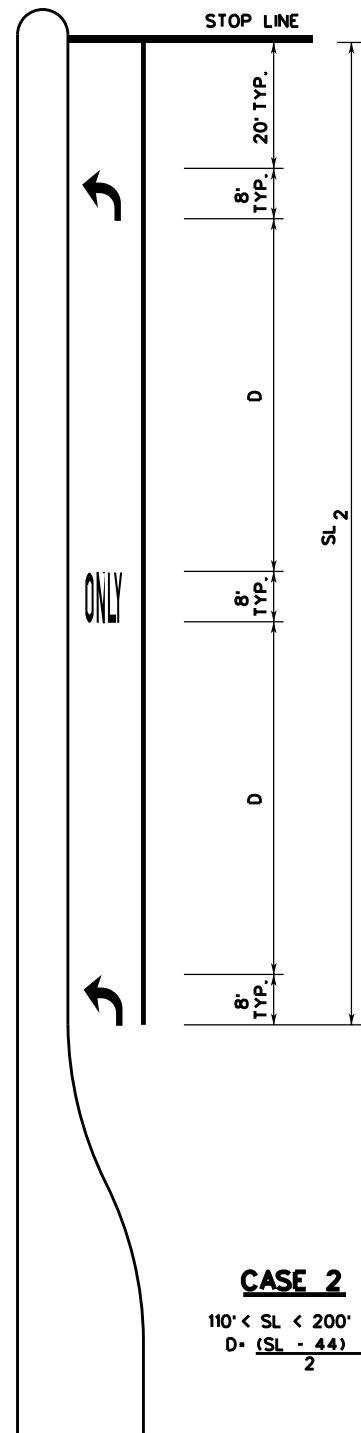
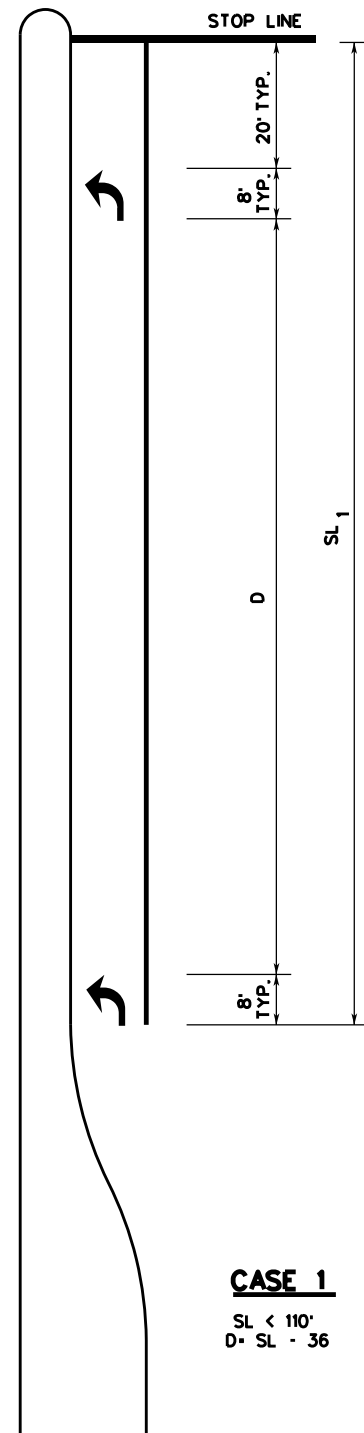
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FEBRUARY 2006

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

TRAFFIC SIGN STANDARDS
METRO STREET NAME SIGN
AND SIGN PLACEMENT
SHEET 4 OF 4

DRWN. BY: A.F.G.	DSGN. BY: E.N.M.	CHKD. BY: J.D.F./E.N.M.	SHEET NO: 49 OF 65
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KEY:

SL - STORAGE LENGTH (FEET)

D - DISTANCE BETWEEN ARROWS AND LEGENDS (FEET)

GENERAL NOTES:

1. THESE DETAILS ALSO APPLY TO RIGHT-TURN LANES.
2. FOR DUAL-TURN LANES, DIMENSIONS SHALL BE THE SAME FOR EACH LANE.
3. SL DIMENSION IS FROM STOP LINE TO END OF TURN LANE, WHICH DOES NOT INCLUDE TAPER LENGTH.
4. PAVEMENT ARROWS AND "ONLY" LEGEND MARKINGS ARE TYPICALLY USED AT SIGNALIZED INTERSECTIONS AND AT UNSIGNALIZED INTERSECTIONS WHERE A DEMONSTRATED NEED EXISTS.
5. MINIMUM SL = 110'. SL MAY BE LESS THAN 110 FEET AS DIRECTED BY THE CITY TRAFFIC ENGINEER.

SEPTEMBER 2009

CITY OF SAN ANTONIO

DEPARTMENT OF PUBLIC WORKS

TRAFFIC ENGINEERING STANDARDS

LEFT-TURN "ONLY" AND ARROW
SPACING WORKSHEET

SHEET 1 OF 16

DATE: _____	PROJECT NO.: _____	% SUBMITTAL: _____
DRWN. BY: J.A.N.	DSGN. BY: C.B.V.	CHKD. BY: M.E.

SHEET NO.: 50 OF 63

TRUCKS NEXT YIELD MERGE EXIT STOP ONLY

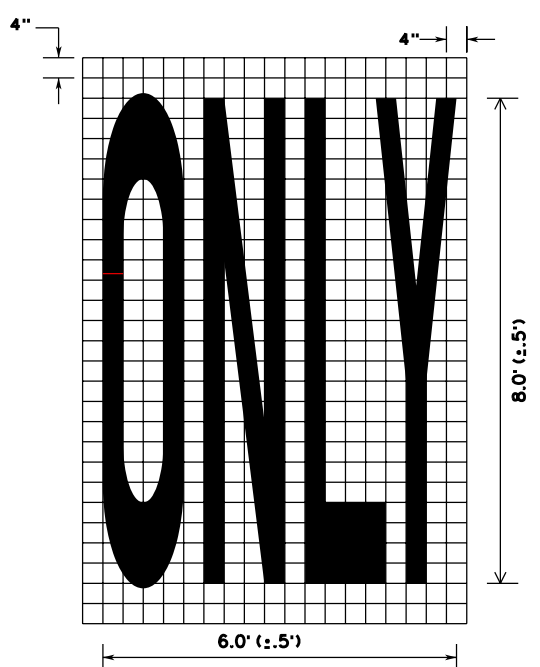
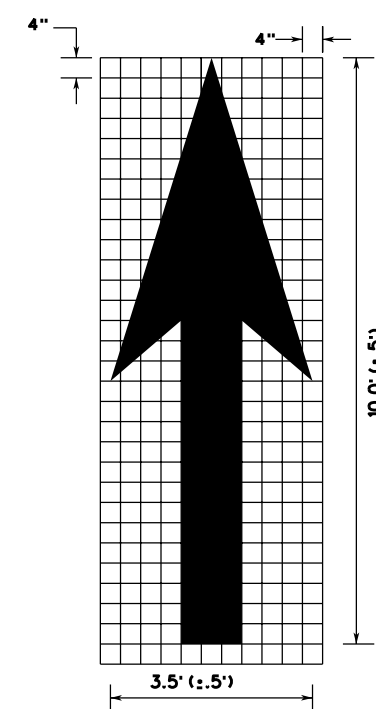
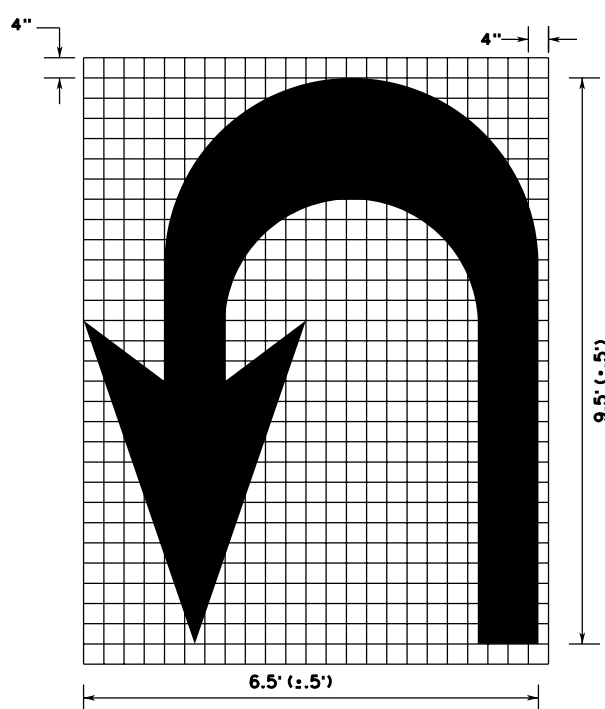
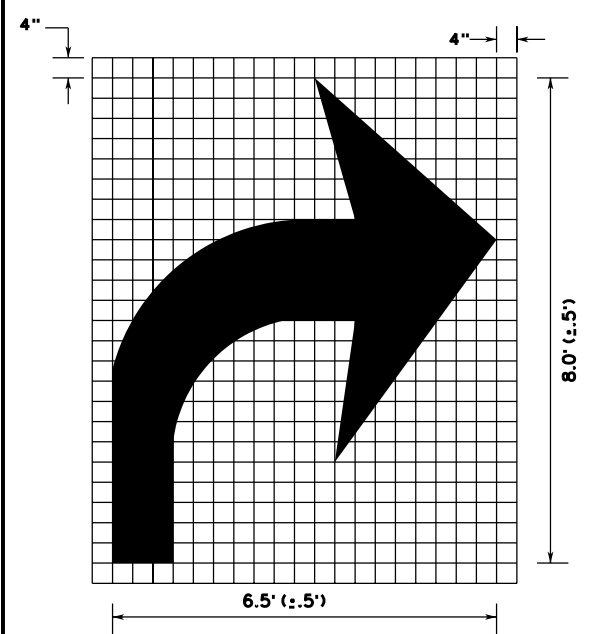
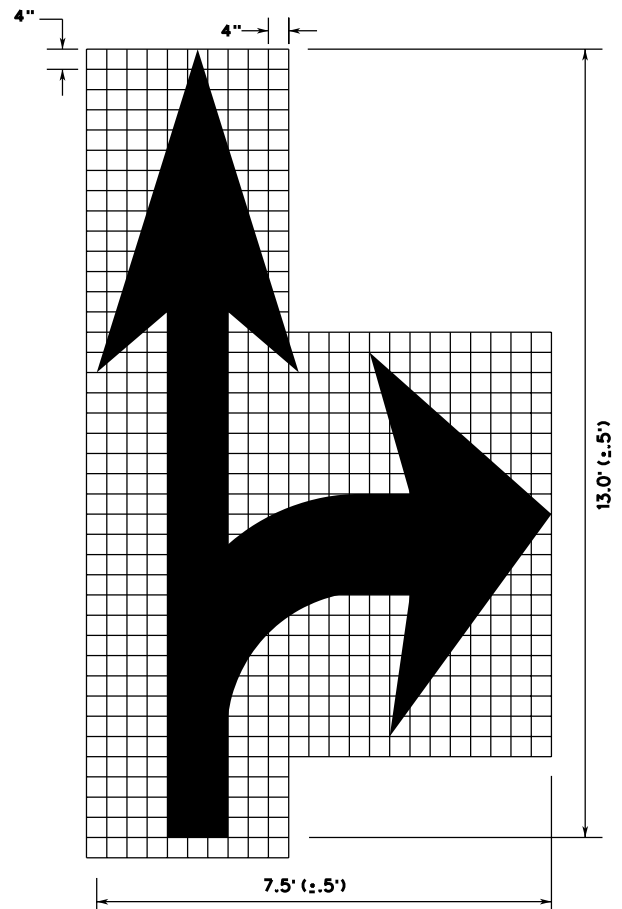
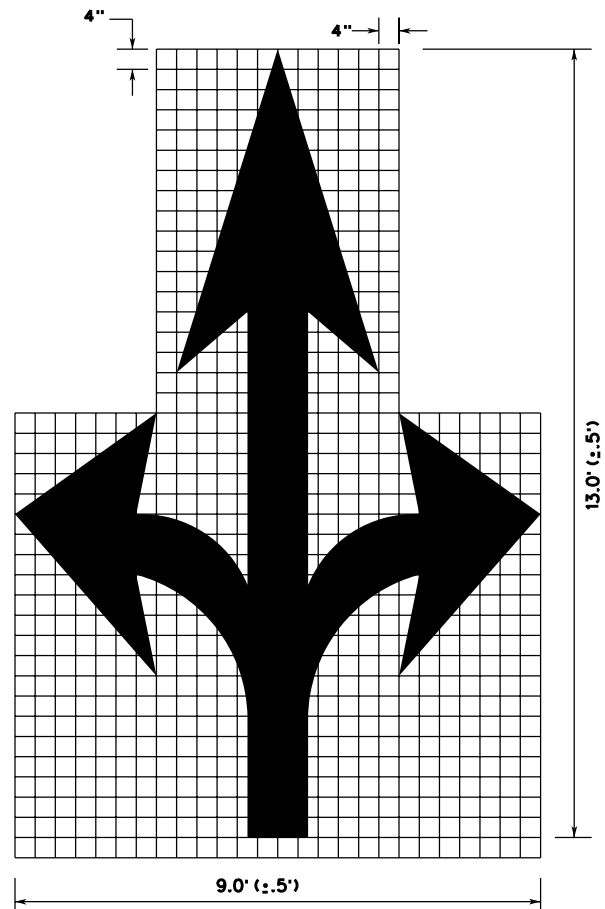
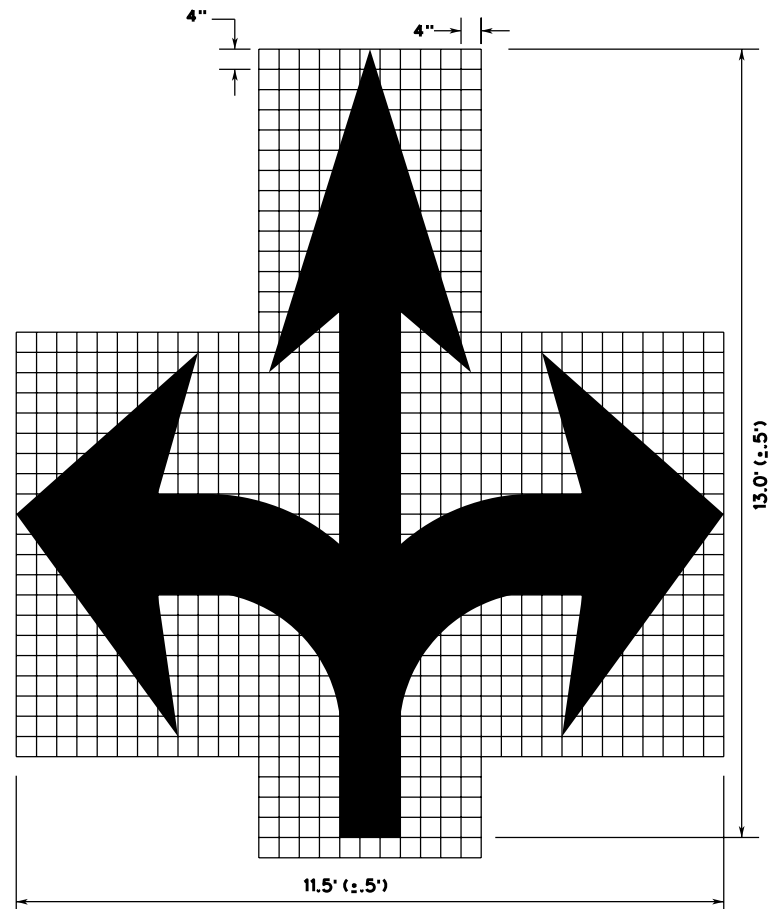
SCHOOL SIGNAL TURN LANE ENDS PED

ZONE AHEAD RIGHT LEFT ROUTE X-ING

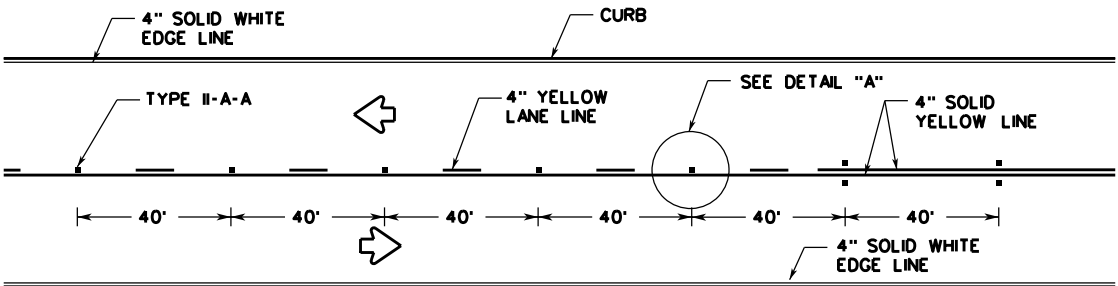
1234567890 MPH BUS

NOTES:

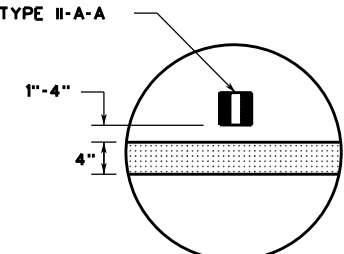
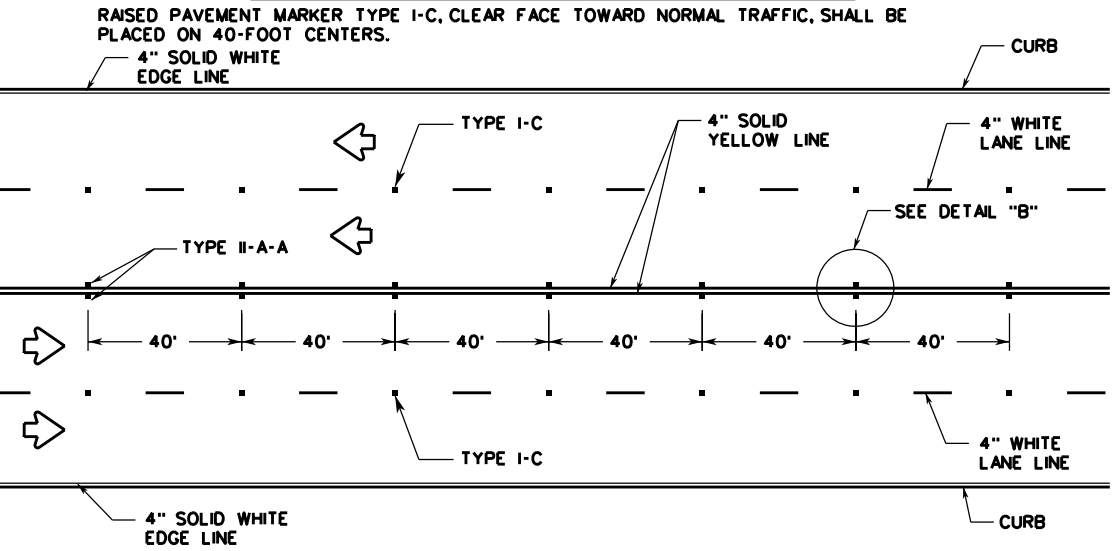
1. MINIMUM 8 FOOT WHITE MARKINGS SHALL BE USED, UNLESS OTHERWISE NOTED. IF MESSAGE CONSISTS OF MORE THAN ONE WORD, IT SHOULD BE PLACED WITH FIRST WORD NEAREST THE DRIVER.
2. THESE DETAILS ARE STANDARD SIZE FOR NORMAL INSTALLATION; SIZES MAY BE REDUCED APPROXIMATELY ONE-THIRD DEPENDING ON CONDITIONS.
3. THE LONGITUDINAL SPACE BETWEEN MARKINGS SHOULD BE 30 FEET.
4. MARKINGS CONSIDERED APPROPRIATE FOR USE WHEN WARRANTED INCLUDE THE FOLLOWING:
 - A. REGULATORY
 - STOP
 - RIGHT (LEFT) TURN ONLY
 - 25 MPH
 - SYMBOL ARROWS
 - B. WARNING
 - STOP AHEAD
 - SIGNAL AHEAD
 - SCHOOL
 - SCHOOL X-ING
 - PED X-ING
 - R X R (SEE RCPM DETAIL)
5. UNCONTROLLED USE OF PAVEMENT MARKINGS CAN RESULT IN DRIVER CONFUSION. WORD AND SYMBOL MARKINGS SHOULD BE NO MORE THAN THREE LINES.
6. THE WORD "STOP" SHALL NOT BE USED ON THE PAVEMENT UNLESS ACCOMPANIED BY A STOP LINE AND STOP SIGN. THE WORD "STOP" SHALL NOT BE PLACED ON THE PAVEMENT IN ADVANCE TO A STOP LINE, UNLESS EVERY VEHICLE IS REQUIRED TO STOP AT ALL TIMES.
7. PAVEMENT MARKINGS SHOULD GENERALLY BE NO MORE THAN ONE LANE IN WIDTH, WITH SCHOOL MESSAGES BEING THE EXCEPTION. FOR DETAILS OF SCHOOL AND SCHOOL CROSSING PAVEMENT MARKINGS, REFER TO PART VII OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
8. SPACING BETWEEN LETTERS SHOULD BE APPROXIMATELY 4 INCHES. THE WIDTH OF LETTERS MAY VARY DEPENDING ON THE WIDTH OF THE TRAVEL LANES.
9. LANE-USE ARROW MARKINGS MAY BE USED TO CONVEY EITHER GUIDANCE OR MANDATORY MESSAGES. ARROWS USED TO CONVEY A MANDATORY MOVEMENT MUST BE ACCOMPANIED BY STANDARD SIGNS AND THE PAVEMENT MARKING WORD "ONLY".
10. PAVEMENT MARKINGS ARE TO BE LOCATED AS SPECIFIED ELSEWHERE IN THE PLANS.



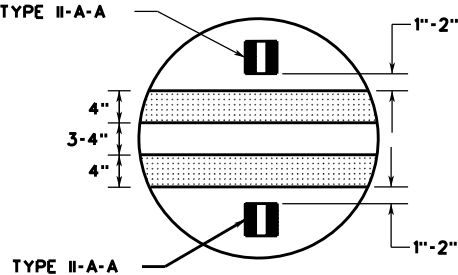
CENTERLINE & EDGE FOR ALL TWO LANE STREETS WITH PASSING ZONE



CENTERLINE, LANE LINES & EDGE LINES FOR FOUR LANE TWO-WAY STREETS

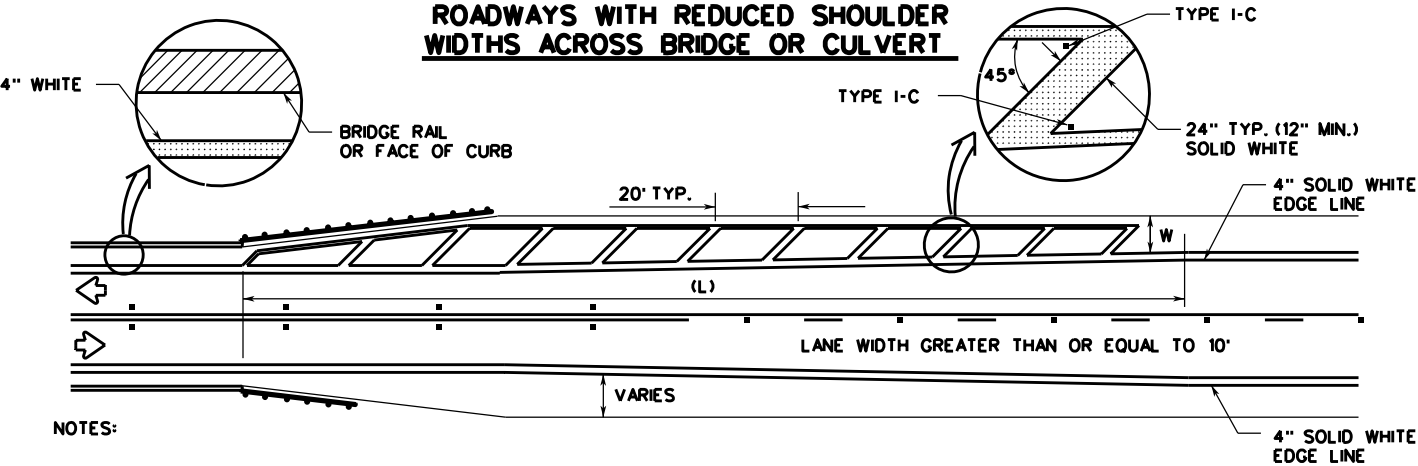


DETAIL "A"



DETAIL "B"

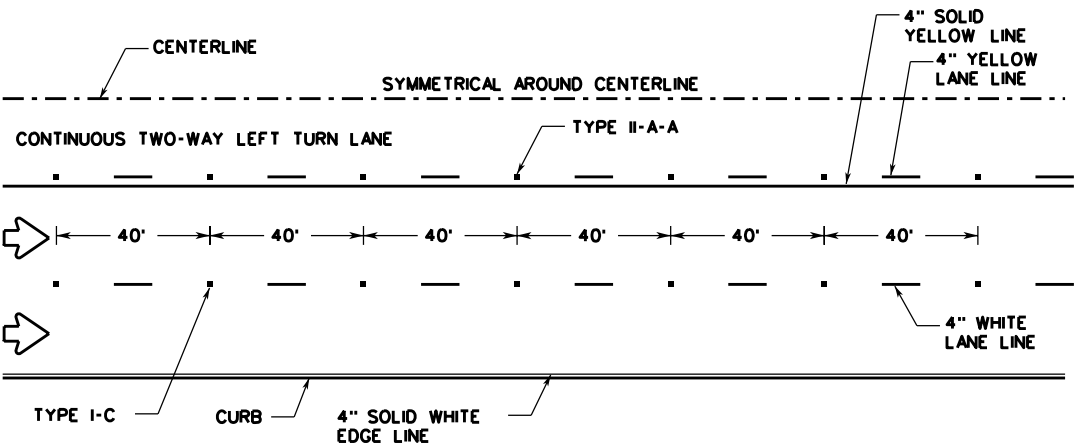
ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT



NOTES:

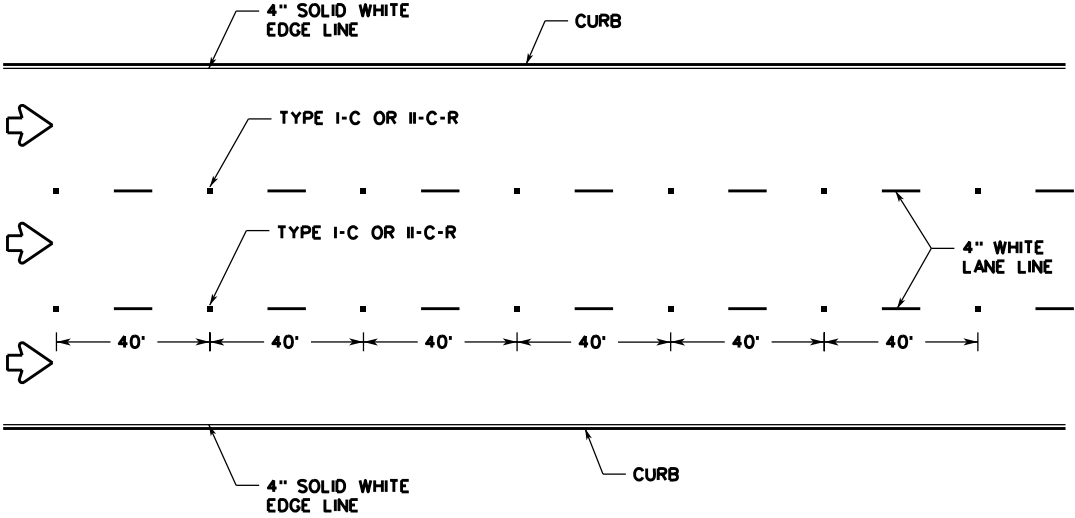
1. NO-PASSING ZONE ON BRIDGE APPROACH IS OPTIONAL BUT IF USED, IT SHALL BE A MINIMUM 500 FEET LONG.
2. FOR CROSSHATCHING LENGTH (L) SEE TABLE 1.
3. THE WIDTH OF THE OFFSET (W) AND THE REQUIRED CROSSHATCHING WIDTH IS THE FULL SHOULDER WIDTH IN ADVANCE OF THE BRIDGE.
4. THE CROSSHATCHING SHOULD BE REQUIRED IF THE SHOULDER WIDTH IN ADVANCE OF THE BRIDGE IS 4 FOOT OR WIDER AND ANY REDUCTION IN SHOULDER WIDTH ACROSS THE BRIDGE OCCURS.

CENTERLINE, LANE LINES, & EDGE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES & EDGE LINES FOR ONE-WAY MULTILANE STREET

RAISED PAVEMENT MARKERS TYPE II-C-R SHALL HAVE CLEAR FACE TOWARD NORMAL TRAFFIC AND RED FACE TOWARD WRONG-WAY TRAFFIC.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

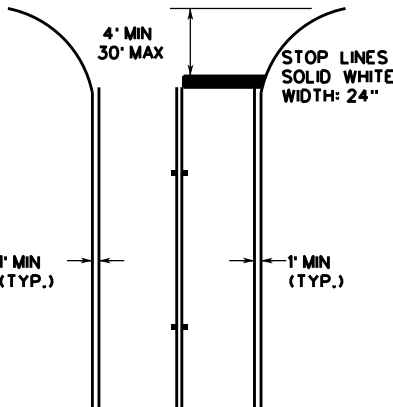


TABLE 1 - TYPICAL LENGTH (L)

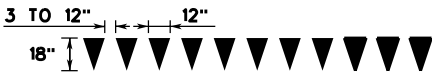
POSTED SPEED	FORMULA
45>	$L = \frac{WS^2}{60}$
≥45	$L = WS$

* 85TH PERCENTILE SPEED MAY BE USED ON ROADS WHERE TRAFFIC SPEEDS NORMALLY EXCEED THE POSTED SPEED LIMIT. CROSSHATCHING LENGTH SHOULD BE ROUNDED UP TO NEAREST 5 FOOT INCREMENT.

L = LENGTH OF CROSSHATCHING (FT)
W = WIDTH OF OFFSET (FT)
S = POSTED SPEED (MPH)

EXAMPLES:
AN 8 FOOT SHOULDER IN ADVANCE OF A BRIDGE REDUCES TO 4 FEET ON A 70 MPH ROADWAY. THE LENGTH OF THE CROSSHATCHING SHOULD BE:
L = 8X70 = 560 FT
A 4 FOOT SHOULDER IN ADVANCE OF A BRIDGE REDUCES TO 2 FEET ON A 40 MPH ROADWAY. THE LENGTH OF THE CROSSHATCHING SHOULD BE:
L = 4(40)² / 60 = 106.67 FT ROUNDED TO 110 FT

YIELD LINES



GENERAL NOTES:

1. EDGELINE ADJACENT TO CURB AND GUTTER IS NOT REQUIRED IN ALL CASES, HOWEVER SHALL BE PLACED AS DIRECTED BY CITY TRAFFIC ENGINEER.
2. THE TRAVELED WAY INCLUDES ONLY THAT PORTION OF THE ROADWAY USED FOR VEHICULAR TRAVEL AND NOT THE PARKING LANES, SIDEWALKS, BERMS AND SHOULDERS. THE TRAVELED WAYS SHALL BE MEASURED FROM THE INSIDE OF EDGELINE TO INSIDE OF EDGELINE OF A TWO LANE ROADWAY.
3. ALL RAISED PAVEMENT MARKERS PLACED IN BROKEN LINES SHALL BE PLACED IN LINE WITH AND MIDWAY BETWEEN THE STRIPES.
4. ON CONCRETE PAVEMENTS THE RAISED PAVEMENT MARKERS SHOULD BE PLACED TO ONE SIDE OF THE LONGITUDINAL JOINTS.
5. ALL PAVEMENT MARKING MATERIAL SHALL MEET THE REQUIRED MATERIAL SPECIFICATIONS AS SPECIFIED BY CITY OF SAN ANTONIO STANDARD SPECIFICATIONS.
6. 4" SOLID WHITE EDGE LINES ARE OPTIONAL AS DIRECTED BY THE CITY TRAFFIC ENGINEER.

SEPTEMBER 2009

CITY OF SAN ANTONIO

DEPARTMENT OF PUBLIC WORKS

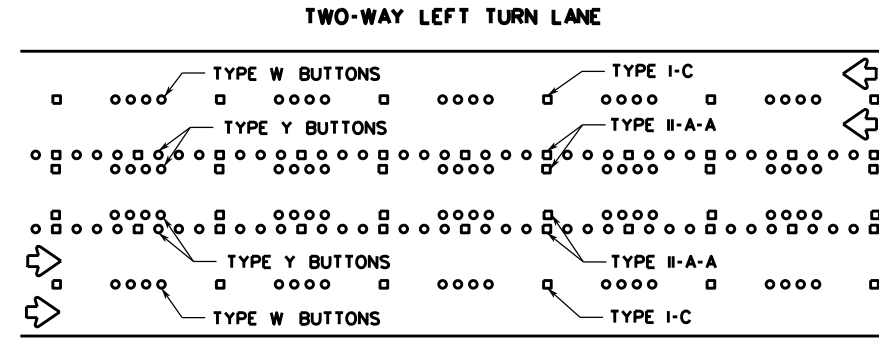
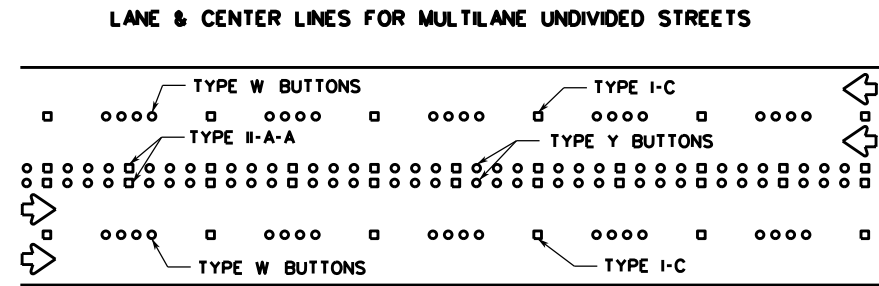
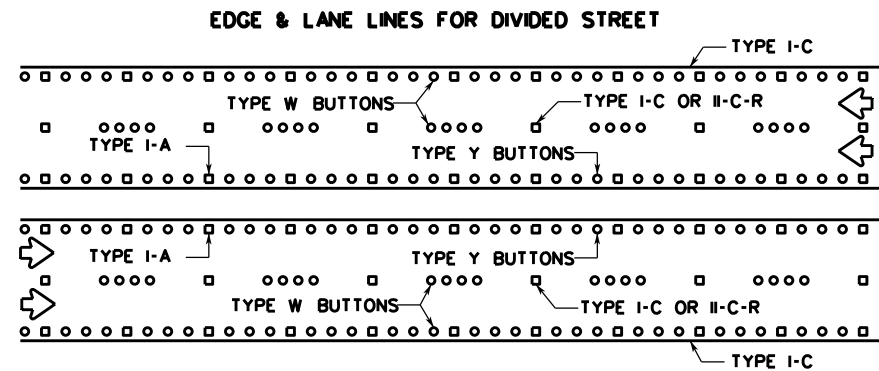
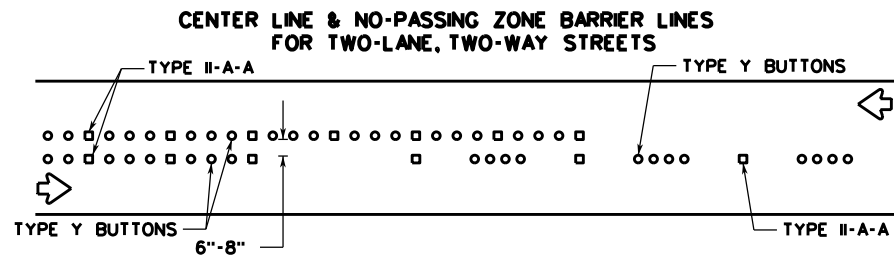
TRAFFIC ENGINEERING STANDARDS

STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE 1

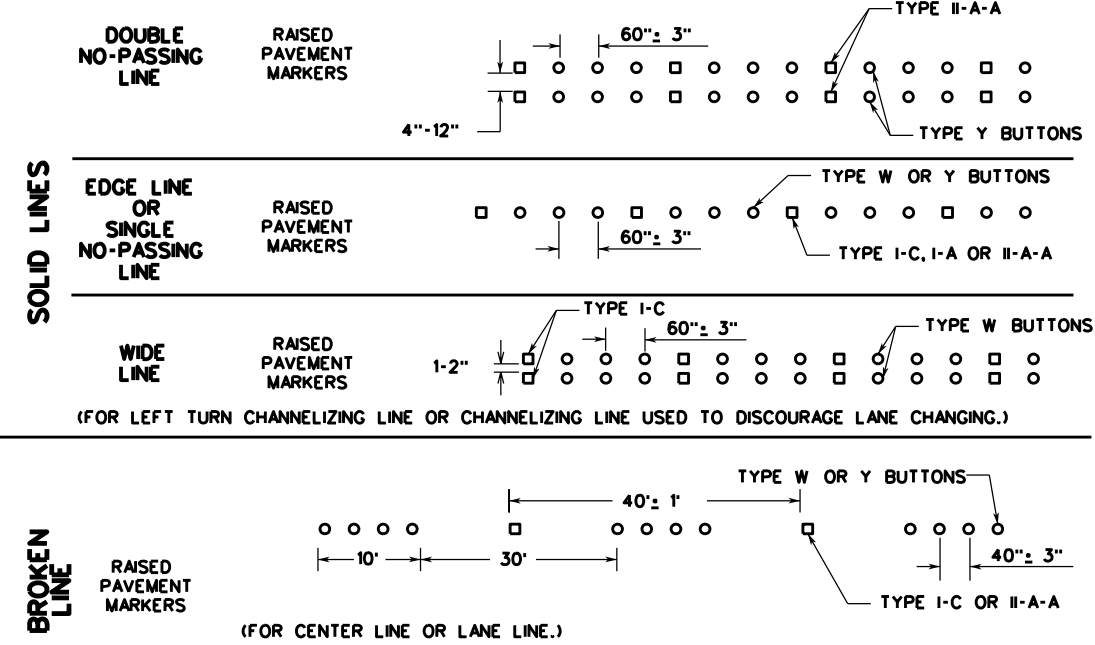
SHEET 4 OF 16

DRWN. BY: J.A.N. DSGN. BY: C.B.V. CHKD. BY: M.E. SHEET NO.: 33 OF 63

RAISED PAVEMENT MARKING PLACEMENT PATTERNS PLACED W/ REFLECTION PAVEMENT MARKERS (OPTIONAL)

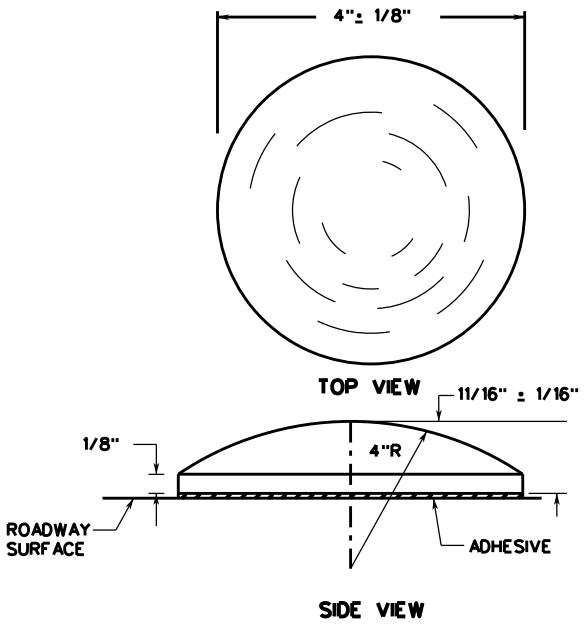


RAISED PAVEMENT MARKINGS PLACEMENT DETAILS PLACED W/ REFLECTION PAVEMENT MARKERS (OPTIONAL)

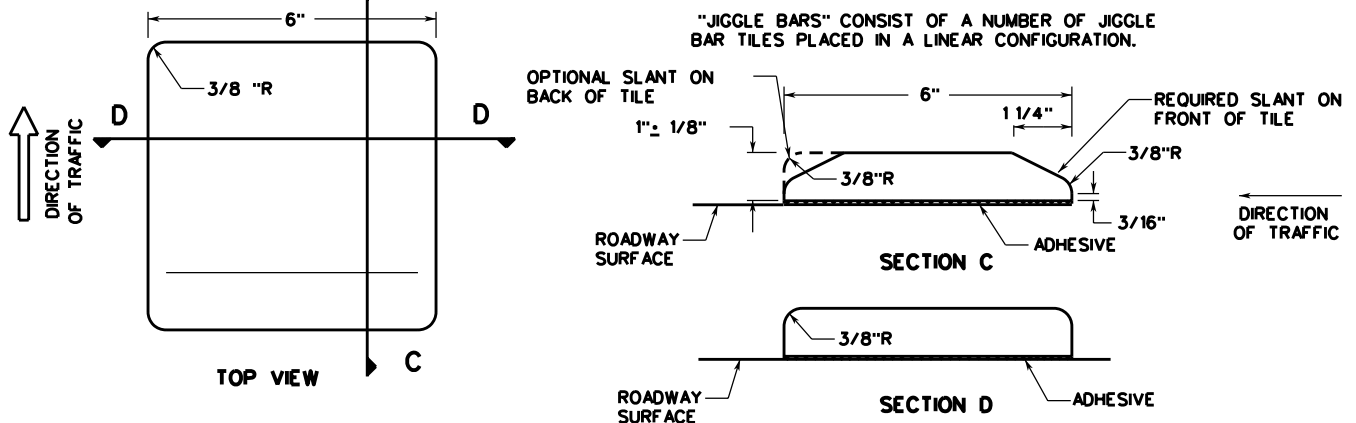


TRAFFIC BUTTONS (NON-REFLECTORIZED)

NOTE: MINIMUM AREA OF MARKERS SHALL BE NOT LESS THAN 12.5 SQUARE INCHES.

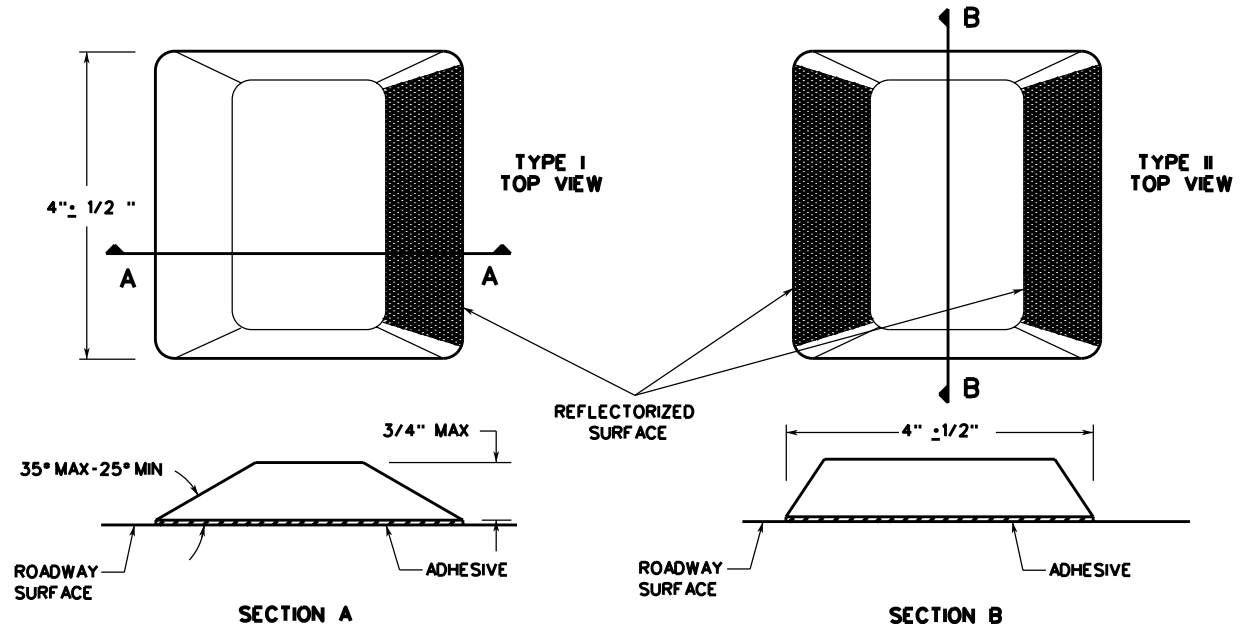


JIGGLE BAR TILES (NON-REFLECTORIZED)



- NOTES:**
1. RAISED PAVEMENT MARKERS (RPMs) MAY CONSIST OF TRAFFIC BUTTONS, PAVEMENT MARKERS AND/OR JIGGLE BAR TILES. PAVEMENT SURFACE SHALL BE PREPARED AND CLEANED SUBJECT TO APPROVAL OF THE CITY TRAFFIC ENGINEER BEFORE ADHESIVE AND RPMs ARE PLACED.
 2. JIGGLE BARS SHALL BE ORIENTED PERPENDICULAR TO ROADWAY. JIGGLE BARS SHALL ALSO BE PLACED AT SUCH OTHER LOCATIONS AS SHOWN IN PLANS OR AS DIRECTED BY THE CITY TRAFFIC ENGINEER.
 3. MARKERS, BUTTONS AND JIGGLE BAR TILES SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY AND NOT INTENDED TO SPECIFY ANY PARTICULAR PRODUCT. ALL PAVEMENT MARKERS PROVIDED SHALL BE OF THE SAME MANUFACTURER.
 4. ALL DIMENSIONS ARE +/- 1/8" UNLESS OTHERWISE NOTED.
 5. ALL PAVEMENT MARKING MATERIALS SHALL MEET MATERIAL SPECIFICATIONS AS SPECIFIED BY CITY OF SAN ANTONIO STANDARD SPECIFICATIONS.
 6. TRAFFIC BUTTONS AND JIGGLE BAR TILES ARE TO BE USED ONLY FOR TEMPORARY TRAFFIC CONTROL OR AS DIRECTED BY THE CITY TRAFFIC ENGINEER.

RAISED PAVEMENT MARKERS (REFLECTORIZED)

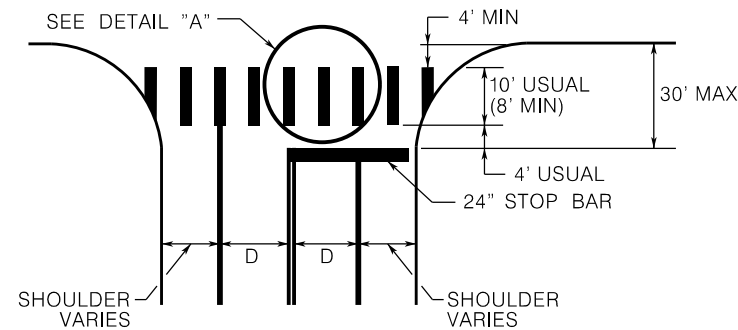


SEPTEMBER 2009

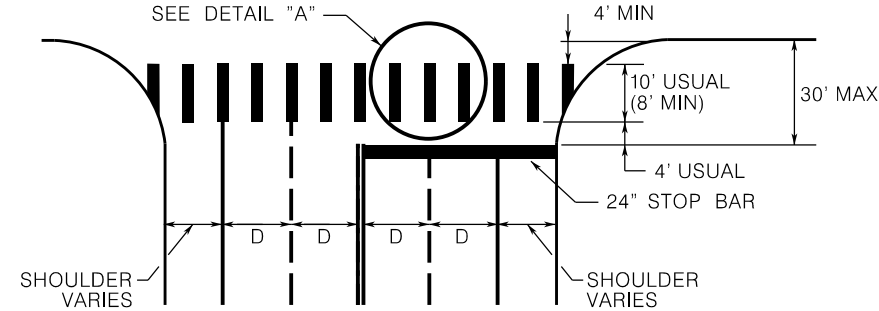
CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

TRAFFIC ENGINEERING STANDARDS
RAISED PAVEMENT MARKERS, REFLECTIVE
PAVEMENT MARKERS, TRAFFIC BUTTONS &
JIGGLE BAR TILES 2
SHEET 5 OF 16

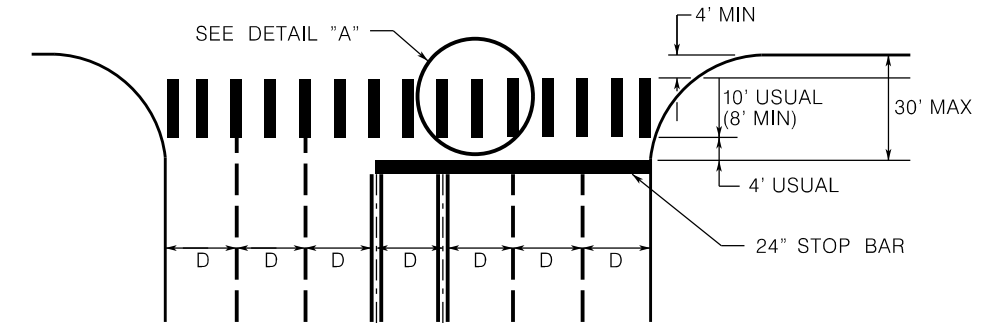
TWO LANES WITH SHOULDERS



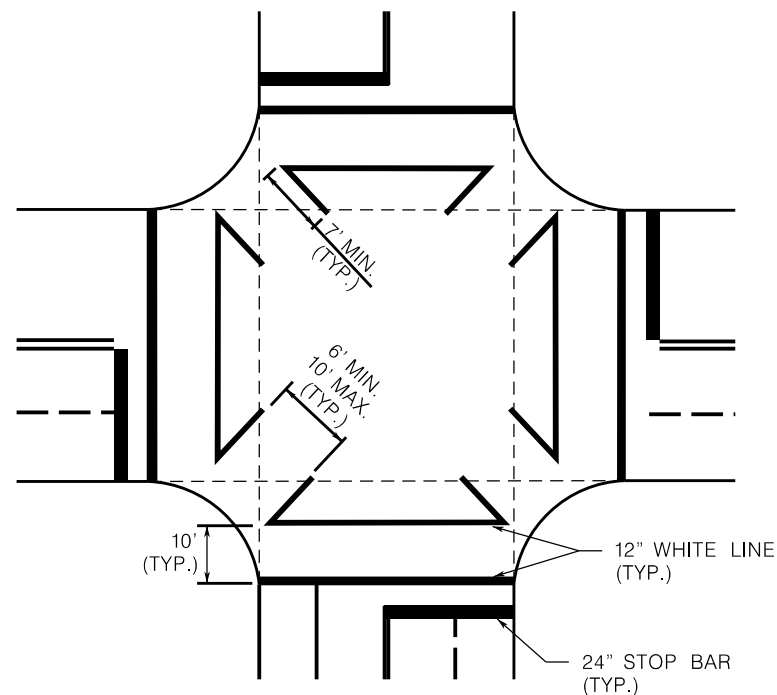
FOUR LANES WITH SHOULDERS



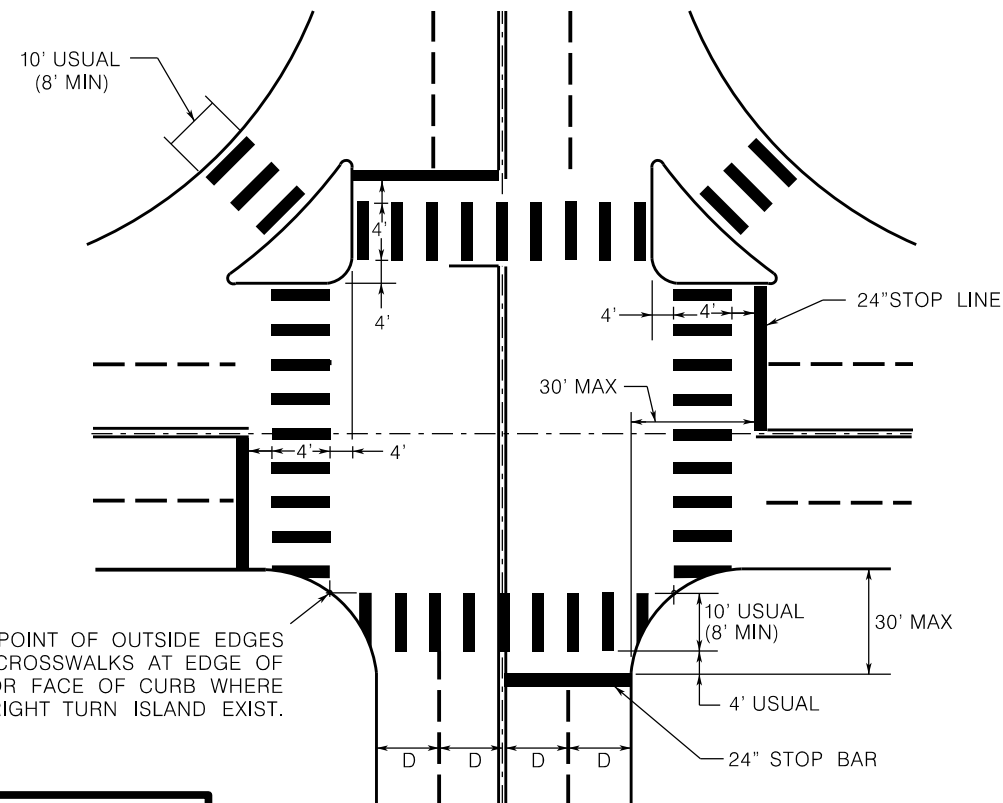
MULTI - LANES



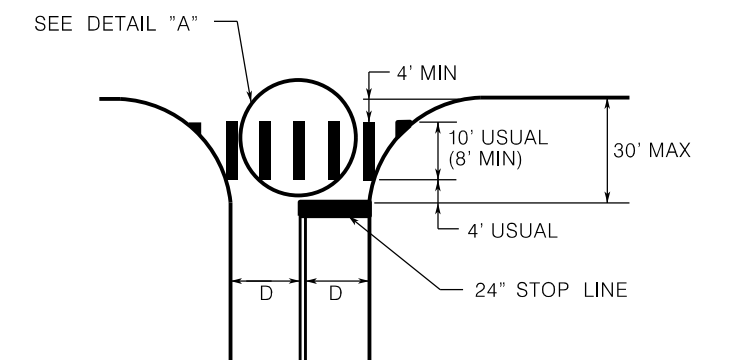
EXCLUSIVE PEDESTRIAN PHASE



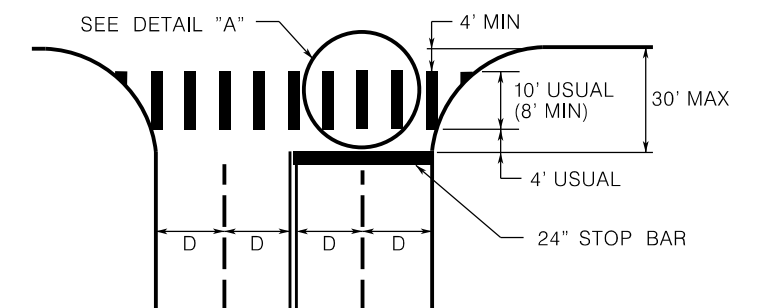
INTERSECTION WITH RIGHT-TURN ISLANDS



TWO LANES



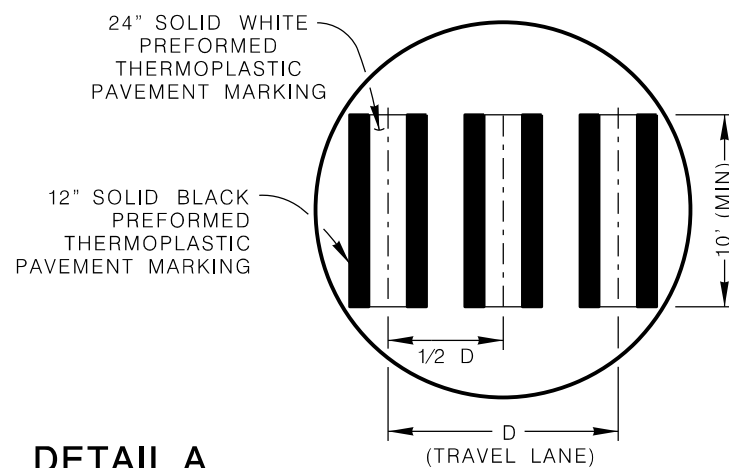
FOUR LANES



HIGH CONTRAST CROSSWALK

NOTES:

- CROSSWALKS AND STOP BARS SHALL BE WHITE.
- "D" IS EQUAL TO THE WIDTH OF TRAVEL LANE.
- PREFORMED THERMOPLASTIC SHALL BE USED FOR ALL CROSSWALK PAVEMENT MARKINGS.
- PREFORMED THERMOPLASTIC MATERIAL SHALL BE SUPPLIED BY A MANUFACTURER LISTED ON TxDOT'S MATERIAL PRODUCER LIST (MPL).



DETAIL A

GENERAL NOTES:

- CROSSWALKS AND STOP BARS SHALL BE WHITE.
- "D" IS EQUAL TO THE WIDTH OF TRAVEL LANE.
- PREFORMED THERMOPLASTIC SHALL BE USED FOR ALL CROSSWALK PAVEMENT MARKINGS.
- PREFORMED THERMOPLASTIC MATERIAL SHALL BE SUPPLIED BY A MANUFACTURER LISTED ON TxDOT'S MATERIAL PRODUCER LIST (MPL).

JULY 2017

CITY OF SAN ANTONIO

TRANSPORTATION & CAPITAL IMPROVEMENTS DEPARTMENT

TRANSPORTATION SERVICES CONSTRUCTION STANDARDS

TYPICAL CROSSWALK DETAILS

% SUBMITTAL	PROJECT NO.:	DATE: 7.25.17
DRWN. BY: LAN	RVSD. BY: AF	CHKD. BY: GE, PE
SHEET NO.: 55 OF 65		

Diagram illustrating the layout of a turn bay opening with storage length, showing various traffic control markings and dimensions:

- 4" DOUBLE YELLOW WITH TYPE II A-A REFL. MARKERS AT 20' O.C. (TWO ROWS)**: Markings on the left side of the turn bay.
- CONC. CURB**: Concrete curb on the left side.
- 4" SOLID WHITE EDGE LINE**: Marking on the top and bottom edges of the turn bay.
- 8" SOLID WHITE LINE WITH TYPE I-C REFL. MARKERS AT 20' O.C.**: Marking on the right side of the turn bay.
- 1' (MIN.)**: Minimum width dimension for the turn bay opening.
- 80'**: Dimension for the length of the turn bay opening.
- 10' (MIN.)**: Minimum width dimension for the storage length area.
- 4" SOLID WHITE EDGE LINE**: Marking on the bottom edge of the storage length area.
- 4" DOUBLE YELLOW WITH TYPE II A-A REFL. MARKERS AT 20' O.C. (TWO ROWS)**: Markings on the left side of the storage length area.
- TURN BAY OPENING**: The area where the vehicle turns.
- STORAGE LENGTH**: The area where the vehicle is stored.
- MIDDLE OF CORNER RADIUS OR STOP LINE (IF PRESENT)**: Marking on the right side of the storage length area.

MINIMUM STORAGE LENGTH	
POSTED SPEED (MPH)	MINIMUM OPENING (FT)
40 OR LESS	110'
45 OR MORE	150'

DUAL LEFT (RAISED MEDIAN)

4" WHITE DASHED STRIPES WITH TYPE I-C REFL. MARKERS AT 40' O.C.

CONC. CURB

1' (MIN)

4" SOLID WHITE EDGE LINE

RAISED MEDIAN CURB

1' (MIN)

6" BROKEN WHITE LINE (2' LINE - 6' O.C.)

SEE DETAIL "A"

RADIUS PER PLANS, OR AS DIRECTED BY THE ENGINEER

4" SOLID YELLOW EDGE LINE

1' (MIN)

VARIES BASED ON LANE CONFIGURATION

1' (MIN)

BAY TAPER

CONC. CURB

4" SOLID WHITE EDGE LINE

8" SOLID WHITE LINE WITH TYPE I-C REFL. MARKERS AT 20' O.C.

STORAGE LENGTH

MIDDLE OF CORNER RADIUS OR STOP LINE (IF PRESENT)

MINIMUM TURN BAY REVERSE CURVE TAPER LENGTHS

POSTED SPEED (MPH)	DUAL LT LANES (FT)
25-35	150'
40-45	150'
50-55	250'

MINIMUM STORAGE LENGTH

POSTED SPEED (MPH)	MINIMUM LENGTH (FT)
40 OR LESS	110'
45 OR MORE	150'

DETAIL "A"

2' 4' 2'

8" SOLID WHITE LINE WITH TYPE I-C REFL. MARKERS AT 20' O.C.

4" WHITE DASHED STRIPES WITH TYPE I-C REFL. MARKERS AT 40' O.C.

RAISED MEDIAN CURB CONC. CURB

4" SOLID WHITE EDGE LINE

24" WHITE STOP LINE OR CROSSWALK LINE

1' (MIN)

1' (MIN)

1' (MIN)

4" SOLID YELLOW EDGE LINE

4" SOLID WHITE EDGE LINE

1' (MIN)

BAY TAPER

STORAGE LENGTH

MIDDLE OF CORNER RADIUS OR STOP LINE (IF PRESENT)

MINIMUM TURN BAY REVERSE CURVE TAPER LENGTHS	
POSTED SPEED (MPH)	SINGLE LT LANE (FT)
25-35	100'
40-45	100'
50-55	150'

MINIMUM STORAGE LENGTH	
POSTED SPEED (MPH)	MINIMUM LENGTH (FT)
40 OR LESS	110'
45 OR MORE	150'

MINIMUM STORAGE LENGTH	
POSTED SPEED (MPH)	MINIMUM LENGTH (FT)
40 OR LESS	110'
45 OR MORE	150'

- NOTES:
1. THE POSTED SPEED LIMIT IS TYPICALLY EQUAL TO THE DESIGN SPEED MINUS 5 MPH.
 2. THE DIMENSIONS GIVEN FOR DUAL LEFT (RAISED MEDIAN) IN THE MINIMUM LENGTH TABLES ON THIS SHEET ARE ALSO APPLICABLE FOR DUAL RIGHT-TURN LANES.
 3. STORAGE LENGTHS LONGER THAN THE MINIMUMS LISTED ON THIS DRAWING MAY BE DETERMINED USING TRAFFIC ENGINEERING ANALYSIS OR APPROXIMATE CALCULATIONS.
 4. FOR THE PLACEMENT OF PAVEMENT ARROWS AND WORDS SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.
 5. REFER TO APPLICABLE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKINGS.
 6. REFER TO BICYCLE LANE PAVEMENT MARKINGS STANDARD FOR TYPE AND PLACEMENT.
 7. 4" SOLID WHITE AND YELLOW EDGE LINES ARE OPTIONAL AS DIRECTED BY THE CITY TRAFFIC ENGINEER.

DEPARTMENT OF PUBLIC WORKS

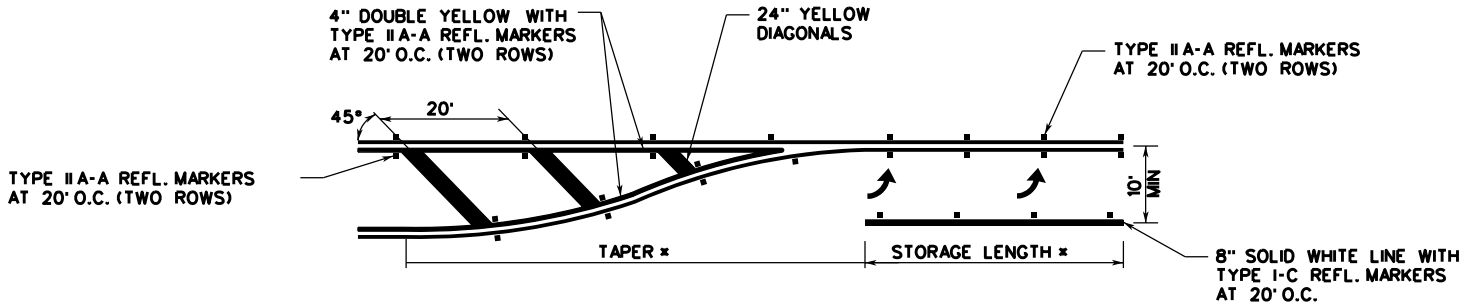
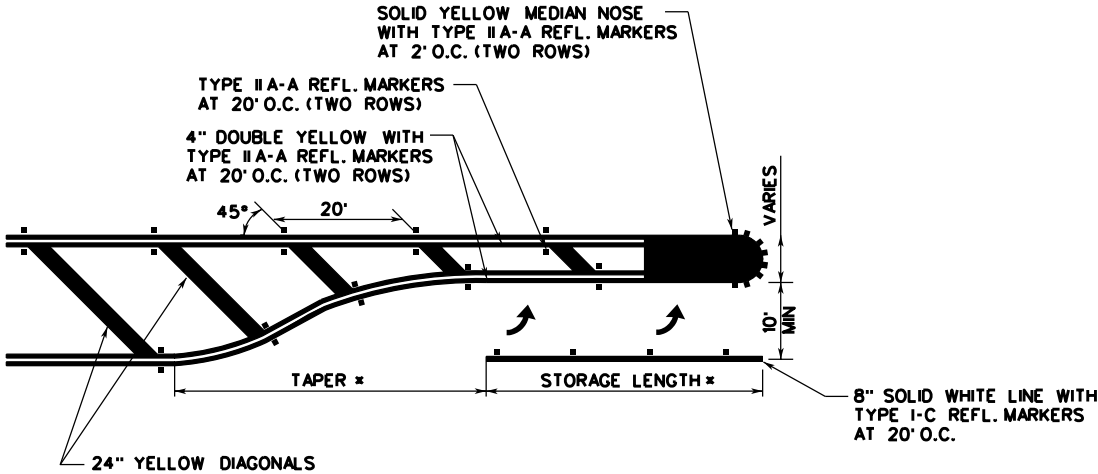
LEFT-TURN LANE & RIGHT-TURN LANE DESIGN WORKSHEET 1

SHEET 10 OF 16

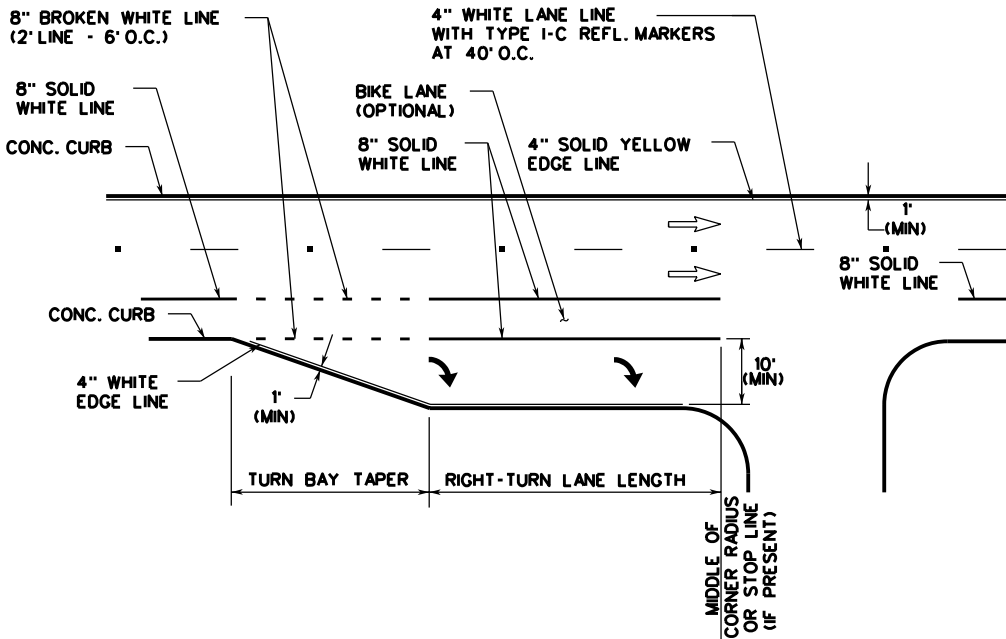
_____% SUBMITTAL		PROJECT NO.: _____		DATE: _____	
DRWN. BY: LAN		DSGN. BY: C.B.V.		CHKD. BY: M.E.	
				SHEET NO.: 56 OF 65	

PAINTED MEDIAN LEFT TURN BAY DETAILS

* - USE MINIMUM TURN BAY REVERSE CURVE TAPER LENGTH AND MINIMUM STORAGE LENGTH TABLES FOR "LEFT-TURN LANE (RAISED MEDIAN)" ON SHEET 10 OF 16.



UNSIGNALIZED RIGHT-TURN LANE



MINIMUM TURN BAY TAPER LENGTH	
POSTED SPEED (MPH)	LENGTH (FT)
30 OR LESS	90'
35 OR MORE	120'

MINIMUM RIGHT-TURN LANE LENGTH	
POSTED SPEED (MPH)	LENGTH (FT)
40 OR LESS	110'
45 OR MORE	150'

NOTES:

1. THE POSTED SPEED LIMIT IS TYPICALLY EQUAL TO THE DESIGN SPEED MINUS 5 MPH.
2. THE DIMENSIONS GIVEN FOR DUAL LEFT (RAISED MEDIAN) IN THE MINIMUM LENGTH TABLES ON THIS SHEET ARE ALSO APPLICABLE FOR DUAL RIGHT-TURN LANES.
3. STORAGE LENGTHS LONGER THAN THE MINIMUMS LISTED ON THIS DRAWING MAY BE DETERMINED USING TRAFFIC ENGINEERING ANALYSIS OR APPROXIMATE CALCULATIONS.
4. FOR THE PLACEMENT OF PAVEMENT ARROWS AND WORDS SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.
5. REFER TO APPLICABLE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKINGS.
6. REFER TO BICYCLE LANE PAVEMENT MARKINGS STANDARD FOR TYPE AND PLACEMENT.
7. 4" SOLID WHITE AND YELLOW EDGE LINES ARE OPTIONAL AS DIRECTED BY THE CITY TRAFFIC ENGINEER.

SEPTEMBER 2009

CITY OF SAN ANTONIO

DEPARTMENT OF PUBLIC WORKS

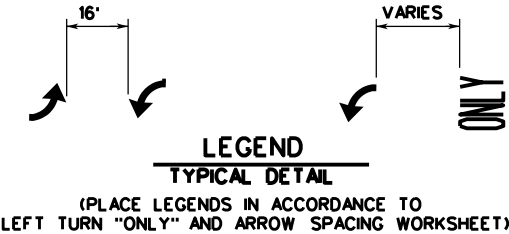
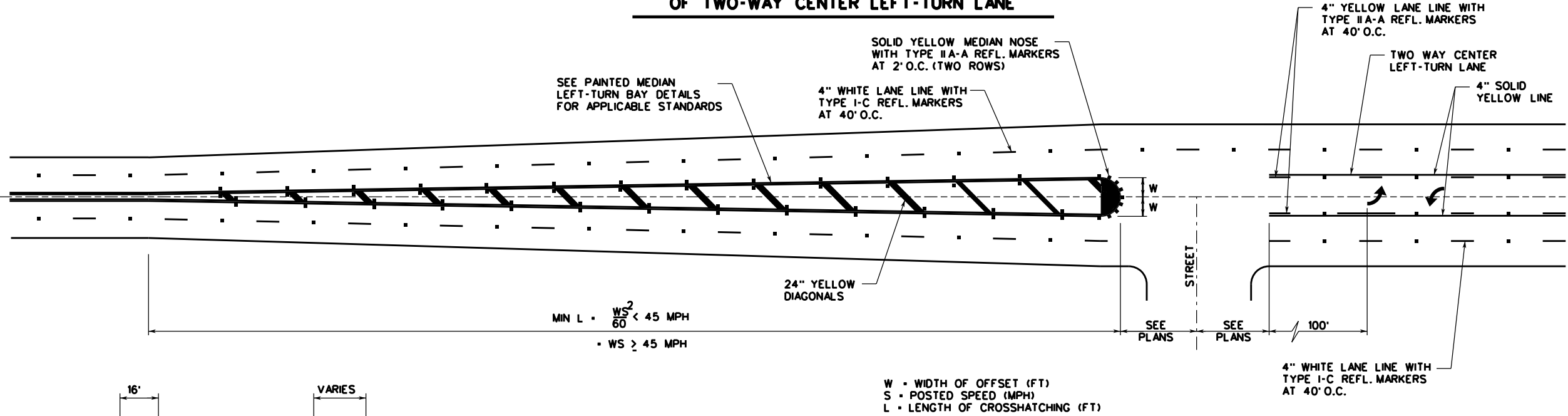
TRAFFIC ENGINEERING STANDARDS

LEFT-TURN LANE & RIGHT-TURN LANE
DESIGN WORKSHEET 2

SHEET 11 OF 16

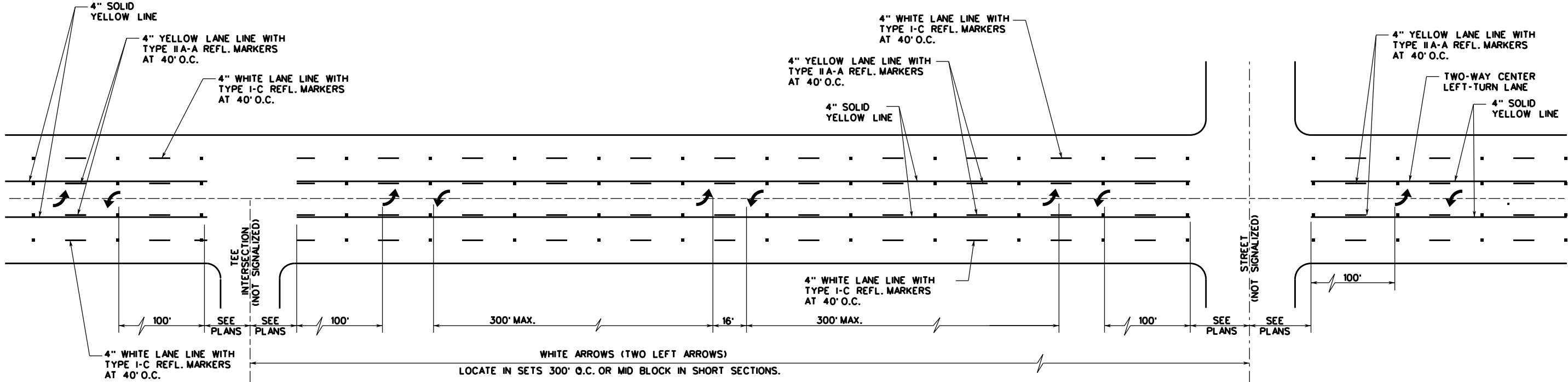
DATE:
PROJECT NO.:
SUBMITTAL:
DRWN. BY:
DSGN. BY:
CHKD. BY:
M.E.
SHEET NO.: 57 OF 63

TYPICAL TRANSITION AT BEGINNING AND END OF TWO-WAY CENTER LEFT-TURN LANE



- NOTE:
1. REFLECTIVE RAISED PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS.
 2. SEE LEFT-TURN & RIGHT-TURN LANE DESIGN WORKSHEET FOR APPLICABLE INFORMATION.
 3. SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.

TWO-WAY LEFT-TURN LANE DETAILS NON-SIGNALIZED INTERSECTIONS

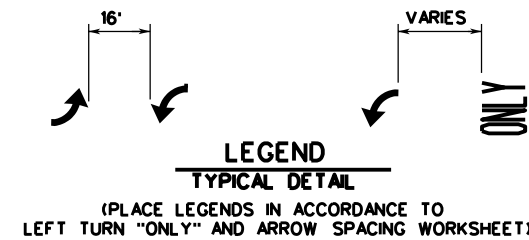
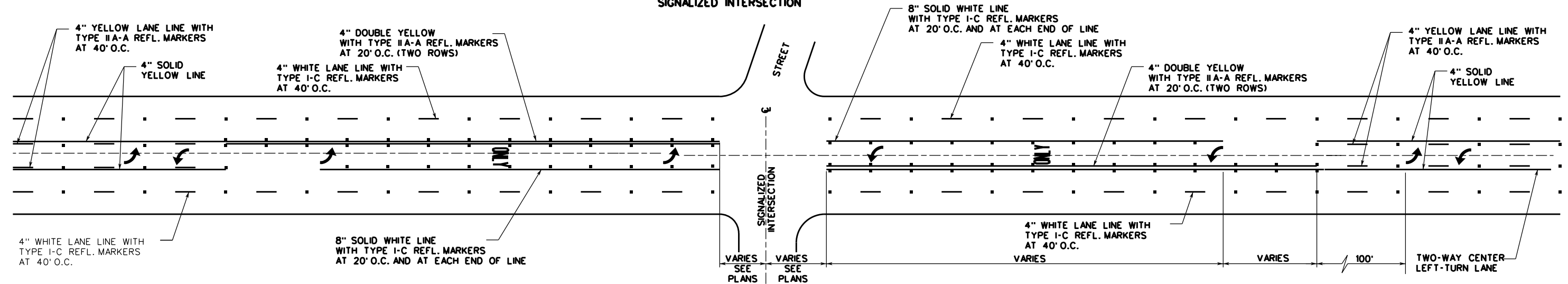


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CITY OF SAN ANTONIO
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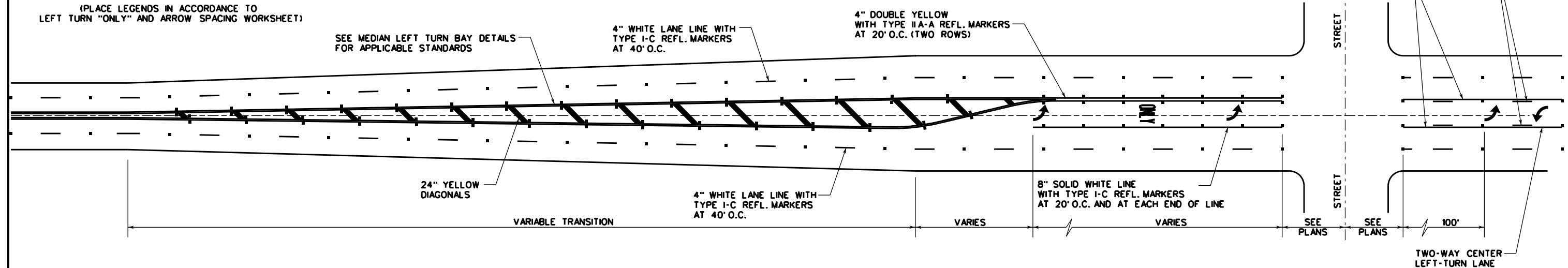
TRAFFIC ENGINEERING STANDARDS
TWO-WAY LEFT-TURN
LANE DETAILS 1
SHEET 12 OF 16

1/4" SUBMITTAL	PROJECT NO.:	DATE:
DRWN. BY: LAN	DSGN. BY: C.B.V.	CHKD. BY: M.E.
SHEET NO.:	58 OF 60	

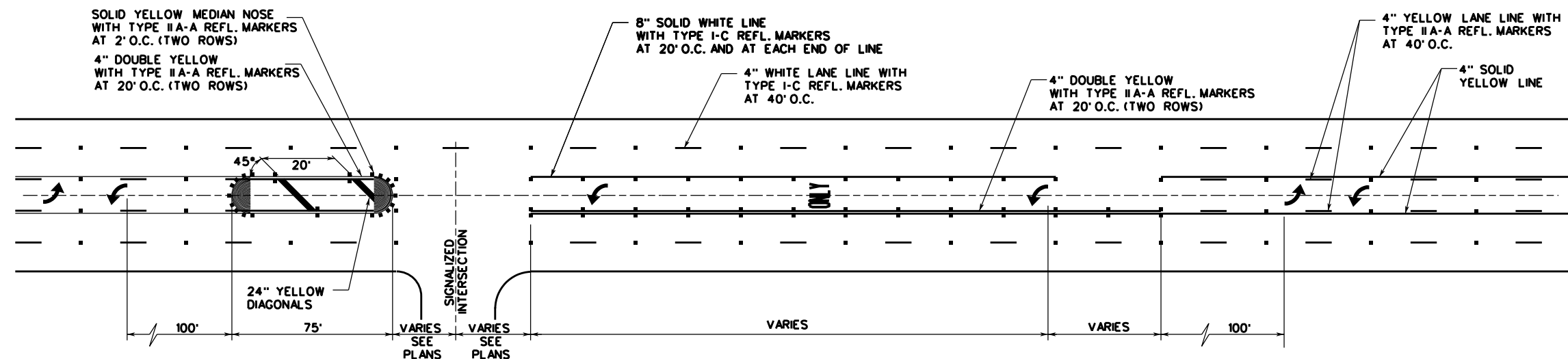
TYPICAL TWO-WAY LEFT-TURN LANE DETAILS SIGNALIZED INTERSECTION



TYPICAL MEDIAN LEFT TURN BAY SIGNALIZED AND NON-SIGNALIZED CROSS STREETS AT BEGINNING AND END OF TWO-WAY CENTER LEFT-TURN LANE



TYPICAL TWO-WAY LEFT-TURN LANE DETAILS SIGNALIZED TEE INTERSECTION



NOTE:

1. REFLECTIVE RAISED PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE AND LEFT-TURN & RIGHT-TURN LANE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS.
2. SEE LEFT-TURN & RIGHT-TURN LANE DESIGN WORKSHEET FOR APPLICABLE INFORMATION.
3. SEE LEFT-TURN "ONLY" AND ARROW SPACING WORKSHEET.

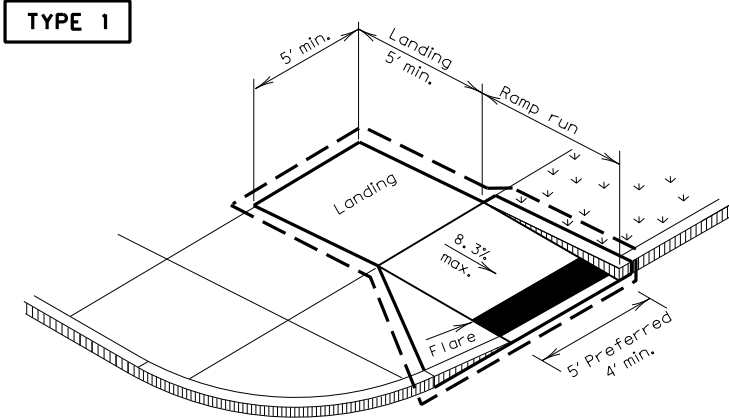
SEPTEMBER 2009
CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

TRAFFIC ENGINEERING STANDARDS
TWO-WAY LEFT-TURN
LANE DETAILS 2
SHEET 13 OF 16

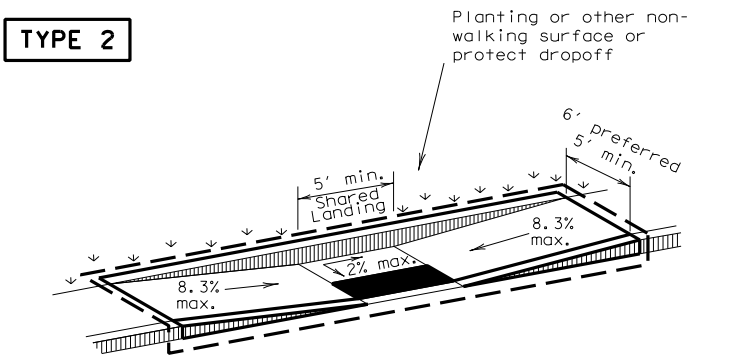
DRWN. BY: LAN	DSGN. BY: C.B.V.	CHKD. BY: M.E.	SHEET NO.: 59 OF 60
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DATE: FILE:

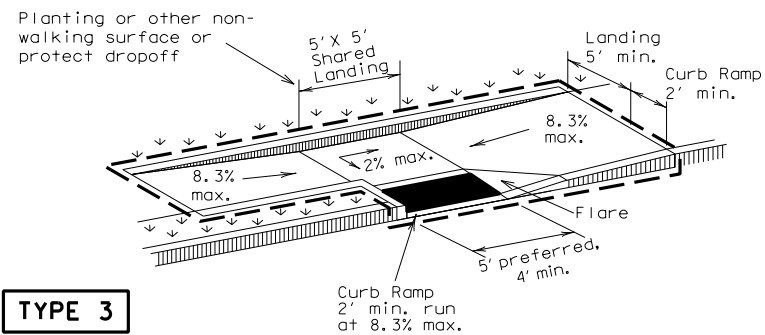


PERPENDICULAR CURB RAMP

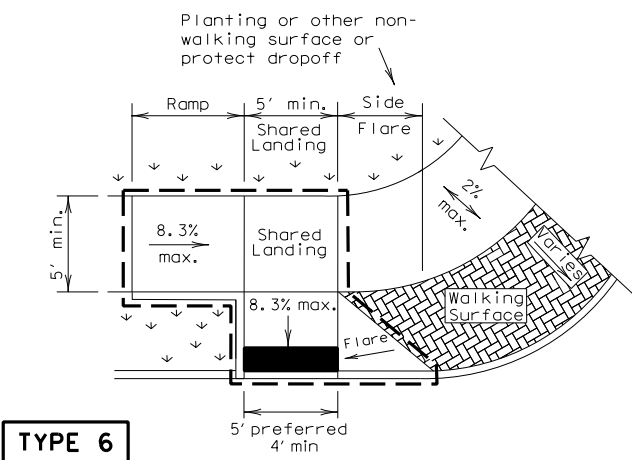


PARALLEL CURB RAMP

(Use only where water will not pond in the landing.)

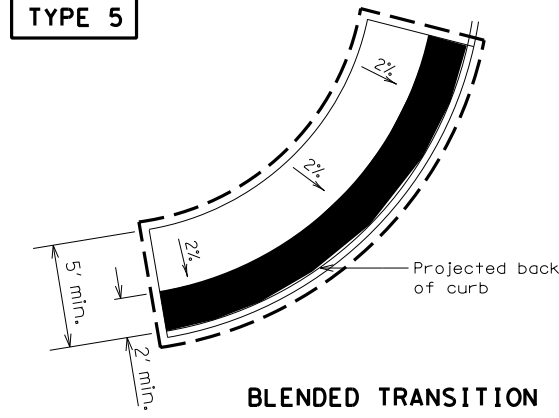


TYPE 3

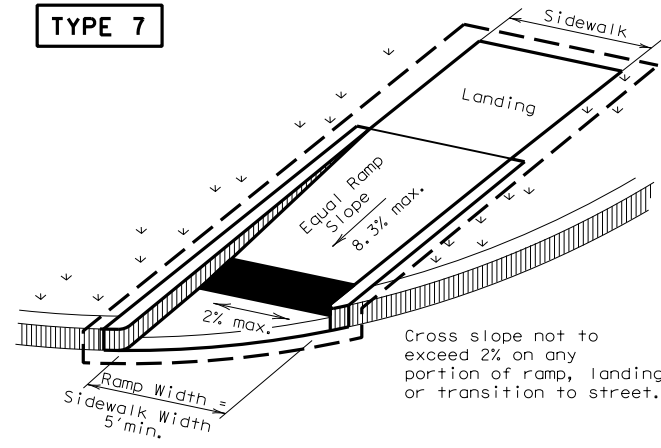


TYPE 6

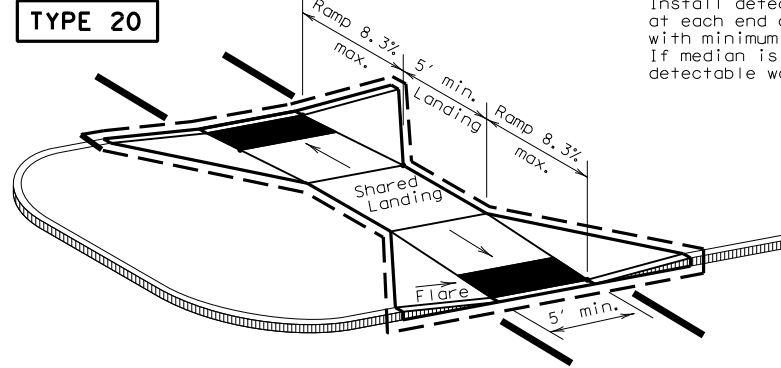
COMBINATION CURB RAMPS



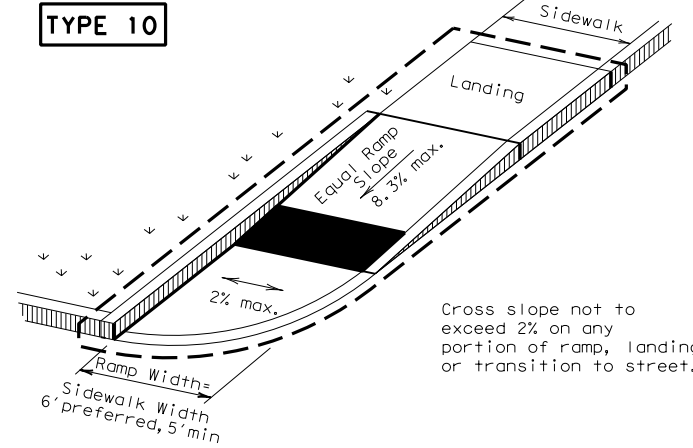
BLENDED TRANSITION



(Sidewalk set back from curb)

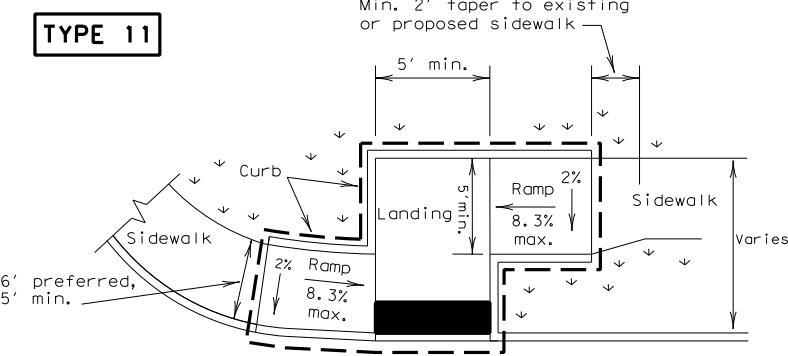


CURB RAMPS AT MEDIAN ISLANDS

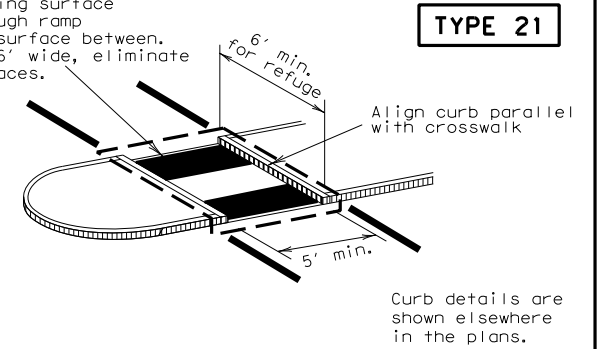


(Sidewalk adjacent to curb)

DIRECTIONAL RAMPS WITHIN RADIUS

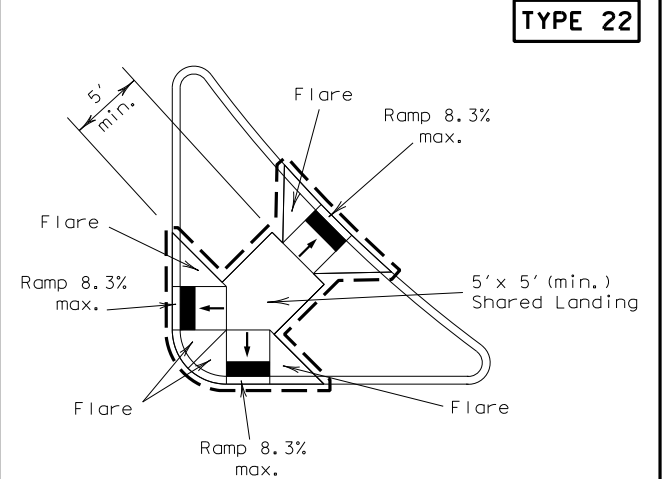


OFFSET PARALLEL CURB RAMP



TYPE 21

Curb details are shown elsewhere in the plans.



TYPE 22

COMBINATION ISLAND RAMPS

NOTES / LEGEND:


See General Notes on sheet 2 of 4 for more information.

Denotes planting or non-walking surface not part of pedestrian circulation path.

Ramp Limits of Payment

Detectable Warning Surface

SHEET 1 OF 4

 <i>Texas Department of Transportation</i>		<i>Design Division Standard</i>	
PEDESTRIAN FACILITIES			
CURB RAMPS			
PED-12A			
FILE: ped12a.dgn	DN: TxDOT	CK: RM	DW: TxDOT
© TxDOT March 2002	CONT	SECT	JOB
REVISIONS			HIGHWAY
VP June 13, 2012	DIST	COUNTY	SHEET NO.
			60

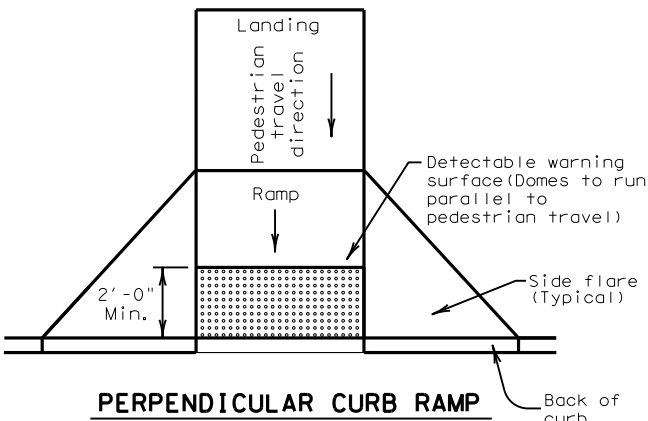
General Notes

Curb Ramps

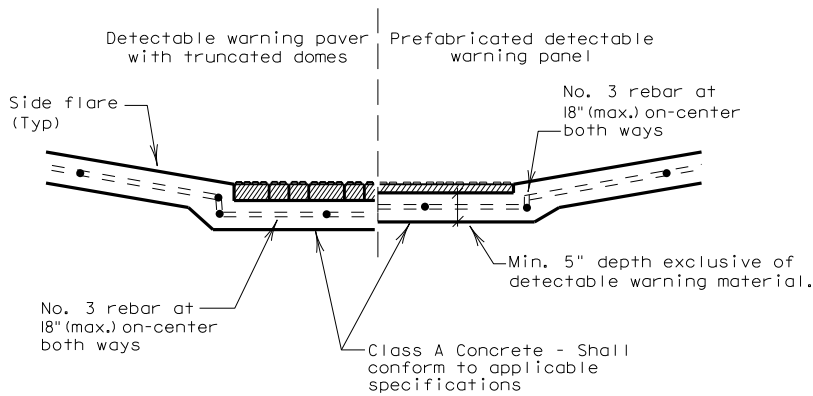
1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Lesser slopes that will still drain properly should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5' x 5' passing areas at intervals not to exceed 200' are required.
4. Landings shall be 5' x 5' minimum with a maximum 2% slope in any direction.
5. Maneuvering space at the bottom of curb ramps shall be a minimum of 4' x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
6. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) and 16 TAC 68.102.
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5' x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Handrails are not required on curb ramps. Provide curb ramps wherever on accessible route crosses (penetrates) a curb.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Provide a smooth transition where the curb ramps connect to the street.
16. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
17. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.

Detectable Warning Material

18. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with Section 705 of the TAS. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
19. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
20. Detectable warning surfaces must be slip resistant and not allow water to accumulate.
21. Detectable warning surfaces shall be a minimum of 24" in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
22. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb. Align the rows of domes to be perpendicular to the grade break between the ramp run and the street. Detectable warning surfaces may be curved along the corner radius.
23. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

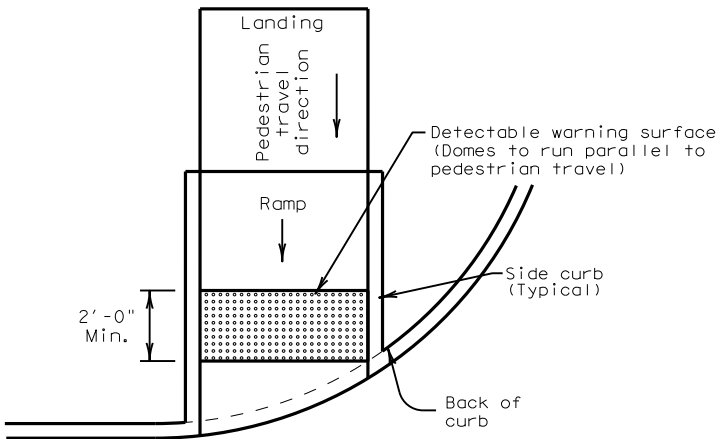


PERPENDICULAR CURB RAMP
Typical placement of detectable warning surface on sloping ramp run.

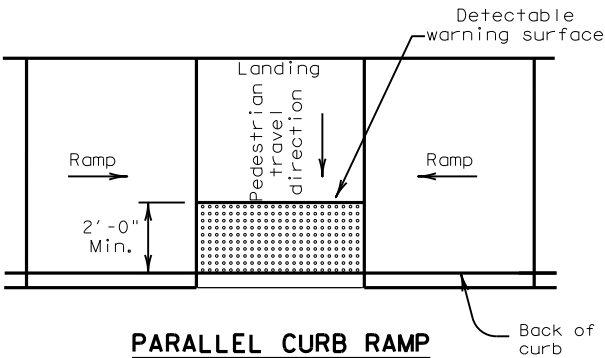


SECTION: CURB RAMP AT DETECTABLE WARNING

DETECTABLE WARNINGS



DIRECTIONAL CURB RAMP
Typical placement of detectable warning surface on sloping ramp run.



PARALLEL CURB RAMP
Typical placement of detectable warning surface on landing at street edge.

Detectable Warning Pavers

24. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
25. Lay full-size units first followed by closure units consisting of at least 25 percent of a full unit. Cut detectable warning paver units using a power saw.

Sidewalks

26. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within one or more reach ranges specified in TAS 308.
27. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
28. Street grades and cross slopes shall be as shown elsewhere in the plans.
29. Changes in level greater than 1/4 inch are not permitted.
30. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than 5% must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with TAS 505.
31. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
32. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
33. Sidewalk details are shown elsewhere in the plans.

SHEET 2 OF 4



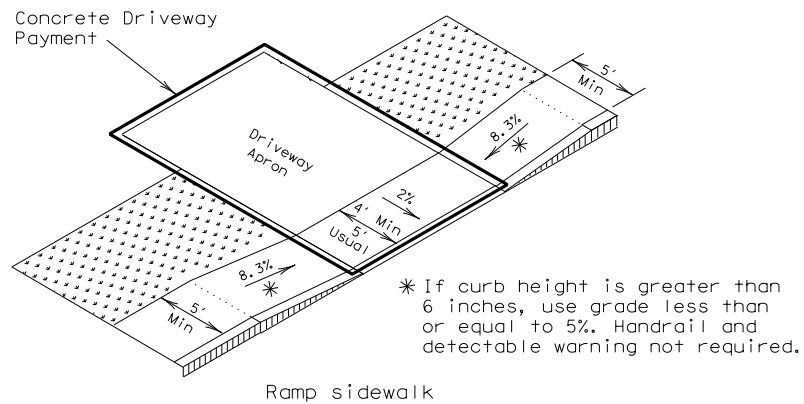
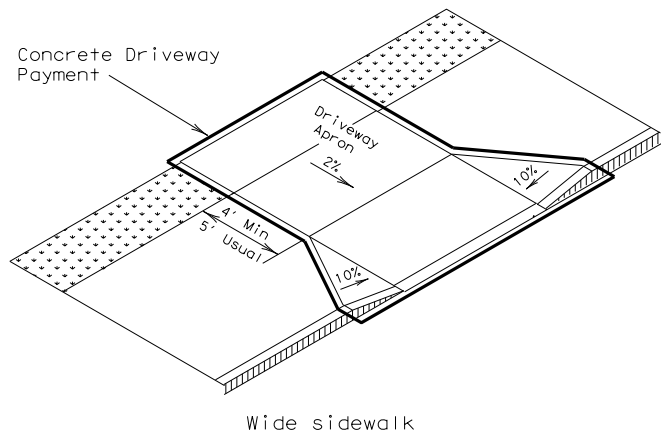
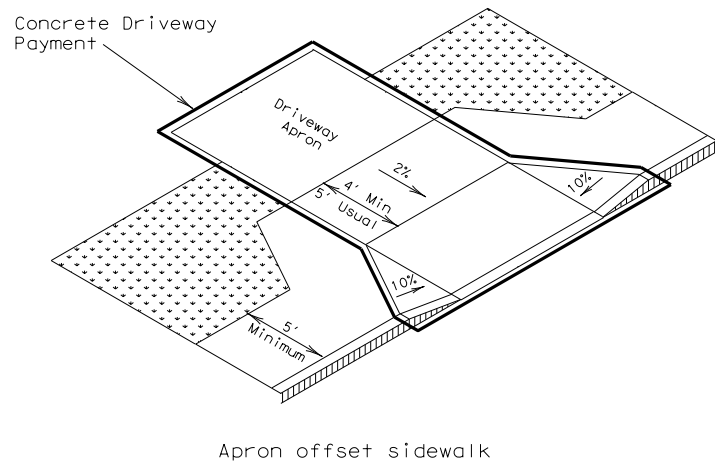
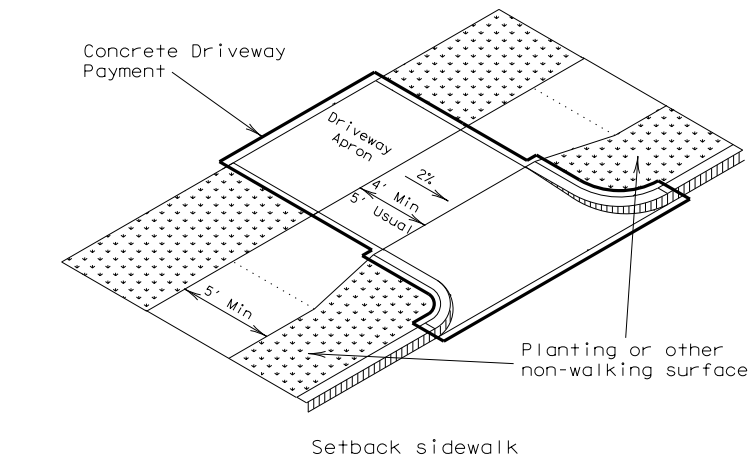
PEDESTRIAN FACILITIES
CURB RAMPS

PED-12A

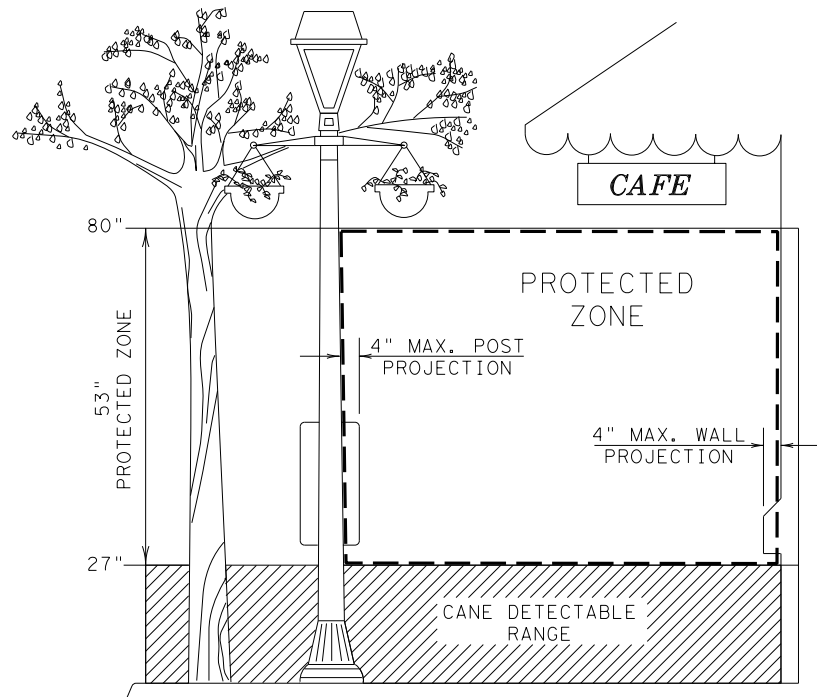
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© TxDOT March 2002	CONT	SECT	JOB	HIGHWAY
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VP June 13, 2012	DIST	COUNTY		SHEET NO.
				61

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DATE:
FILE:

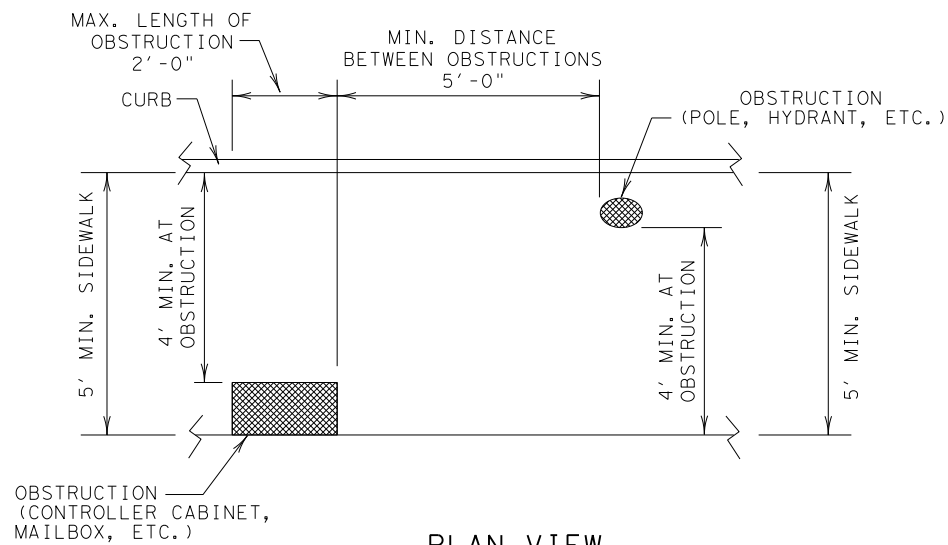


SIDEWALK TREATMENT AT DRIVEWAYS



PROTECTED ZONE

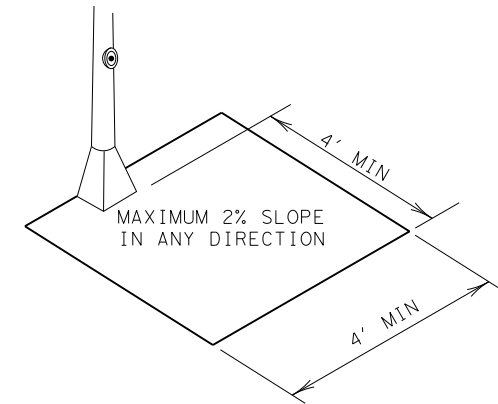
In pedestrian circulation area, maximum 4" projection for post or wall mounted objects between 27" and 80" above the surface.



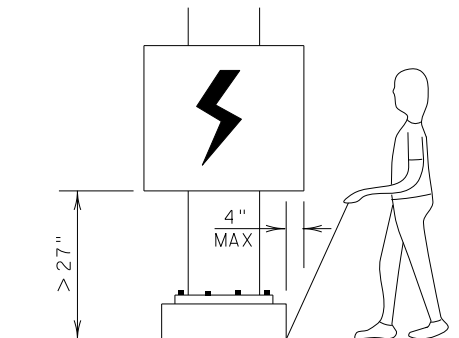
PLAN VIEW

PLACEMENT OF STREET FIXTURES

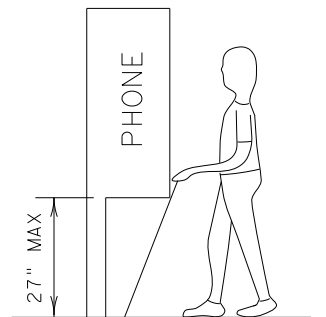
(ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' x 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.)



CLEAR GROUND SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



When an obstruction of a height greater than 27" from the surface would create a protrusion of more than 4" into the pedestrian circulation area, construct additional curb or foundation at the bottom to provide a maximum 4" overhang.



Protruding objects of a height $\leq 27"$ are detectable by cane and do not require additional treatment.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

SHEET 3 OF 4



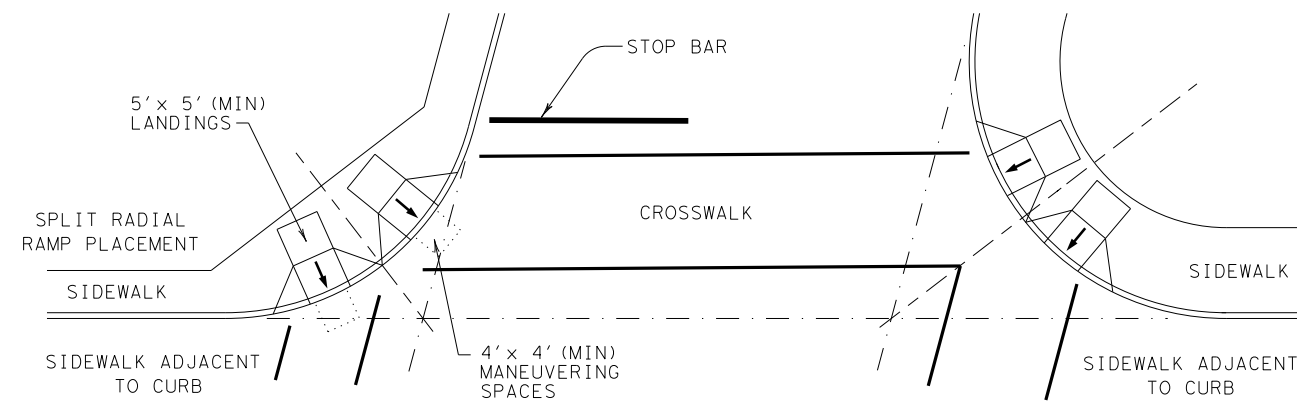
Design
Division
Standard

PEDESTRIAN FACILITIES
CURB RAMPS

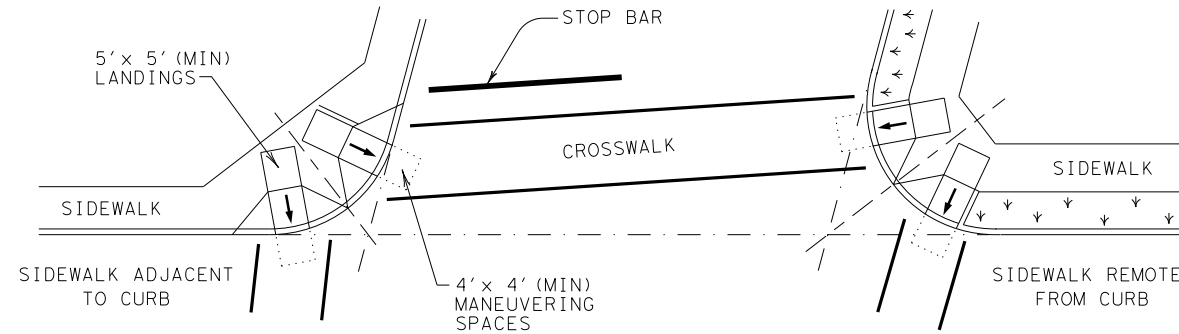
PED-12A

FILE: ped12a.dgn	DN: TxDOT	CK: RM	DW: TxDOT	CK: VP
© TxDOT March 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
VP June 13, 2012	DIST		COUNTY	SHEET NO.
				62

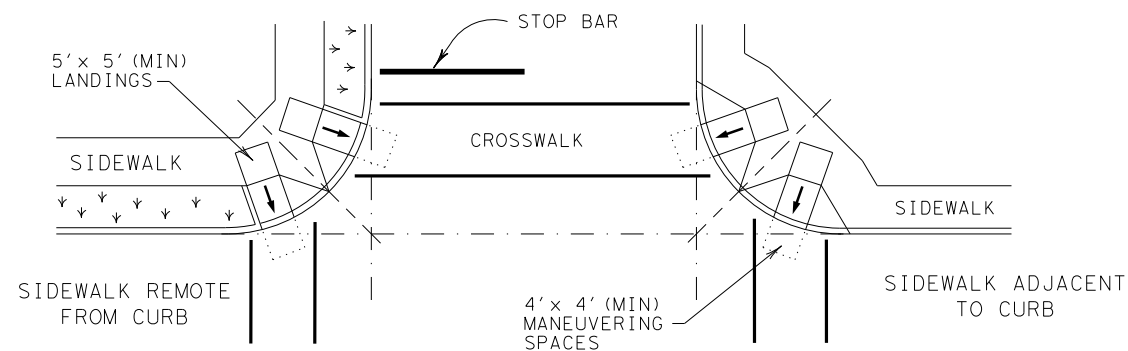
DATE:
FILE:



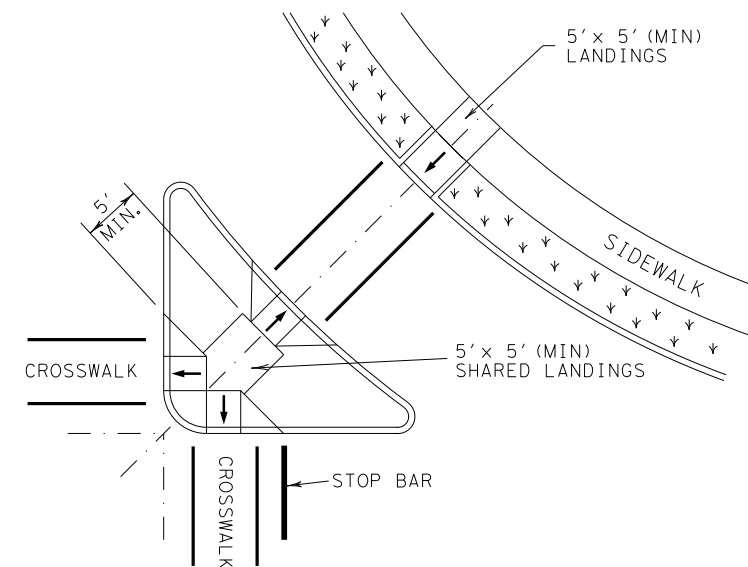
SKewed INTERSECTION WITH "LARGE" RADIUS



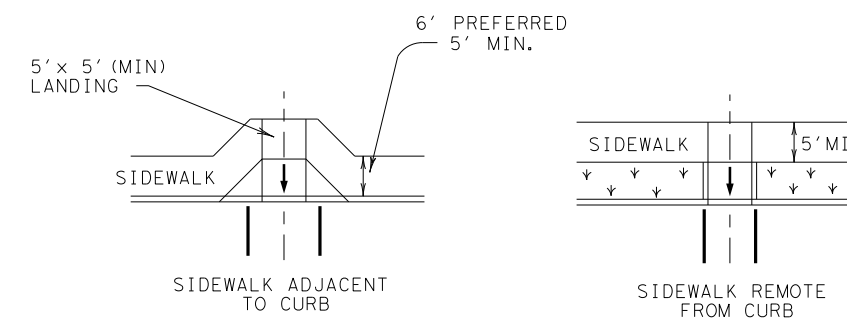
SKewed Intersection with "Small" Radius



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

SHEET 4 OF 4



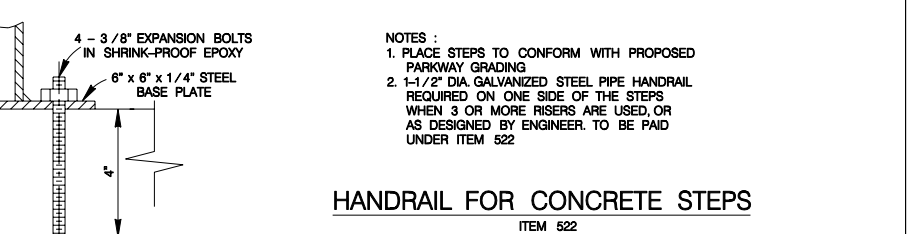
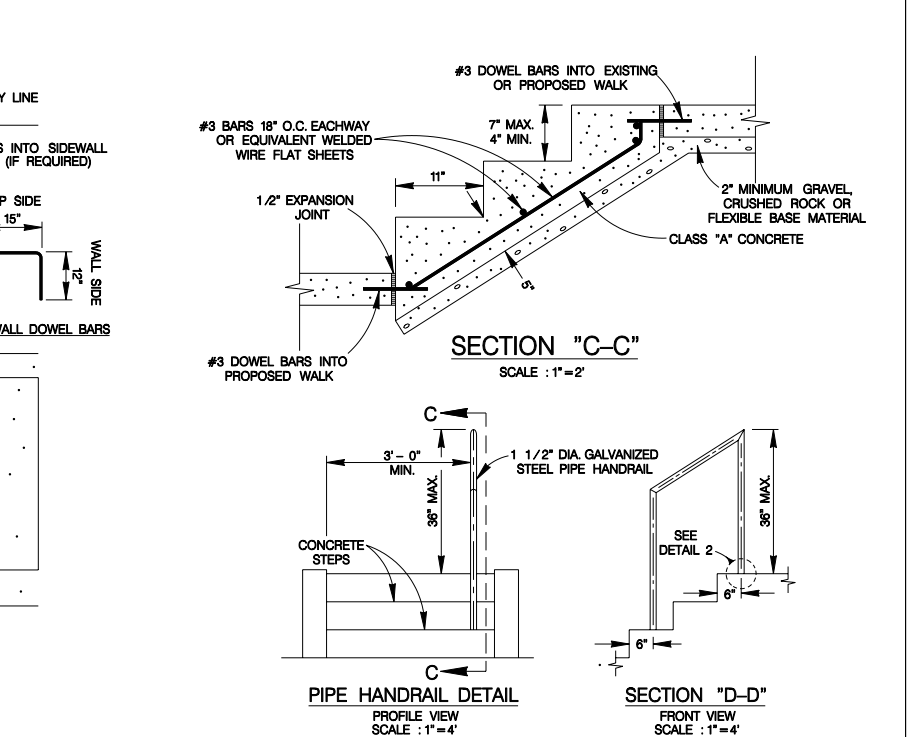
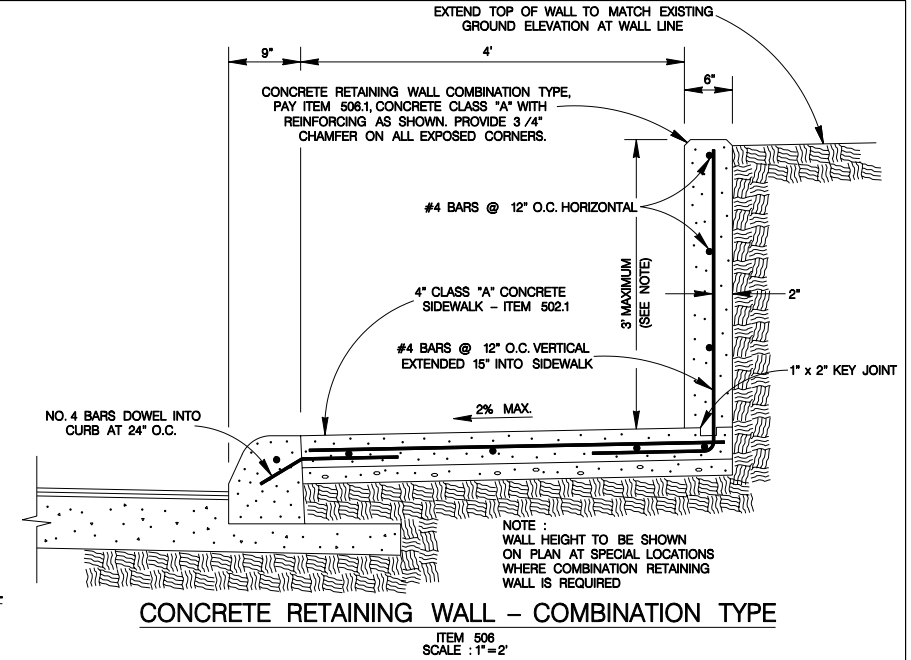
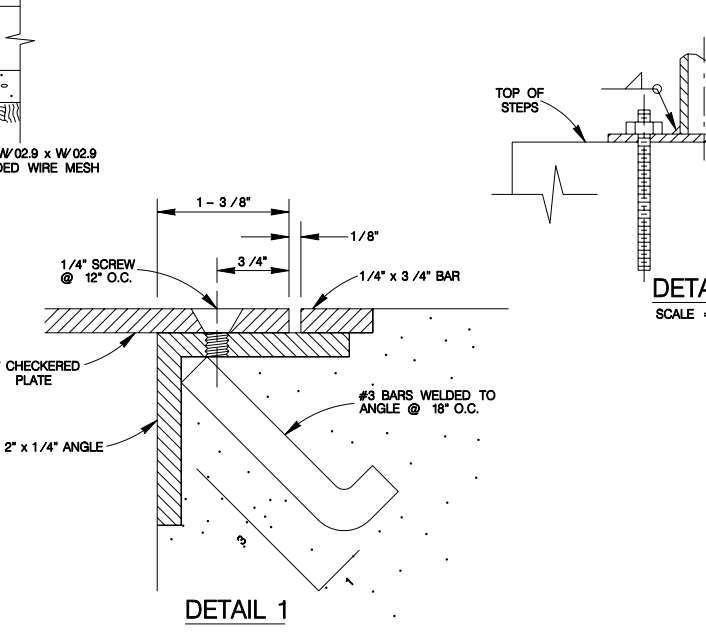
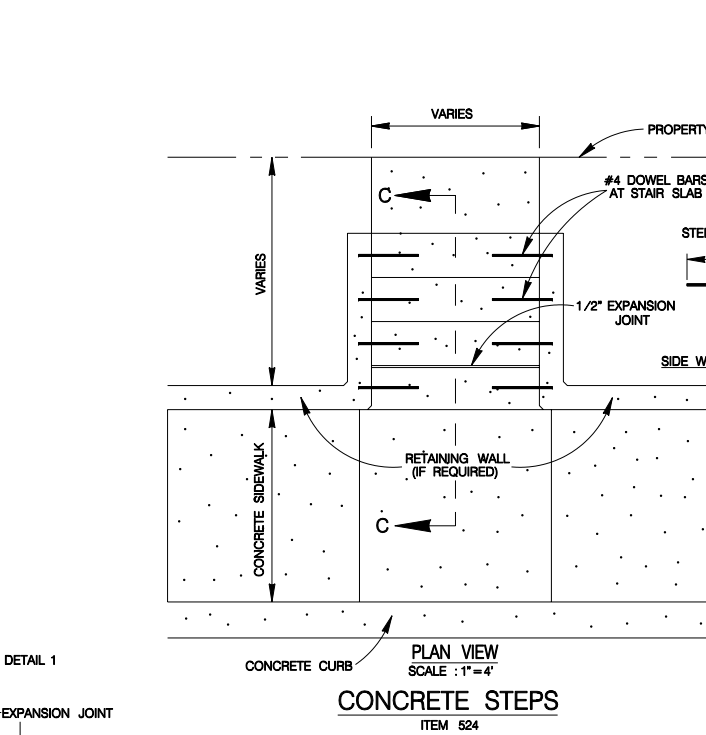
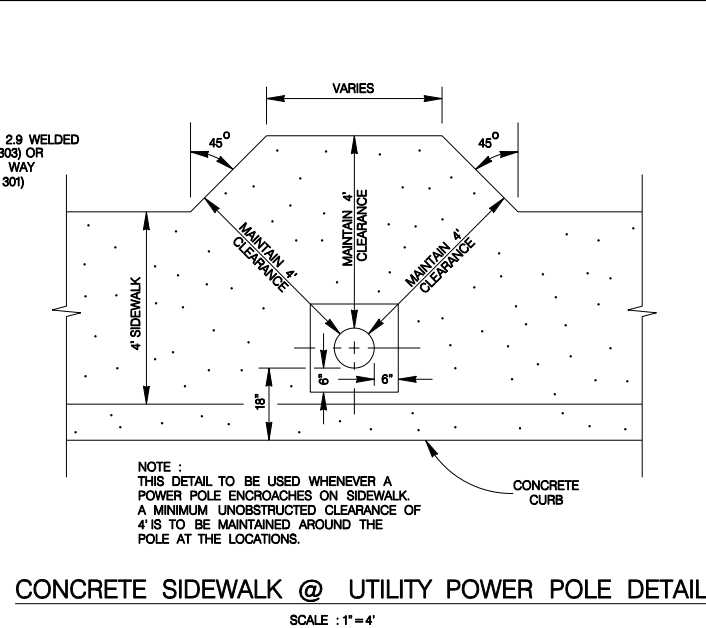
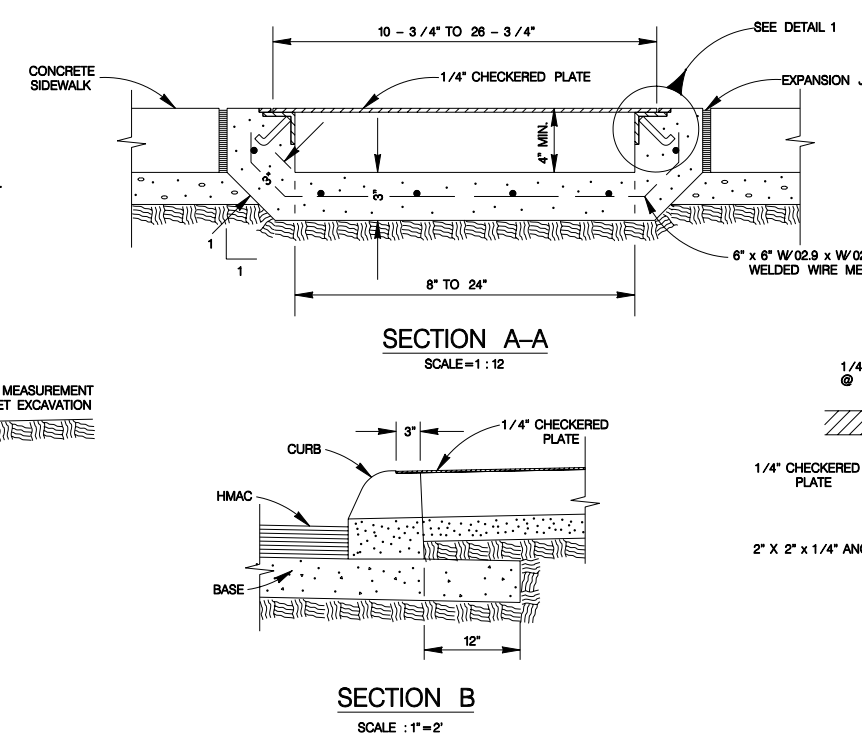
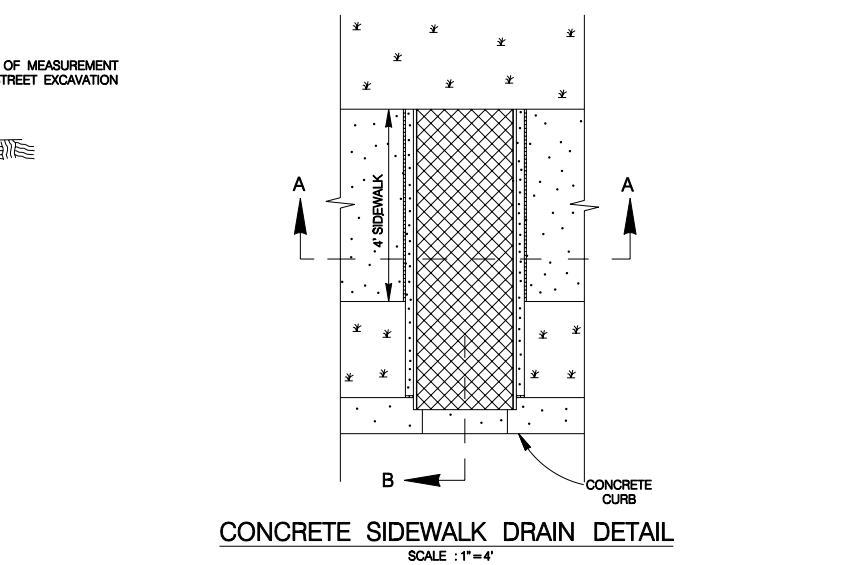
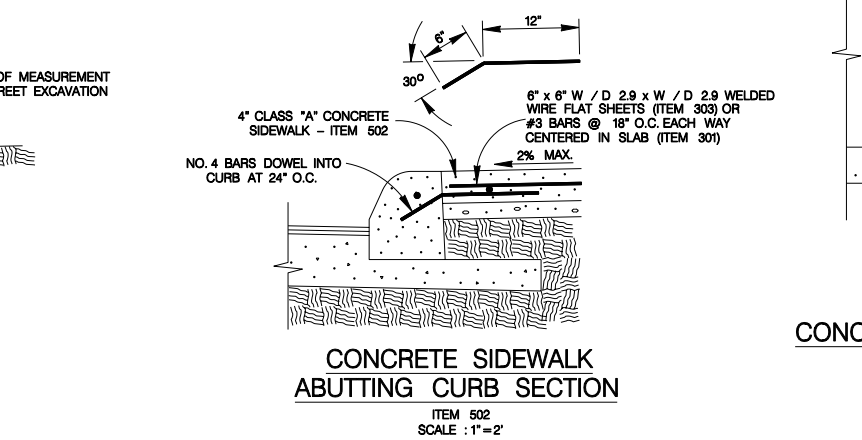
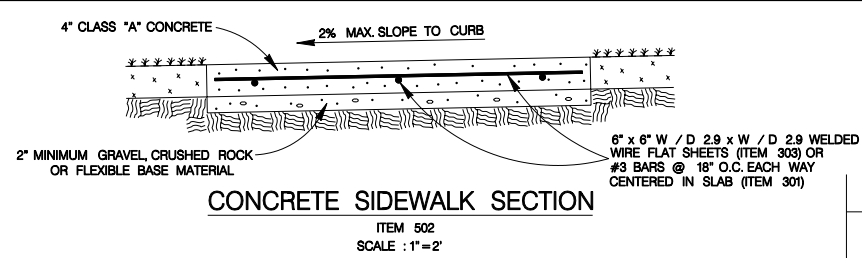
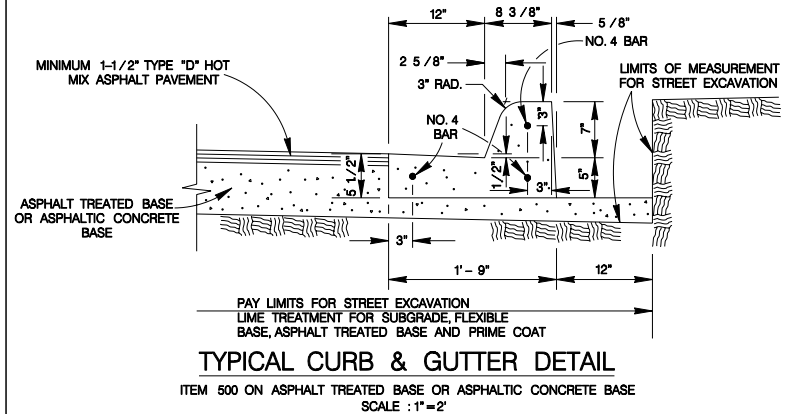
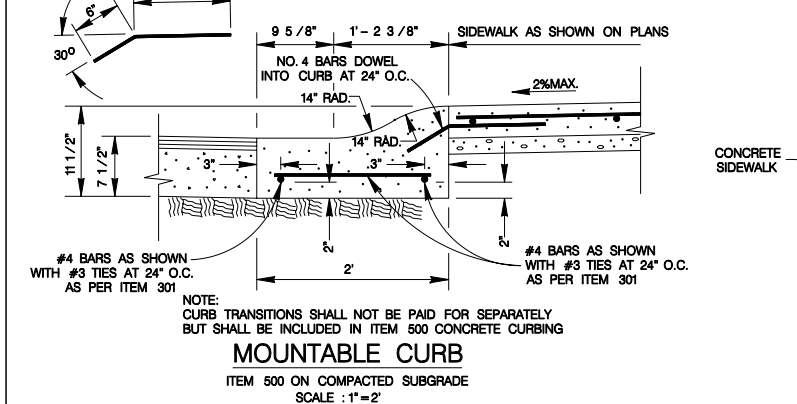
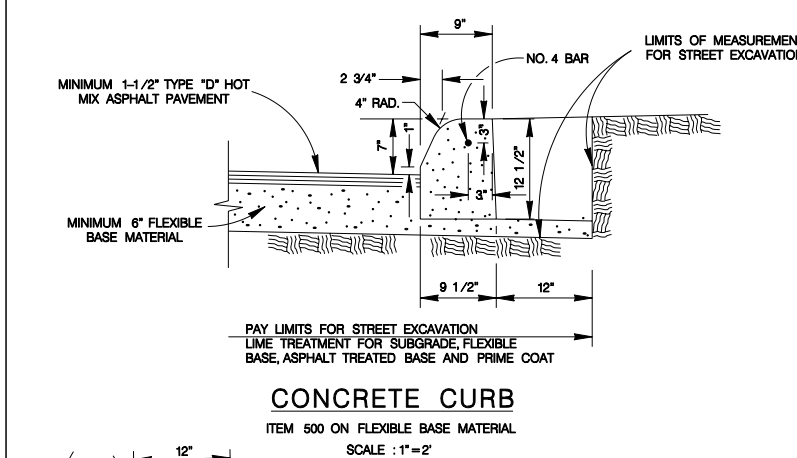
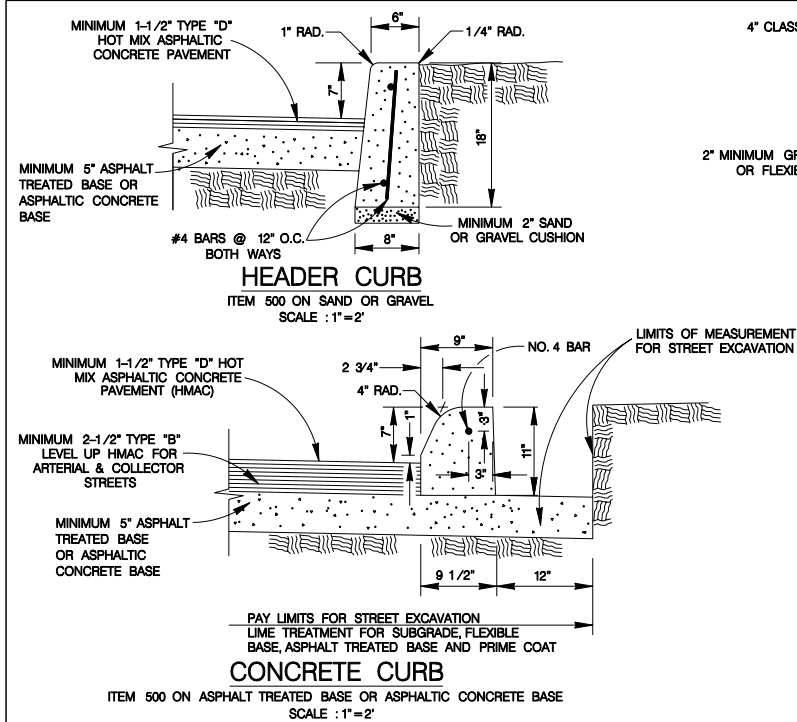
**Design
Division
Standard**

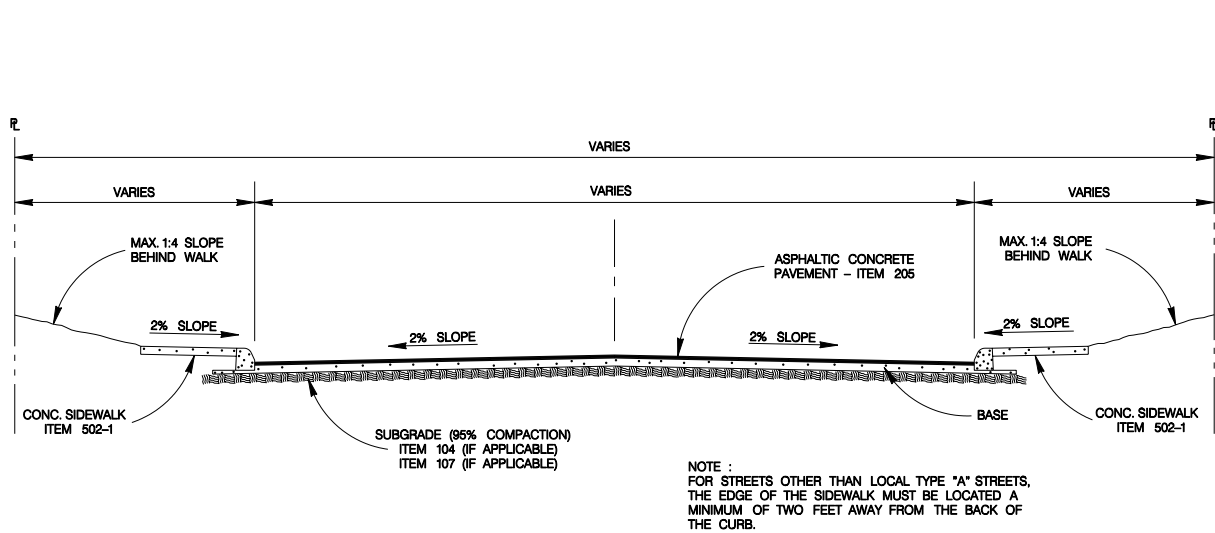
PEDESTRIAN FACILITIES

CURB RAMPS

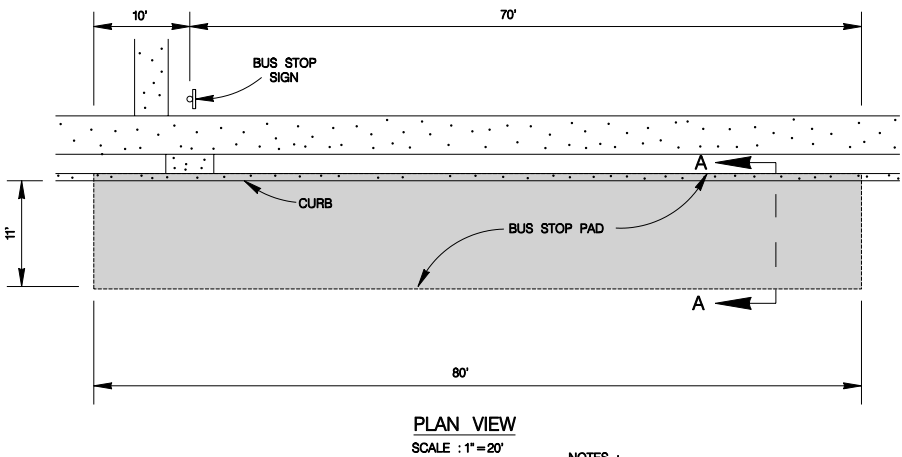
PED-12A

FILE: ped12a.dgn	DN: TxDOT		CK: RM	DW: TxDOT	CK: VP
Ⓒ TxDOT March 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
VP June 13, 2012	DIST	COUNTY			SHEET NO.
					63



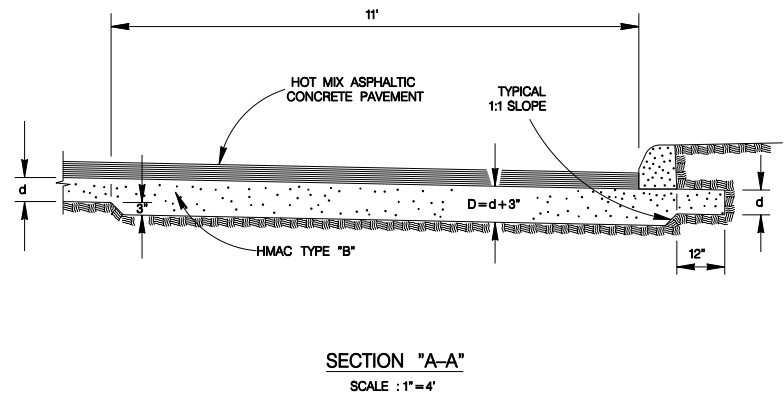


TYPICAL STREET SECTION
SCALE : 1"=8'

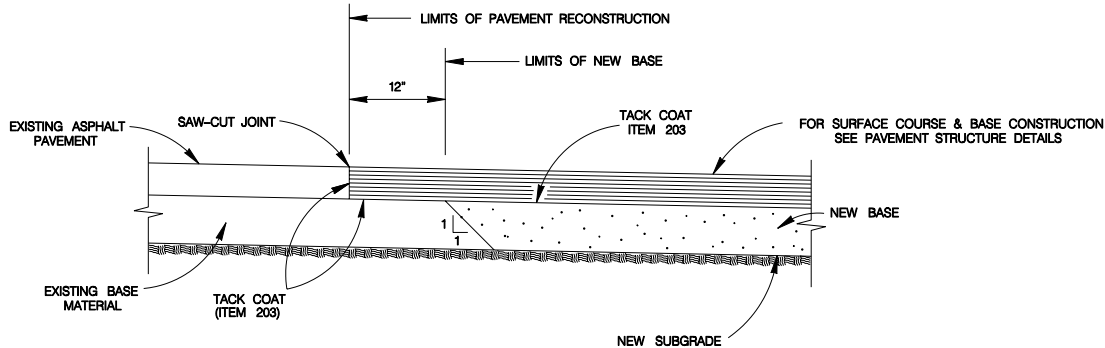


PLAN VIEW
SCALE : 1"=20'

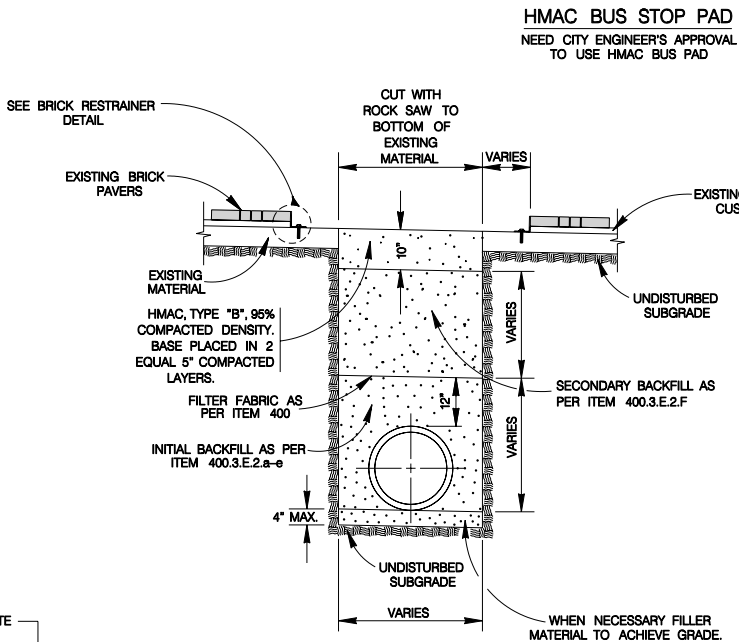
- NOTES :
- EXCAVATION FOR THICKENED PAVEMENT SECTION WILL BE PAID UNDER ITEM NO.104 "STREET EXCAVATION".
 - BASE MATERIALS :
 - A) IF THE MEASUREMENT FOR THE HMAC MATERIAL IS PER TON, THICKENED PAVEMENT SECTION WILL BE PAID FOR UNDER ITEM NO.205, TYPE "B" - PER TON.
 - B) IF THE MEASUREMENT FOR THE HMAC MATERIAL IS PER SQUARE YARD, NO EXTRA PAYMENT WILL BE MADE FOR THE THICKENED PAVEMENT.



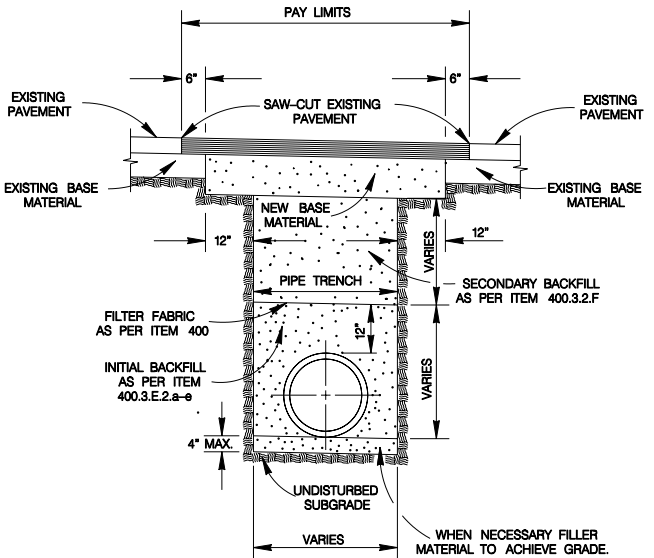
SECTION "A-A"
SCALE : 1"=4'



PAVEMENT JUNCTION DETAILS
SCALE : 1"=2'

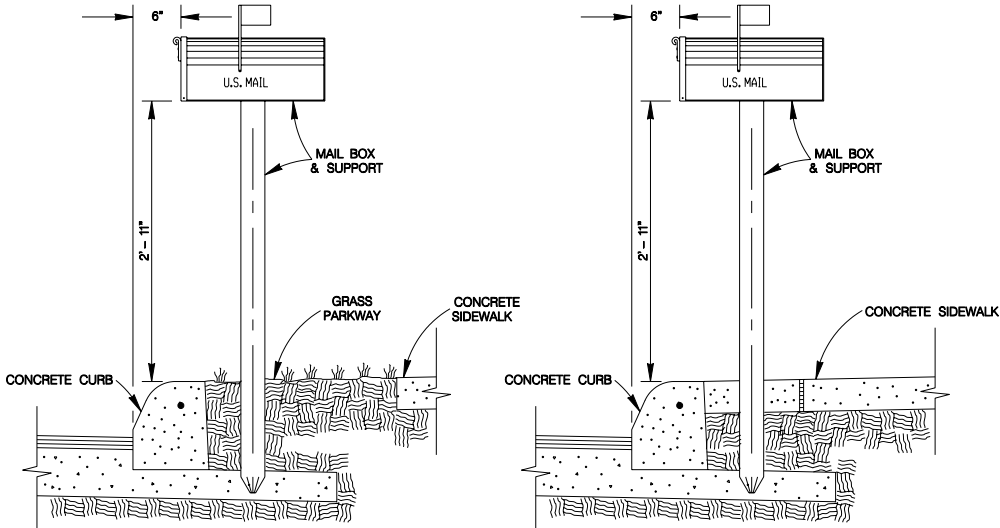


TYPICAL BASE REPLACEMENT FOR
BRICK SURFACED STREET SECTION
ITEM 511.3
SCALE : 1"=4'



- NOTES :
- FOR LOCAL TYPE "A" & "B" STREETS (RESIDENTIAL) USE 6" ASPHALT CONCRETE BASE TYPE "B" WITH 1-1/2" TYPE "D" HOT MIX ASPHALTIC CONCRETE PAVEMENT.
 - FOR ARTERIAL & SECONDARY STREETS (COMMERCIAL) USE 12.5" TYPE "B" HOT MIX ASPHALTIC CONCRETE PAVEMENT LEVELING-UP COURSE & 1-1/2" TYPE "D" HOT MIX ASPHALTIC CONCRETE PAVEMENT SURFACE COURSE.

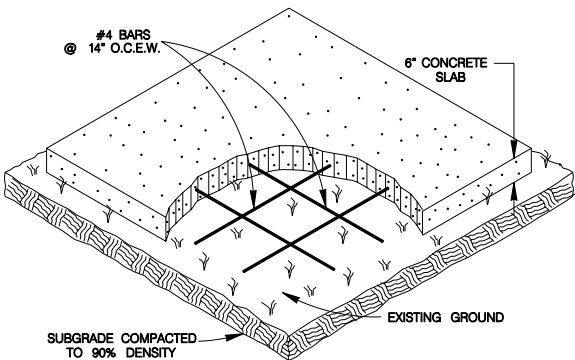
TYPICAL PAVEMENT REPLACEMENT
ITEM 511
SCALE : 1"=4'



MAIL BOX PERPENDICULAR TO CURB
WHEN SIDEWALK IS DETACHED FROM CURB
SCALE : 1"=2'

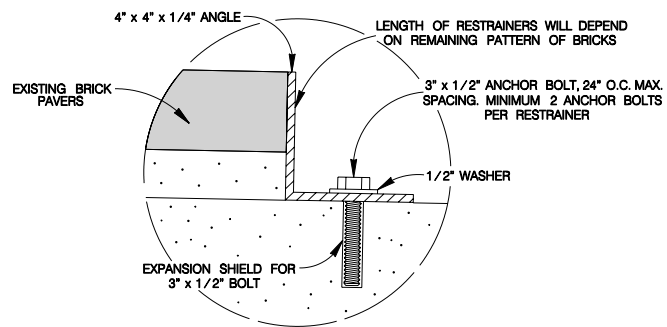
MAIL BOX PERPENDICULAR TO CURB
WHEN SIDEWALK IS ATTACHED TO CURB
SCALE : 1"=2'

MAIL BOX LOCATION
ITEM 513.1



- MAIL BOX PAD NOTES :
- THE CONTRACTOR WILL CONSTRUCT SLABS FOR "TEMPORARY MAIL BOX COLLECTION PAD" FOR THE UNITED STATES POSTAL SERVICE WITH LOCATIONS AND SIZES SPECIFIED BY THE CITY ENGINEER DURING CONSTRUCTION.
 - THE CONSTRUCTION OF SLABS SHALL CONFORM TO ITEM 513 "REMOVING AND RELOCATING MAILBOXES".
 - PAYMENT WILL BE MADE UNDER ITEM 513.2 "COMMUNITY MAILBOX SLAB - PER SQUARE YARD".
 - UNIT PRICE WILL INCLUDE REMOVAL OF "TEMPORARY MAIL BOX COLLECTION PAD" SLABS AT THE END OF THE PROJECT. NO SEPARATE PAY ITEM.

COMMUNITY
MAIL BOX SLAB
ITEM 513.2
SCALE : 1"=4'



BRICK RESTRAINER DETAIL
SCALE = 1:6

FEBRUARY 2010
CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT
MISCELLANEOUS
CONSTRUCTION STANDARDS II