

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH359, ETC.
DIST	COUNTY		SHEET NO.
16	JIM WELLS, ETC.		1

# STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

## PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

STATE PROJECT NO. C 87-2-59 & C 1052-3-32

## SH 359 & FM 666 JIM WELLS & SAN PATRICIO COUNTIES

NET LENGTH OF PROJECT 0087-02-059 = 3,608 FT. = 0.68 MI.  
NET LENGTH OF PROJECT 1052-03-032 = 3,957 FT. = 0.749 MI.

### INSTALLATION OF HAWK SIGNALS

LIMITS: SH 359 - 1,000 FT WEST OF WENDT ST TO 600 FT EAST OF W MENDOZA AVE (LENGTH = 3,608 FT, 0.68 MI)  
FM 666 - 1,000 FT WEST OF LAMAR ST TO 0.56 MI EAST OF LAMAR ST (LENGTH = 3,957 FT, 0.749 MI)

FOR THE CONSTRUCTION OF CONSTRUCT PEDESTRIAN INFRASTRUCTURE  
CONSISTING OF INSTALLATION PHB (HAWK SYSTEM), REFRESH PAVEMENT MARKINGS AND SIGNS  
RELATIVE TO THE HAWK SYSTEM AND INSTALL SIDEWALKS, RAMPS AND CONCRETE MEDIANS.

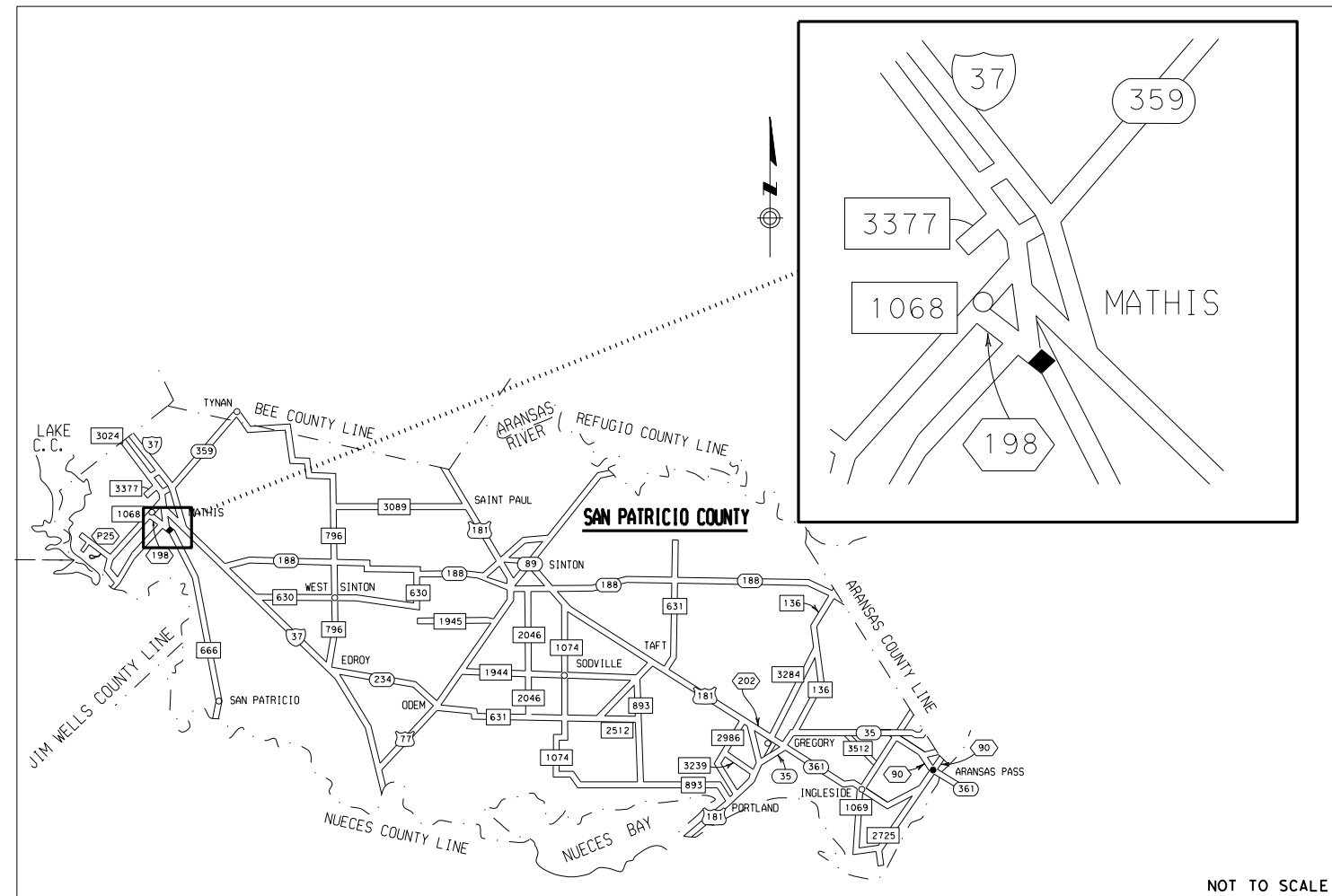
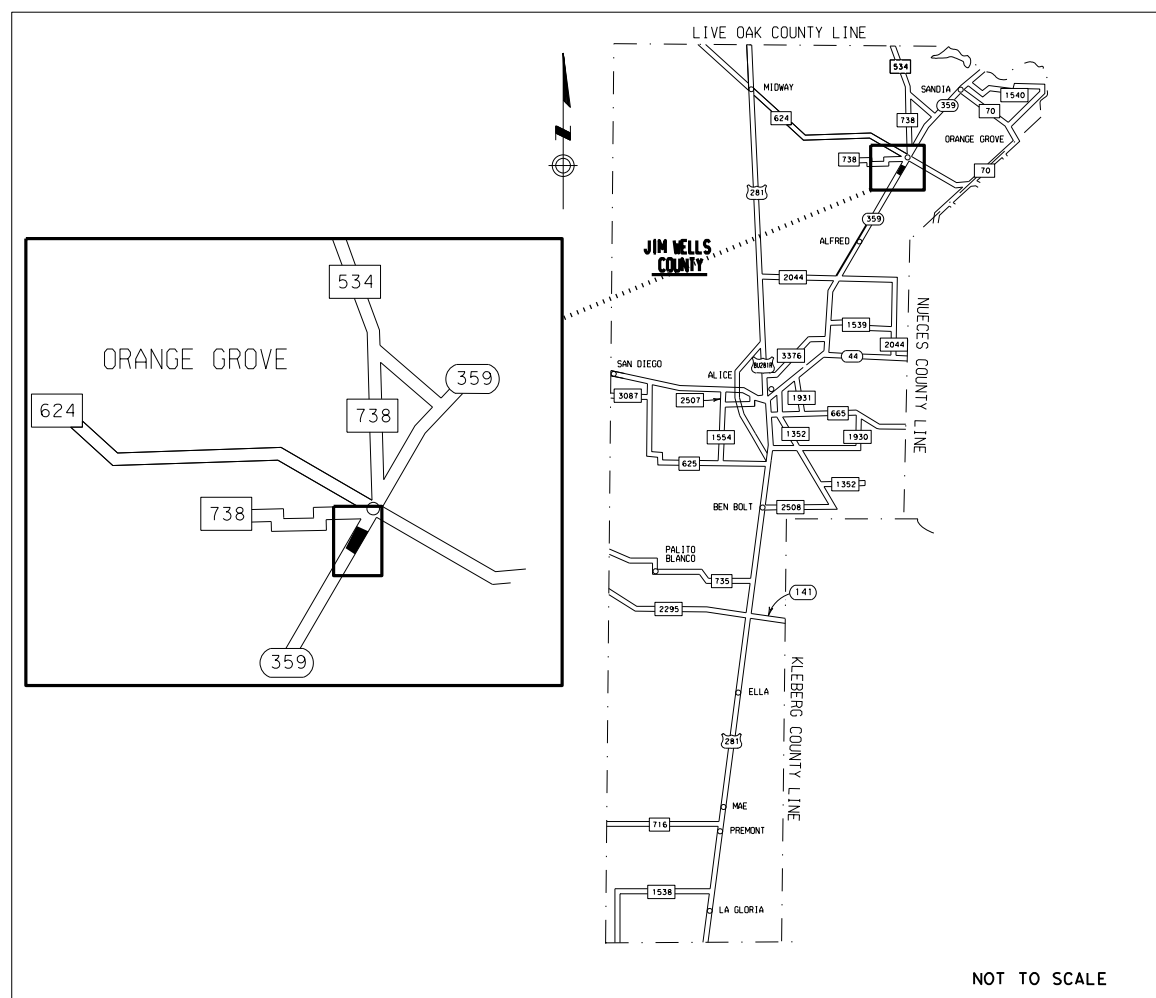
DESIGN SPEED - 40 MPH

DESIGN GUIDELINES

FUNCTIONAL CLASSIFICATION

TRAFFIC DATA		
EXIST ADT,	2022	7,051
PERCENT TRUCKS IN ADT		634.60

RAS REVIEW REQUIRED  
TDLR #



EXCEPTIONS: NONE  
EQUATIONS: NONE  
RAILROAD CROSSINGS: UNION PACIFIC RAILROAD AFFECTED:  
\* DOT # 4355835 @ RRMP 114.050 AT GRADE ON LAMAR ST - - CORPUS CHRISTI DIVISION

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION,  
NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AS FOLLOWS,  
SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE  
PROJECTS: SP000---008



APPROVED FOR LETTING: 4/9/2024

DocuSigned by:  
*Valente Alvarez*  
303F64E8A9B44E0  
DISTRICT ENGINEER

RECOMMENDED FOR LETTING: 4/8/2024

DocuSigned by:  
*Paula Sales-Evans, P.E.*  
5975450A19CC435  
DISTRICT DIRECTOR OF TRANSPORTATION  
PLANNING AND DEVELOPMENT

DATE: 4/7/2024 6:37:16 PM  
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# INDEX OF SHEETS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
	<u>GENERAL</u>
1	TITLE SHEET
2	INDEX OF SHEETS
3	GENERAL NOTES
4	ESTIMATE & QUANTITY
5	MISCELLANEOUS CONCRETE & REMOVAL ITEMS SUMMARY
6	SURFACE DETAIL & REMOVAL SUMMARY
7	SIGN MOUNTING & REMOVAL SUMMARY
8	TRAFFIC SIGNAL ITEMS SUMMARY
9	SW3P SUMMARY
	<u>TRAFFIC CONTROL PLAN</u>
10	SEQUENCE OF CONSTRUCTION
11-22	*BC (1) - 21 THRU BC (12) - 21
23-24	*WZ (BTS-1)-13 THRU WZ (BTS-2)-13
25	*WZ (RS)-22
26-27	*TCP (1-1)-18 AND TCP (1-4)-18
28	*TCP (2-4)-18
29-31	*TCP (3-1)-13, (3-3)-14 AND (3-4)-13
32	*TCP (7-1)-13
33-36	TCP (5-1 AND 5-2)-08A, TCP (5-2C)-10, AND TCP (5-3)-08
	<u>ROADWAY ITEMS</u>
37-38	CONCRETE REMOVAL LAYOUT SHEETS
39-41	CONCRETE MEDIAN & MISCELLANEOUS DETAIL SHEETS
42	*CCCG-22
43-46	*PED (1-22) THRU PED (4-22)
47	*PSET-RP
48	*PSET-RR
49	*PSET-SP
50	*SETP-PD
	<u>PAVEMENT MARKING AND DELINEATION ITEMS</u>
51-52	SURFACE DETAIL REMOVAL LAYOUT SHEETS
53-54	SURFACE DETAIL LAYOUT SHEETS
55-58	*PM (1)-22 THRU PM (4)-22a
	<u>SIGNING ITEMS</u>
59-60	SIGN REMOVAL LAYOUT SHEETS
61-62	SUMMARY OF SMALL SIGNS (SOSS)
63-64	SIGN LAYOUT SHEETS
65	SIGN MOUNT FOR TRAFFIC SIGNAL MAST ARMS
66	*REFLECTIVE WRAP DETAIL DIST STD
67-69	*TSR (3)-13 THRU TSR(5)-13
70	*SMD (GEN)-08
71-73	*SMD (SLIP-1)-08 THRU SMD (SLIP-3)-08
74	*SMD (TWT)-08
75	*SMD (FRP)-08
76-79	*SMD (2-1)-08 THRU SMD (2-4)-08

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
	<u>TRAFFIC SIGNAL ITEMS</u>
80-81	HAWK SIGNAL CONDUIT & CONDUCTOR LAYOUT SHEETS
82-83	PEDESTRIAN HYBRID BEACON DETAILS AND SIGNAL TABLES
84	*PEDESTRIAN SIGNAL DETAILS DIST STD
85	*CONTROLLER FOUNDATION DETAILS DIST STD
86-90	*LMA (1)-12 THRU LMA (5)-12
91-92	*SMA-100(1)-12 AND SMA-100(2)-12
93	*LUM-A-12
94	*CFA-12
95-96	*MA-C-12 AND MA-D-12
97	*TS-FD-12
98	*MA-DPD-20
99	*TS-BP-20
	<u>ELECTRICAL ITEMS</u>
100	ELECTRICAL SERVICE DATA SHEET
101-112	*ED (1)-14 THRU ED (12)-14
113	*RIP (3)-19
	<u>ENVIRONMENTAL ITEMS</u>
114-117	STORMWATER POLLUTION PREVENTION PLAN (SWP3)
118	ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS
119	*EC (1)-16
120-122	*EC (9-1)-16 THRU EC (9-3)-16
	<u>RAILROAD ITEMS</u>
123-124	RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS
125	RAILROAD SCOPE OF WORK



THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A " \* " HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

04/07/2024  
 NAME \_\_\_\_\_ DATE \_\_\_\_\_

**SH 359, ETC.  
INDEX OF SHEETS**



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		2



County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

**GENERAL NOTES:**

Find, for your information and convenience, tools such as forms, software, materials, and various other information provided by the Department at <https://www.txdot.gov/business.html>. Please note that these tools are updated periodically, and your attention is directed to the latest edition.

In the event of a called evacuation, emergencies, impending adverse weather or as directed, do not perform any work without written authorization. The District reserves the right to suspend all work in support of evacuations or emergencies occurring from other parts of the state. Any work performed, other than work directed by the Department, is unauthorized work in accordance with Item 5.

Sweep, clean and remove any construction waste, surplus materials or debris from the roadway and right of way at the end of each day unless otherwise approved. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Cut existing pavement using a saw or other approved method to ensure a neat transverse and/or longitudinal line to assure a smooth tie-in with new pavement. Cut to a minimum depth of the final lift thickness. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

All pavement markings shall be in accordance with the latest edition of Texas MUTCD.

Contractor questions on this project are to be addressed to the following individual(s):

Alice Area Office:

Eric Martinez, P.E.      [Eric.Martinez@txdot.gov](mailto:Eric.Martinez@txdot.gov)  
Lucia Adame, P.E.      [Lucia.Adame@txdot.gov](mailto:Lucia.Adame@txdot.gov)

Contractor questions will be accepted through email, phone, and in person by the above individuals. Questions may also be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

General Notes

Sheet A

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

**ITEM 2**

It is recommended that prospective bidders examine the specified work locations with the Engineer to view the nature of the work, the need for close coordination with the various utilities, traffic control considerations, and other factors influencing the prosecution of the work.

**ITEM 5**

Field verify all dimensions and notify Engineer prior to initiating any work.

Verify the locations of utilities, underground or overhead, shown within the limits of the right-of-way. Adhere to OSHA Standards when working within the vicinity of overhead power lines. Coordinate with the utility companies and notify the Engineer of any possible conflicts. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

The 811 call services for a utility location does not include TxDOT facilities. Provide notification to the District Traffic Signal Shop by email at [CRP\\_UTILITY Locate@txdot.gov](mailto:CRP_UTILITY Locate@txdot.gov) or call 361-739-6044 when planning, drilling, or excavating in areas where existing TxDOT underground utilities exist. Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 48 hours in advance of performing the work, but no earlier than 72 business hours before the work will commence. Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work.

Notify the Engineer immediately of utility conflicts in accordance with Item 5.6. Refer to Item 4.5 for consideration of differing site conditions.

The responsibility for the construction surveying on this contract will be in accordance with Item 5.9.3, "Method C".


No person or tool will be permitted within 8 feet of high voltage electrical lines (600 volts or greater) unless arrangements have been made with the power company. No equipment will be permitted within 10 feet of high voltage electrical lines unless there are warnings posted and an insulated guard is attached to the boom or bucket. The Contractor shall notify the Engineer if there are any conflicts with high voltage electrical lines.

Establish and mark the location of existing standard pavement markings including but not limited to edge lines, transitions, passing and no passing zones, gore areas, etc.

The locations of all signal related items, pavement markings, signing, etc. are diagrammatic only & may be shifted to accommodate field conditions or as directed by the Engineer.

General Notes

Sheet B

 <b>Texas Department of Transportation</b> <b>GENERAL NOTES</b>	FED. RD. DIV. NO.			HIGHWAY NO.
	6			SH 359, ETC.
	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	CRP	JIM WELLS, ETC.	3
CONTROL	SECTION	JOB		
0087	02	059, etc.		

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

**ITEM 6**

Inspection at Precast Concrete Fabrication Plants is as follows: TxDOT's Materials and Pavements Section will inspect any precast units at commercial fabrication yards and staging areas. The Area Engineer will inspect all other precast units.

For Department-furnished material, contact the Engineer or his designated representative to request material a minimum of one workday prior to pick up. Load material with contract personnel. Materials are to be stored in a safe location outside TXDOT property or right-of-way, {unless otherwise approved.} Use material furnished by the Department only on the project(s) intended. Return any unused material as soon as possible.

**ITEM 7**

The work performed for Item 7.2.4, "Public Safety and Convenience" will not be measured or paid for directly, but will be subsidiary to pertinent Items.

When working at street, farm-to-market, state highway, and county road intersections, schedule work to minimize intersection closures. During nonworking hours, all public road intersections will be open to the traveling public.

The total disturbed area for this project is 0 acres. The disturbed area in this project, all project locations in the Contract, and Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off ROW. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer.

Comply with the Texas Aggregate Quarry and Pit Safety Act for waste areas or material source areas resulting from this project.

No significant traffic generator events identified.

Submit charge summary and invoices for Law Enforcement Personnel using the Department forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

General Notes

Sheet C

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site.

A maximum combined rate of \$70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case by case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

**ITEM 8**

Prepare the progress schedule using the Critical Path Method (CPM). Submit (2) two 11" x 17" hard copies and an electronic file of the original or updated progress schedule. Submit the original progress schedule seven (7) days before the Preconstruction Conference.

Submit an updated progress schedule as directed to show proposed major changes, changes affecting compliance with the contract requirements, or changes affecting the critical path/controlling item of work.

Working days will be computed and charge in accordance with Article 8.3.1.4, "Standard Workweek".

Work above traffic is not allowed.

Nighttime work is allowable.

Notify the Engineer at least 48 hours in advance of weekend or nighttime work.


Lane closures are not permitted Monday through Friday before 8 A.M. or after 4 P.M. unless approved.

Work during the week will be between the hours of 9 A.M.-3 P.M., Monday through Friday, during school days, excluding school related holidays. The Engineer reserves the right to change working hours & working days as working conditions warrant.

Refer to the Sequence of Construction in this plan set for more information regarding lane closures and the impact to traffic along the corridors.

General Notes

Sheet D

 <b>Texas Department of Transportation</b> <b>GENERAL NOTES</b>	FED. RD. DIV. NO.			HIGHWAY NO.
	6			SH 359, ETC.
	STATE	DISTRICT	COUNTY	
	TEXAS	CRP	JIM WELLS, ETC.	SHEET NO.
CONTROL	SECTION	JOB		
0087	02	059, etc.		3A

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

**ITEM 9**

Monthly progress payments will be made for items of work completed by the 28th day of each month. Any work completed after the 28th will be included for payment in the subsequent monthly progress estimate.

Submit signed request for compensation of material-on-hand (MOH), including any requests from subcontractors, suppliers, or fabricators for MOH, at least two (2) working days prior to the end of the month on the Departments approved forms.

**ITEM 100**

Coordinate all right of way preparation activities with the project's Storm Water Pollution Prevention Plan (SWP3) and Environmental Permit Issues, and Commitments Sheet (EPIC) or as approved.

Prune trees and shrubs as directed. Use accepted pruning practices in accordance with Item 192 and as defined by the National Arborist Association. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

**ITEM 134**

Use backfill material with a plasticity index (PI) ranging from 10 to 40. Notify the Engineer of the proposed material sources and of changes to material sources. The Engineer may sample and test project materials at any time before compaction throughout the duration of the project to assure specification compliance.

Manipulate and compact backfill material in accordance with Item 132.3.4.1, "Ordinary Compaction". The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Apply SS-1 at a rate of application of 0.15 gallon per square yard. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items

**ITEM 416**

If casings are to be used for drilled shafts founded below the groundwater line, casings shall be removed after placement to allow skin friction to develop in the drilled shaft per foundation design.

General Notes

Sheet E

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

Stake foundation locations & have them approved by the inspector before installation. This will ensure that all luminaires are clear of all overhead lines & underground utilities before drilling begins. The signal inspector along with the Contractor will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

Notify the inspector 48 hours prior to forming & placing concrete in any unit of all the Signal Pole & Controller foundations. Do not place concrete without inspector present. Failure to inform the inspector & provide adequate time to arrive on the job site may result in removing & replacing the foundation at the expense of the Contractor.

If drill shaft has not been poured, provide proper cover & construction barrier during construction at the location of the drill shaft. This is subsidiary to item 502.

**ITEM 421**

The Engineer will provide strength-testing equipment for acceptance testing.

Furnish curing facilities adequately sized for this project as approved.

Furnish test molds for cylindrical concrete specimens measuring four (4") inches in diameter by eight (8") inches in length.

No air entrainment in concrete is required.

**ITEM 464**

The work performed for concrete collars will not be measured or paid for directly, but will be subsidiary to pertinent Items.

**ITEM 467**

The flowline of the safety end treatment shall match the flowline of the culvert.


Reinforce concrete riprap with 4 x 4 – W2.9 x W2.9 welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction.

The work performed for concrete collars will not be measured or paid for directly, but will be subsidiary to pertinent Items.

All safety end treatments shall include riprap to the dimensions shown on PSET-RR. This riprap shall be subsidiary to Item 467.

General Notes

Sheet F

 <b>Texas Department of Transportation</b> <b>GENERAL NOTES</b>	FED. RD. DIV. NO.			HIGHWAY NO.
	6			SH 359, ETC.
	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	CRP	JIM WELLS, ETC.	3B
CONTROL	SECTION	JOB		
0087	02	059, etc.		

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

**ITEM 500**

"Materials on Hand" payments are not considered when determining partial payments.

**ITEM 502**

Furnish additional barricades, signs, and traffic handling as directed. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Traffic control for daytime lane closures shall be in accordance with applicable standards. Traffic control shall include temporary rumble strips in accordance with WZ (RS)-22.

All signs shall be erected in a manner that they shall not obstruct the traveling public;s view of the normal roadway signing or necessary sight distance at intersection & curves.

There will be no direct payment for traffic control, this function (traffic control) will be considered subsidiary to pertinent bid items.

When advanced warning flashing arrow panels are specified, furnish one (1) standby unit in good condition at the job site for immediate use.

Attach stop/slow paddle to a staff with a minimum length of 6 feet to the bottom of the sign.

Maintain traffic control devices by taking corrective action as soon as possible.

Unless otherwise shown on plan sets, channelization device spacing shall be as shown on "BC(9)-21"

For lighting purposes, nighttime is defined as occurring shortly before sunset until after sunrise.

Prior to nighttime work, a lighting plan shall be submitted for approval by the Engineer. The plan shall outline the types of lighting systems that will be used to adhere to following conditions. Before nightttitme construction may begin, the lighting systems shall be demonstrated as being operational.

Provide a photometer for use by the Engineer to check the adequacy of illumination for any nighttime operations. The meter shall have a digital display calibrated to NIST standards, shall be cosine and color corrected, and shall have an accuracy of 1/- five percent. The sensor shall have a level indicator to ensure measurements are taken in a horizontal plane. Readings will be taken 3 feet above the pavement or ground surface.

The lighting system shall provide a minimum of 5 foot candles of illumination throughout the work area. For stationary operations, the work area is defined as the entire area where work is

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

being performed. For mobile operations, the work area shall be defined as 25 feet in front of and behind moving equipment.

20 foot candles of illumination shall be provided for installation of signal equipment or other electrical/ mechanical equipment and other tasks involving fine details or intricate parts and equipment.

Provide shields, visors, or louvers on luminaires as necessary to reduce objectionable levels of glare. A void objectionable glare on roadways open to traffic. Corrections shall be made when the Engineer determines glare exceeds acceptable levels.

Lighting needed to perform work shall not be paid for directly and should be considered subsidiary to Item 502.

Contractors attention is directed to a construction speed zone, signage is subsidiary to Item 502.

The use of a pilot vehicle in conjunction with flaggers will be permitted. If used, provide positive and unrestricted communication between the driver of the pilot vehicle and the flaggers. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

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.


All items marked as optional on all traffic control standards shall be required unless otherwise approved by an Engineer.

Trail vehicle shall be required on all mobile traffic control operations.

**ITEM 506**

Designate in writing a Contractor Responsible Person (CRP) for implementing, maintaining, and reviewing environmental requirements.

Do not discharge onto the ground or surface waters any pollutants such as chemicals, raw sewage, fuels, lubricants, coolants, hydraulic fluids, bitumens, or any other petroleum product. Operate and maintain equipment on site in a manner as to prevent actual or potential water pollution. Manage, control, and dispose of litter on site such that no adverse impacts to water quality occur. Prevent dust from creating a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property. Wash out concrete

 <b>Texas Department of Transportation</b> <b>GENERAL NOTES</b>	FED. RD. DIV. NO.			HIGHWAY NO.
	6			SH 359, ETC.
	STATE	DISTRICT	COUNTY	
	TEXAS	CRP	JIM WELLS, ETC.	
CONTROL	SECTION	JOB		SHEET NO.
0087	02	059, etc.		3C

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

trucks only in approved contained areas. Use appropriate controls to minimize the offsite transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water (i.e. dewatering). Prevent discharges that would contribute to a violation of Edwards Aquifer Rules, water quality standards, the impairment of a listed water body, or other state or federal law.

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7.

**ITEM 529**

Construct an expansion joint at a depth equal to the depth of the curb, gutter, and combined curb and gutter every 40 feet. Construct a tooled joint every 10 feet. When sidewalks are constructed next to curb or curb and gutter, place sidewalk expansion joints at the same location as the curb and gutter expansion joints.

**ITEM 531**

Reinforce sidewalks with 4 x 4 – W2.9 x W2.9 welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction unless otherwise shown.

Construct an expansion joint at a depth equal to the depth of the sidewalk every 40 feet. Construct a tooled joint every 5 feet. When sidewalks are constructed next to curb or curb and gutter, place sidewalk expansion joints at the same location as the curb and gutter expansion joints.

Mixing of detectable warning materials is not permitted on curb ramps.

Provide proper construction safety barrier/fence for the duration of the project. This is subsidiary to item 502.

**ITEM 616**

Place the lighting system in operation for a 14-day test period. Burn the lighting system steadily for 48 hours. Then cycle the photocell or other control device for 12 days.

Pass a 14-day performance test of the lighting system.

Pass a 14-day performance test of the lighting system.

General Notes

Sheet I

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

**ITEM 618**

Seal all conduits terminating in ground boxes and pole foundations with a sealant made of polyurethane or equivalent that will cure in the presence of moisture. Ensure sealant is suitable for sealing ends with electrical conductor extending past the ends of the conduit. Inject the sealant a minimum of 3 inches and a maximum of 5 inches into the conduit.

Provide rigid metal conduit (RMC) elbows for all underground conduit bends of 45 degrees or more, including bends into ground boxes. Provide a polyvinyl chloride conduit (PVC) elbow in lieu of a RMC elbow for conduit 1 inch or larger. Ensure the elbow is the same schedule rating as the conduit to which it is connected.

Bond the RMC to the grounding conductor with grounding type bushings when the RMC is exposed or extends into the ground box.

Provide a flat, high tensile strength polyester fiber pull tape in each conduit to pull conductors.

Provide wide sweep conduit elbows.

Jacking of conduit will not be permitted.

Use materials from prequalified material producers list as shown on the Texas Department of Transportation (TxDOT) materials producers list. Category is "Roadway Illumination and Electrical Supplies."

Use red 3-in 4-mil polyethylene underground warning tape that continuously states/ reads "Caution Buried Electrical Line Below".

Use 2-hole type clamps for 2-in diameter or larger conduit.


Fit PVC and HDPE conduit terminations with bushings or bell ends. Fit metal conduit terminations with a grounding type bushing, except conduit used for duct cable casing that does not terminate in a ground box and is not exposed at any point. Conduit terminating in threaded bossed fitting does not need a bushing.

Before installation of conductors or final acceptance, pull a properly sized mandrel or piston through the conduit to ensure that it is free from obstruction. Cap or plug empty conduit placed for future use.

Place warning tape approximately 10-in above trenched conduit. Where existing surfacing is removed for placing conduit, repair by backfilling with material equal in composition and density to the surrounding areas and by replacing any removed surfacing, such as asphalt pavement or concrete riprap, with like material to equivalent condition. Mark conduit locations as directed.

General Notes

Sheet J

 <b>Texas Department of Transportation</b> <b>GENERAL NOTES</b>	FED. RD. DIV. NO.			HIGHWAY NO.
	6			SH 359, ETC.
	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	CRP	JIM WELLS, ETC.	
CONTROL	SECTION	JOB		
0087	02	059, etc.		30



County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

All conduit runs under existing pavement or existing driveways shall be bored. Where boring is required, it shall be placed at a minimum depth of 3.5 feet from proposed grade.

**ITEM 620**

Grounding conductors that share the same conduit, junction box, ground box, or structure shall be bonded together at every accessible point in accordance with the current National Electrical Code and TxDOT requirements. Provide cable with green color insulation.

Electrical certification for this project will be as per Item 7 of the current Texas Standard Specifications and any Special Provisions to Item 7.

Ensure all grounding conductors size 8AWG and larger are stranded, except for the grounding electrode conductor that terminates at meter Enclosure, which will be a solid conductor.

Make insulation resistance tests on the conductors before making final connections, and insure each continuous run of insulated conductor has a minimum DC resistance of 5 megohms when tested at 1,000 volts DC. The Engineer may require verification testing of all or part of the conductor system. The Engineer will witness these verification tests. Replace conductors exhibiting an insulation resistance of less than 5 megohms at no additional cost to the Department.

**ITEM 624**

Construct concrete aprons as shown on the plans and in accordance with Item 432, "Riprap," and Item 440, "Reinforcement for Concrete."

Aggregate fill shall consist of ¾ inch up to 2 inch course aggregate. Ensure aggregate is in place prior to setting box and conduits shall be capped.

**ITEM 628**

Provide a Single phase with a bypass meter enclosure for all electrical services.

Follow NEC and local utility company requirements when installing the electrical equipment.

The Contractor shall coordinate with AEP Energy at 1-877-373-4858 at least 30 days prior to installation of the electrical service.

Time-charge suspension due to the availability of power shall not be considered unless all arrange

General Notes

Sheet K

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

**ITEM 644**

Use crash worthy supports as shown on the BC sheets, the CWZTCD, or as directed for signs relocated using temporary supports. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

All slip bases and hardware including but not limited to nuts, bolts, screws and washers will be galvanized. All sign and housing components will be galvanized. Slip bases shall be clamp-style.

Any abandoned slip base footings in the vicinity of the existing sign shall be removed and will be subsidiary to ITEM 644-6076.

Sign Post Wraps shall be subsidiary to ITEM 644.

Sign Post Wraps shall be installed in accordance with the included district standard. However, the Engineer may request that additional signs receive post wraps. These additional post wraps shall be subsidiary to ITEM 644.

All salvageable signs and sign components will become the property of the Department and will be stockpiled at designated locations. Contact Project Engineer to determine locations.

Coordinates/Stations provided in this plan set are approximate locations. All signs placed shall follow the Texas Department of Transportation's sign placement guidelines to include but not be limited to the Sign Crew Field Book and the Texas Manual on Uniform Traffic Control Devices.

Disassemble, deliver and neatly stack salvageable materials at secure location. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

**ITEM 677**

Eliminate all conflicting pavement markings as work progresses or as directed.

Use Method A for asphaltic pavements in cases where full eradication of pavement markings is required. Use a PB Grade 5 aggregate at an application rate of 1 cy/ 130 sy and asphalt AC-5, AC-10, CRS-2 or HFRS-2 at an application rate of 0.39 Gal/sy.


For all other cases refer to the spec book for allowable methods of pavement marking removal. No Surface Treatment Method on concrete surfaces.

Removal method must be approved by the Engineer.

No Surface Treatment Method on concrete surfaces.

General Notes

Sheet L

 <b>Texas Department of Transportation</b> <b>GENERAL NOTES</b>	FED. RD. DIV. NO.			HIGHWAY NO.
	6			SH 359, ETC.
	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	CRP	JIM WELLS, ETC.	3E
CONTROL	SECTION	JOB		
0087	02	059, etc.		

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

When using Surface Treatment Method for asphaltic pavements, use a PB Grade 5 aggregate at an application rate of 1 cy/130 sy and asphalt AC-10, CRS-2 or HFRS-2 at a application rate of 0.39 Gal/sy.

**ITEM 680**

Do not activate traffic signals without approval. For new signal installations, notify the Engineer two (2) weeks in advance of the activation date for advertisement purposes and place the signals on flash as directed.

**ITEM 682**

Provide all signal heads from the same manufacturer.

Provide all LED traffic signal lamp units, as well as the various components of the signal heads to be installed within this project.

Traffic signal heads shall be yellow aluminum with black aluminum vented back plates. Cover all signal faces until placed in operation. Refer to standard TS-BP-20 for information regarding retroreflective borders to be used on the backplates.

The internal arrangements of each louver shall consist of five vanes with a 7-degree cut-off right of center. All louvers shall have a flat black finish on the inside surfaces. Each louver shall be of suitable weight and size as to fit inside the full circle visor furnished for the intended signal section.

Furnish and install in aluminum housing, LED "Walking Person," and "Hand" icon pedestrian signal modules with countdown feature.

Housing for LED pedestrian signal module shall be considered subsidiary to this pay item.

**ITEM 684**

Aluminum conductors will be permitted.

Coil an extra 5 feet of cable in each ground box, pole base, and controller assembly.

Identify each cable as shown on the plans (cable 1, etc.) with pre-numbered identification tags of plastic, tape or marking labels at each signal head, ground box, terminal block, pole base and controller.

General Notes

Sheet M

County: Jim Wells, etc.

Control: 0087-02-059, etc.

Highway: SH 359, Etc.

All cables shall be continuous without splices from terminal point to terminal point or as directed or approved. All proposed signal cable and number of conductors required shall be as shown on the plans. Terminate all electrical conductors from the controller at the termination block in the signal pole hand hole whether in use or not.

**ITEM 6001**

Furnish the portable changeable message signs displaying the correct message at least seven (7) days prior to beginning work or as directed.

The Contractor's Responsible Person (CRP) will maintain full control of messages at all times.

The Engineer will provide the sign message text to use at each sign.

Provide cellular phone connection

A minimum of 2 PCMS will be required. However, additional units may be necessary depending on the work in progress.

Standby time will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Portable changeable message signs may be moved and message changed at any time as deemed necessary by the Engineer. This will be considered subsidiary to Item 6001.

**ITEM 6185**

A minimum of 2 TMAS will be required. However, additional units may be necessary depending on the work in progress


Provide manufacturer's curb weight or certified scales weight ticket to the Engineer for approval.

**ITEM 6367**

The cellular modems are to be furnished by the department and installed by the Contractor. The Contractor shall coordinate with the Corpus Christi District Traffic Signal Shop Supervisor, Mr. Carlos Carrillo, to pick these modems up from TxDOT at 1701 South Padre Island Dr., Corpus Christi TX, 78416.

General Notes

Sheet N

 <b>Texas Department of Transportation</b> <b>GENERAL NOTES</b>	FED. RD. DIV. NO.			HIGHWAY NO.
	6			SH 359, ETC.
	STATE	DISTRICT	COUNTY	
	TEXAS	CRP	JIM WELLS, ETC.	
	CONTROL	SECTION	JOB	
	0087	02	059, etc.	
				SHEET NO.
				3F



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0087-02-059

DISTRICT Corpus Christi  
HIGHWAY FM 666, SH 359

COUNTY Jim Wells, San Patricio

CONTROL SECTION JOB				0087-02-059		1052-03-032		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00196641		A00196644			
COUNTY				Jim Wells		San Patricio			
HIGHWAY				SH 359		FM 666			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL		
	104-6015	REMOVING CONC (SIDEWALKS)	SY	10.000				10.000	
	104-6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	11.000		14.000		25.000	
	134-6008	BACKFILL (TY A OR B)	CY	20.000				20.000	
	416-6030	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF			6.000		6.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	28.000				28.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF			22.000		22.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	60.000				60.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	6.000				6.000	
	500-6001	MOBILIZATION	LS	0.570		0.430		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3.000		3.000		6.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	64.000		64.000		128.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	64.000		64.000		128.000	
	506-6041	BIODEG EROSN CONT LOGS (IN STL) (12")	LF			40.000		40.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF			40.000		40.000	
	529-6002	CONC CURB (TY II)	LF	380.000		247.000		627.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	48.000				48.000	
	531-6002	CONC SIDEWALKS (5")	SY	96.000		144.000		240.000	
	531-6016	CURB RAMPS (TY 21)	EA	19.000		11.000		30.000	
	531-6018	CURB RAMPS (TY 1)	SY	24.000		16.000		40.000	
	536-6002	CONC MEDIAN	SY	217.000		77.000		294.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	64.000		50.000		114.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	144.000		14.000		158.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF			10.000		10.000	
	618-6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	144.000		106.000		250.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	206.000		161.000		367.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	42.000		30.000		72.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	84.000		60.000		144.000	
	621-6002	TRAY CABLE (3 CONDR) (12 AWG)	LF	306.000		114.000		420.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	3.000		3.000		6.000	
	628-6143	ELC SRV TY D 120/240 060(NS)SS(E)GC(U)	EA	1.000		1.000		2.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	4.000		4.000		8.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	4.000		2.000		6.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	4.000		2.000		6.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	184.000		116.000		300.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	2.000				2.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	2.000				2.000	
	668-6101	PREFAB PAV MRK TY C (Y) (4") (SLD)	LF	42.000		22.000		64.000	



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0087-02-059

DISTRICT Corpus Christi  
HIGHWAY FM 666, SH 359

COUNTY Jim Wells, San Patricio

CONTROL SECTION JOB				0087-02-059		1052-03-032		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00196641		A00196644			
COUNTY				Jim Wells		San Patricio			
HIGHWAY				SH 359		FM 666			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL		
	672-6009	REFL PAV MRKR TY II-A-A	EA	28.000		14.000		42.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	20.000				20.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF			88.000		88.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	153.000				153.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4.000				4.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	42.000		22.000		64.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	184.000		116.000		300.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	2.000				2.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	2.000				2.000	
	680-6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1.000		1.000		2.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	4.000		4.000		8.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	8.000		8.000		16.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	2.000		2.000		4.000	
	682-6033	BACK PLATE (12")(1 SEC)(VENTED)ALUM	EA	12.000		12.000		24.000	
	684-6030	TRF SIG CBL (TY A)(14 AWG)(4 CONDR)	LF	221.000		171.000		392.000	
	684-6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	LF	813.000		573.000		1,386.000	
	686-6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	1.000				1.000	
	686-6031	INS TRF SIG PL AM(S)1 ARM(28')LUM	EA	1.000				1.000	
	686-6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA			1.000		1.000	
	687-6001	PED POLE ASSEMBLY	EA			1.000		1.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	2.000		2.000		4.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	2.000		2.000		4.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	51.000		51.000		102.000	
	6185-6002	TMA (STATIONARY)	DAY	102.000		102.000		204.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	51.000		51.000		102.000	
	6367-6002	INSTALLATION OF CELLULAR MODEM	EA	1.000		1.000		2.000	
08		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000				1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000				1.000	

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CSJ: 0087-02-059 SH 359 CONCRETE ITEM SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
134	6008	BACKFILL (TY A OR B)	CY	20
464	6003	RC PIPE (CL III)(18 IN	LF	60
467	6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	6
529	6002	CONC CURB (TY II)	LF	380
529	6008	CONC CURB & GUTTER (TY II)	LF	48
531	6002	CONC SIDEWALKS (5")	SY	96
531	6016	CURB RAMPS (TY 21)	SY	19
531	6018	CURB RAMPS (TY 1)	SY	24
536	6002	CONC (MEDIAN)	SY	214

CSJ: 0087-02-059 SH 359 CONCRETE REMOVAL ITEM SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
104	6015	REMOVING CONC (SIDEWALKS)	SY	10
104	6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	11

CSJ: 1052-03-032 FM 666 CONCRETE ITEM SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
529	6002	CONC CURB (TY II)	LF	247
531	6002	CONC SIDEWALKS (5")	SY	144
531	6016	CURB RAMPS (TY 21)	SY	11
531	6018	CURB RAMPS (TY 1)	SY	16
536	6002	CONC (MEDIAN)	SY	77

CSJ: 1052-03-032 FM 666 CONCRETE REMOVAL ITEM SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
104	6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	14

**SH 359, ETC.  
 MISCELLANEOUS  
 CONCRETE  
 ITEMS SUMMARY**



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		5



CSJ: 0087-02-059 SH 359 STRIPING PREPARATION SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0678	6001	PAV SURF PREP FOR MRK (4")	LF	42
0678	6008	PAV SURF PREP FOR MRK (24")	LF	184
0678	6009	PAV SURF PREP FOR MRK (ARROW)	EA	2
0678	6016	PAV SURF PREP FOR MRK (WORD)	EA	2

CSJ: 0087-02-059 SH 359 STRIPING AND PAVEMENT INSTALLATION SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0668	6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	184
0668	6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	2
0668	6085	PREFAB PAV MRK TY C (W) (WORD)	EA	2
0668	6101	PREFAB PAV MRK TY C (Y) (4") (SLD)	LF	42
0672	6009	REFL PAV MRKR TY II-A-A	EA	28


CSJ: 0087-02-059 SH 359 STRIPING REMOVAL SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	QTY
0677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	20
0677	6007	ELIM EXT PAV MRK & MRKS (24")	LF	153
0677	6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4

CSJ: 1052-03-032 FM 666 STRIPING PREPARATION SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0678	6001	PAV SURF PREP FOR MRK (4")	LF	22
0678	6008	PAV SURF PREP FOR MRK (24")	LF	116

CSJ: 1052-03-032 FM 666 STRIPING AND PAVEMENT INSTALLATION SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0668	6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	116
0668	6101	PREFAB PAV MRK TY C (Y) (4") (SLD)	LF	22
0672	6009	REFL PAV MRKR TY II-A-A	EA	14

CSJ: 1052-03-032 FM 666 STRIPING REMOVAL SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	QTY
0677	6005	ELIM EXT PAV MRK & MRKS (12")	LF	88

**SH 359, ETC.  
 SURFACE DETAIL  
 &  
 REMOVAL SUMMARY**



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC. SH 359, ETC.	
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		6

CSJ: 0087-02-059 SH 359 SIGN MOUNTING SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0644	6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	4
0644	6029	INSTALL OF SIGNAL RELATED SIGNS*	EA	6
0644	6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	4
0644	6076	REMOVE SM RD SN SUP&AM	EA	4


CSJ: 1052-03-032 FM 666 SIGN MOUNTING SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0644	6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	4
0644	6029	INSTALL OF SIGNAL RELATED SIGNS*	EA	6
0644	6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	2
0644	6076	REMOVE SM RD SN SUP&AM	EA	2

NOTE: \* TRAFFIC RELATED SIGNS ON THE SIGNAL POLE & MAST ARE ARE NOT DIRECTLY BUT ARE CONSIDERED SUBSIDIARY TO ITEM 0680.

CSJ: 0087-02-059 SH 359 SIGN REMOVAL SUMMARY				
SIGN NO.	STATION	DIRECTION	SIGN DESIGNATION	SIGN CONTENT
1	410 + 85.13 LT	Northbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)
2	410 + 85.13 RT	Southbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)
3	412 + 04.24 LT	Northbound	R1-5b	STOP HERE FOR PEDESTRIANS
4	413 + 46.82 LT	Northbound	R7-5	VISITOR PARKING

CSJ:1052-03-032 FM666 SIGN REMOVAL SUMMARY				
SIGN NO.	STATION	DIRECTION	SIGN DESIGNATION	SIGN CONTENT
1	21 + 54.41LT	Northbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)
2	21 + 34.03RT	Southbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)

**SH 359, ETC.  
SIGN MOUNTING  
&  
REMOVAL SUMMARY**



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		7

DATE: 4/6/2024 5:50:56 PM  
 FILE: P:\t\dot\project\wiseonline.com\TxDOT\4\Documents\16 - CRP\Design Projects\008702059\4 - Design\Plan Set\1. General\TRAFFIC SIGNAL ITEMS SUMMARY.dgn


CSJ: 0087-02-059 SH 359 TRAFFIC SIGNAL ITEM SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	28
624	6010	GROUND BOX TY D (162922)W/APRON	EA	3
628	6143	ELC SRV TY D 120/240 060(NS)SS(E)GC(U)	EA	1
680	6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
682	6003	VEH SIG SEC (12")LED(YEL)	EA	4
682	6005	VEH SIG SEC (12")LED(RED)	EA	8
682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA	2
682	6033	BACK PLATE (12")(1 SEC)(VENTED)ALUM	EA	12
686	6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	1
686	6031	INS TRF SIG PL AM(S)1 ARM(28')LUM	EA	1
688	6001	PED DETECT PUSH BUTTON (APS)	EA	2
688	6003	PED DETECTOR CONTROLLER UNIT	EA	2
6367	6002	INSTALLATION OF CELLULAR MODEM	EA	1

CSJ: 1052-03-032 FM 666 TRAFFIC SIGNAL ITEM SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
416	6030	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF	6
416	6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	22
624	6010	GROUND BOX TY D (162922)W/APRON	EA	3
628	6143	ELC SRV TY D 120/240 060(NS)SS(E)GC(U)	EA	1
680	6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
682	6003	VEH SIG SEC (12")LED(YEL)	EA	4
682	6005	VEH SIG SEC (12")LED(RED)	EA	8
682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA	2
682	6033	BACK PLATE (12")(1 SEC)(VENTED)ALUM	EA	12
686	6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA	1
687	6001	PED POLE ASSEMBLY	EA	1
688	6001	PED DETECT PUSH BUTTON (APS)	EA	2
688	6003	PED DETECTOR CONTROLLER UNIT	EA	2
6367	6002	INSTALLATION OF CELLULAR MODEM	EA	1

CSJ: 0087-02-059 SH 359 CONDUIT & CONDUCTORS SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
618	6046	CONDT (PVC) (SCH 80) (2")	LF	64
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	144
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	144
620	6008	ELEC CONDR (NO.8) INSULATED	LF	206
620	6009	ELEC CONDR (NO.6) BARE	LF	42
620	6010	ELEC CONDR (NO.6) INSULATED	LF	84
621	6002	TRAY CABLE (4 CONDR) (12 AWG)	LF	306
684	6030	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	221
684	6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	LF	813

CSJ: 1052-03-032 FM 666 CONDUIT & CONDUCTORS SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
618	6046	CONDT (PVC) (SCH 80) (2")	LF	50
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	14
618	6053	CONDT (PVC) (SCH 80) (3")	LF	10
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	106
620	6008	ELEC CONDR (NO.8) INSULATED	LF	161
620	6009	ELEC CONDR (NO.6) BARE	LF	30
620	6010	ELEC CONDR (NO.6) INSULATED	LF	60
621	6002	TRAY CABLE (4 CONDR) (12 AWG)	LF	114
684	6030	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	171
684	6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	LF	573

**SH 359, ETC.  
TRAFFIC SIGNAL  
ITEMS SUMMARY**



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		8


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DW: CJK: DMF: CJK:

CSJ: 0087-02-059 SH 359 SW3P SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	64
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	64

CSJ: 1052-03-032 FM 666 SW3P SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
506	6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	40
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	40

**SH 359, ETC.  
 SW3P SUMMARY**



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC. SH 359, ETC.	
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		9

**GENERAL NOTES FOR THE CONSTRUCTION SEQUENCE**

1. ALERT THE PUBLIC OF POSSIBLE LANE CLOSURES, CHANGEABLE MESSAGE BOARDS SHALL BE PLACED AT THE PROJECT LIMITS SEVEN (7) DAYS IN ADVANCE OF BEGGINING WORK
2. CHANGEABLE MESSAGE SIGN SHALL BE PLACED AS NEEDED TO ALERT TRAFFIC OF LANE CLOSURES. MESSAGES SHALL BE APPROVED BY THE ENGINEER.
3. ALL BEGINNING AND ENDING BARRICADES AND SIGNS ARE TO REMAIN IN PLACE FOR THE DURATION OF THE PROJECT.
4. ALL SIGNS, BARRICADES AND PAVEMENT MARKINGS SHALL CONFORM WITH THE BC STANDARD SHEETS, TCP SHEETS, AND THE LATEST EDITION OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
5. CW20-1D, G20-2 & EITHER G20-1bTL or G20-1bTR SIGNS WILL BE REQUIRED AT ALL PUBLIC ROADS, AND INTERSECTIONS WITHIN LIMITS. (G20-2) SIGNS MAY BE MOUNTED ON BACK OF CW20-1D, SEE BC(2)-14.
6. THE CONTRACTOR SHALL PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY HIGHWAY, PUBLIC ROAD, AND STREET CROSSING FOR ALL VEHICLES. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN ALL CROSSINGS IN A SAFE AND PASSABLE CONDITION.
7. REFER TO THE BARRICADE AND CONSTRUCTION STANDARD SHEETS FOR REQUIRED SPACING OF SIGNS AND BARRICADES.
8. THE CONTRACTOR MAY BE REQUIRED TO FURNISH ADDITIONAL BARRICADES, SIGNS, AND WARNING LIGHTS TO MAINTAIN TRAFFIC AND PROMOTE MOTORISTS SAFETY. ANY SUCH ADDITIONAL SIGNS AND BARRICADES SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502.
9. ALL SIGNS SHALL BE NEW OR FRESHLY PAINTED, AND KEPT CLEAN FOR THE DURATION OF THE PROJECT.
10. ALL TRAFFIC BARRELS & EDGE LINE CHANNELIZERS SHALL BE USED IN ACCORDANCE WITH THE PLANS AND MANUFACTURER'S RECOMMENDATIONS AND SHALL HAVE A 7" PRISMATIC REFLECTOR UNIT, AS APPROVED BY THE ENGINEER. ALL MATERIALS SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502.
11. SIGNS, PAVEMENT MARKINGS, CHANNELIZING DEVICES, AND OTHER TRAFFIC CONTROL DEVICES THAT ARE INCONSISTENT WITH INTENDED TRAVEL PATHS THROUGH THE PROJECT AREA SHALL BE REMOVED IMMEDIATELY.
12. ALL TRAFFIC CONTROL DEVICES SHALL BE REMOVED WHEN NO LONGER NEEDED. WHEN WORK IS SUSPENDED FOR SHORT TIME PERIOD, ADVANCED WARNING SIGNS THAT ARE NO LONGER APPROPRIATE SHALL BE REMOVED FROM THE PROJECT AREA.
13. THE CONTRACTOR MAY SUBMIT AN ALTERNATIVE SEQUENCE OF CONSTRUCTION IN ADVANCE & IN WRITING, SUBJECT TO THE APPROVAL OF THE ENGINEER. REFER TO ITEM 502.2 "CONSTRUCTION".

**GENERAL SUGGESTED SEQUENCE OF CONSTRUCTION**

1. PLACE THE FOLLOWING ADVANCE WARNING SIGNS IN ACCORDANCE WITH BC(2)-14: R20-3T, G20-10T, G20-9TP, R20-5T, R20-5aTP, CW20-1D, G20-5T, G20-6T, G20-2bT, G20-2, G20-5aP, G20-1bTR, AND G20-1bTL.
2. PLACE SW3P EROSION CONTROL MEASURES IN ACCORDANCE WITH THE SW3P SUMMARY SHEETS AND APPLICABLE STANDARDS.
3. WORK PER LOCATION IS SUGGESTED IN THE FOLLOWING ORDER:
  - A. WORK SHOULD BE COMPLETED NORTH TO SOUTH.
  - B. PERFORM STRIPING & SIGNING WORK. INSTALL PROPER CONSTRUCTION ZONE SIGNS & CONSTRUCTION BARRIER(S)/FENCE(S) ALONG R.O.W. WHERE SIDEWALK & TRAFFIC SIGNAL CONSTRUCTION IS BEING PERFORMED.
  - C. SURVEY TO VERIFY INSTALLED HEIGHT OF THE TRAFFIC SIGNAL HEADS & OBTAIN ENGINEER APPROVAL FOR TOP OF FOUNDATION ELEVATION.
  - D. POUR FOUNDATIONS, PLACE GROUND BOXES & CONDUIT.
  - E. PULL CONDUCTORS & CABLES.
  - F. INSTALL SIGNAL & ILLUMINATION.
  - G. REMOVE BIOLOGS & CONTROL FENCES.
  - H. REMOVE EXISTING CROSSWALK STRIPING, SIDEWALK, & WHEELCHAIR RAMPS CALLED OUT ON LAYOUT SHEETS ONCE INSTALLATION IS COMPLETED & HAWK SIGNALS ARE OPERATIONAL.
4. ERECTION OF THE POLE & MAST ARM FOR SIGNAL POLES ALONG WITH HANGING OF SIGNS & SIGNAL HEADS ON THE MAST ARM SHALL BE DONE IN A WAY AS TO MINIMIZE THE IMPACT TO TRAFFIC SH 359 & FM 666.
5. THE CONTRACTOR SHALL PROVIDE RETROREFLECTIVITY MEASUREMENTS IN DIGITAL EXCEL SPREADSHEET FORMAT FOR EXISTING & FINAL STRIPING AS DESCRIBED IN ITEM 666, "RETROREFLECTORIZED PAVEMENT MARKINGS". RETROREFLECTIVITY TESTING FREQUENCY IS TO BE DETERMINED BY THE AREA ENGINEER.



*Jorge A. Perez*  
 04/07/2024

**SH 359, ETC.  
 SEQUENCE OF  
 CONSTRUCTION**



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		10



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**BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:**

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
12. The Engineer has the final decision on the location of all traffic control devices.
13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

**WORKER SAFETY NOTES:**


1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.
2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

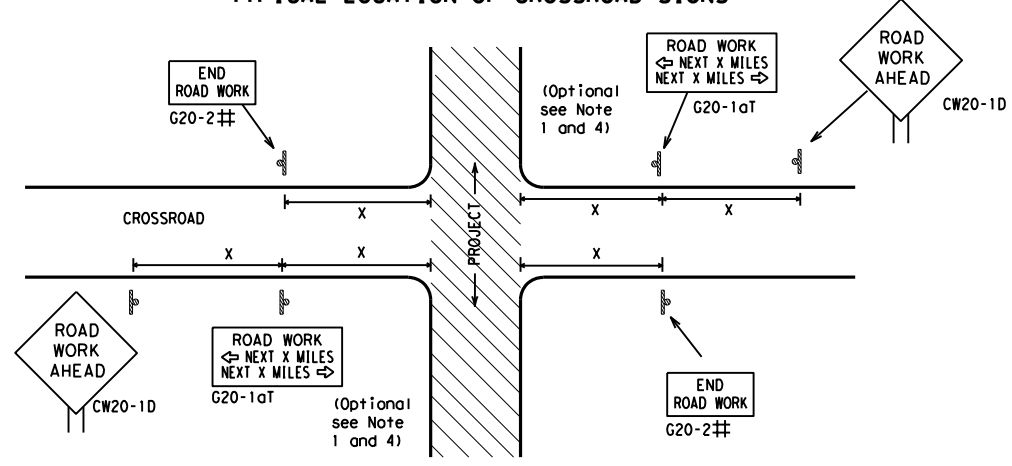
<b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b> <a href="http://www.txdot.gov">http://www.txdot.gov</a>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS) "
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard	
<b>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</b>			
<b>BC (1) - 21</b>			
FILE:	bc-21.dgn	DN:	TxDOT
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		HIGHWAY:	TxDOT
REVISIONS		0087	02
4-03	7-13	059, ETC. SH 359, ETC.	
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5-10	5-21	CRP:	JIM WELLS, ETC.
			SHEET NO. 11

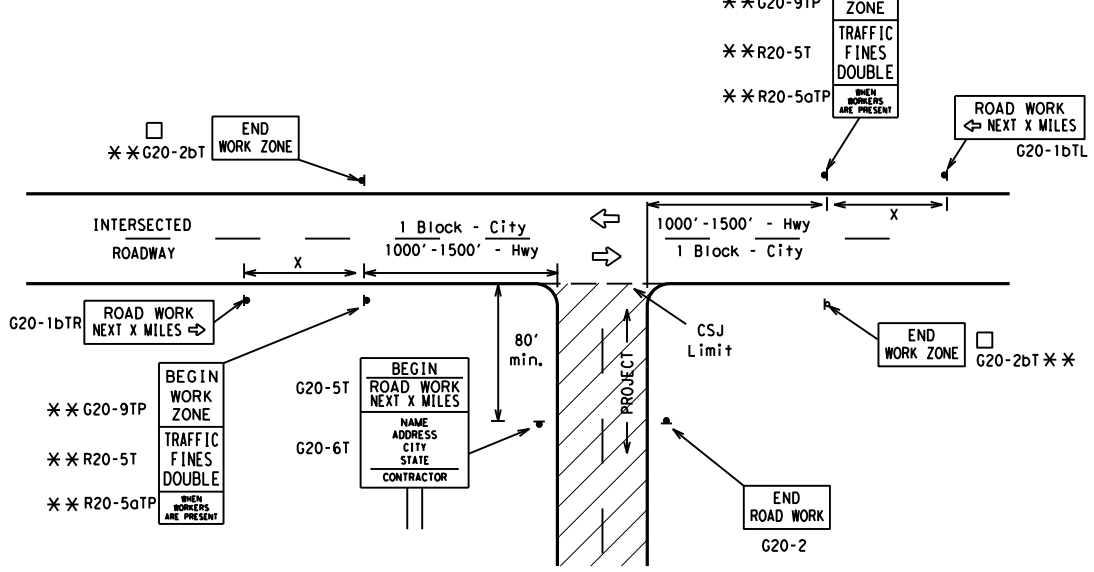
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



- ## May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
  - The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
  - Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
  - The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
  - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
  - When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

- The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
- If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME" (G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow (G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR) signs shall be replaced by the detour signing called for in the plans.

**TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING<sup>1,5,6</sup>**

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 <sup>4</sup>	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 <sup>2</sup>
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			75	900 <sup>2</sup>
			80	1000 <sup>2</sup>
			*	* <sup>3</sup>

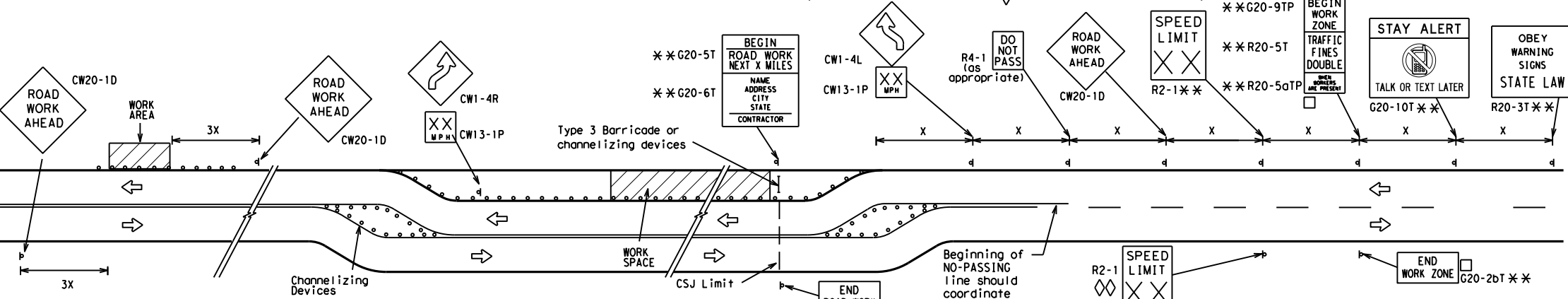
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

**GENERAL NOTES**

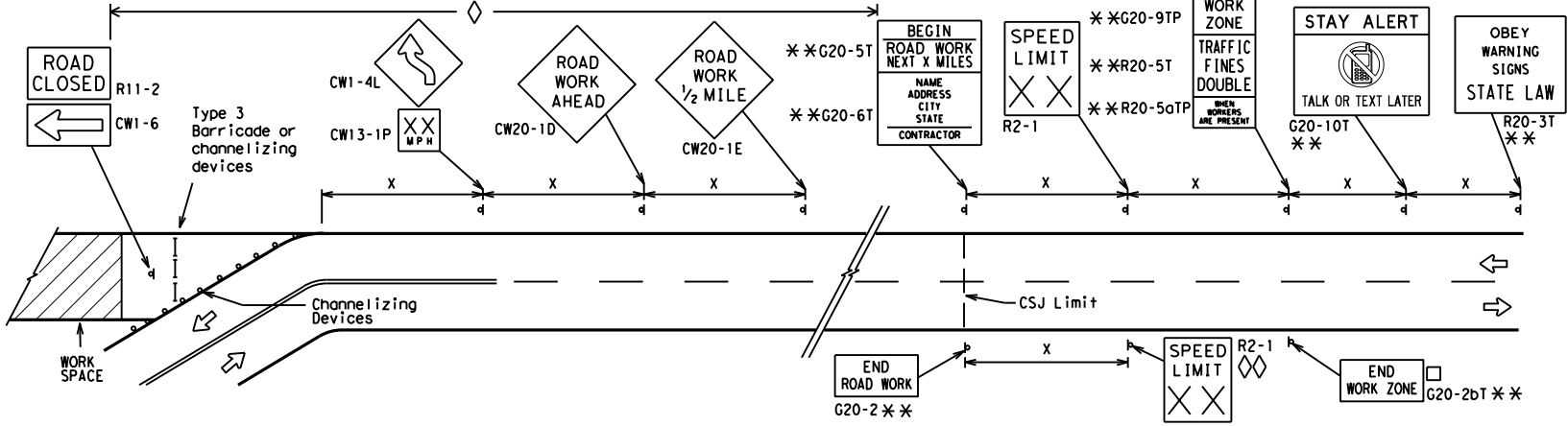
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
- Only diamond shaped warning sign sizes are indicated.
- See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

**WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS**



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS**



**NOTES**

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "x" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
  - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
  - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
  - Contractor will install a regulatory speed limit sign at the end of the work zone.

**LEGEND**

—	Type 3 Barricade
○ ○ ○	Channelizing Devices
■	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12



**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

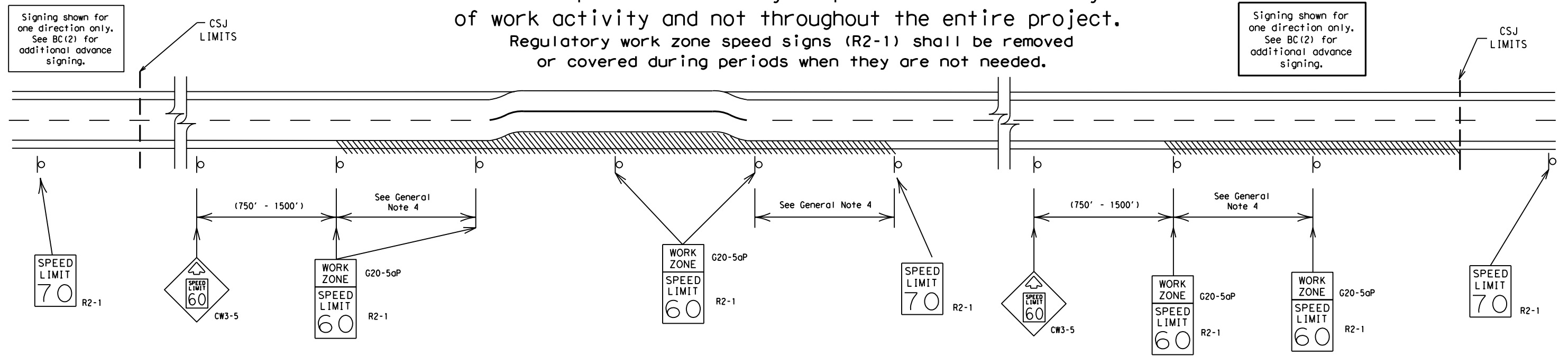
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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	JIM WELLS, ETC.	12	

# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

### SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

## GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:
 

40 mph and greater	0.2 to 2 miles
35 mph and less	0.2 to 1 mile
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
  - Law enforcement.
  - Flagger stationed next to sign.
  - Portable changeable message sign (PCMS).
  - Low-power (drone) radar transmitter.
  - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

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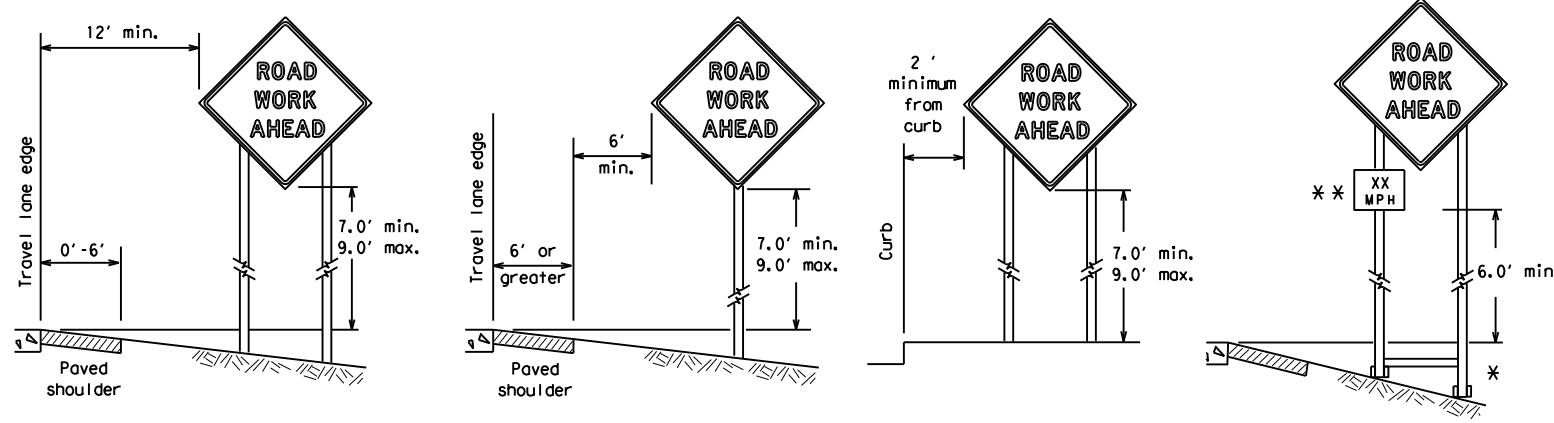
SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC (3) - 21</h3>			
FILE: bc-21.dgn	DW: TxDOT	CK: TxDOT	CR: TxDOT
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REVISIONS		0087 02	059, ETC. SH 359, ETC.
9-07 8-14	DIST	COUNTY	SHEET NO.
7-13 5-21	CRP	JIM WELLS, ETC.	13

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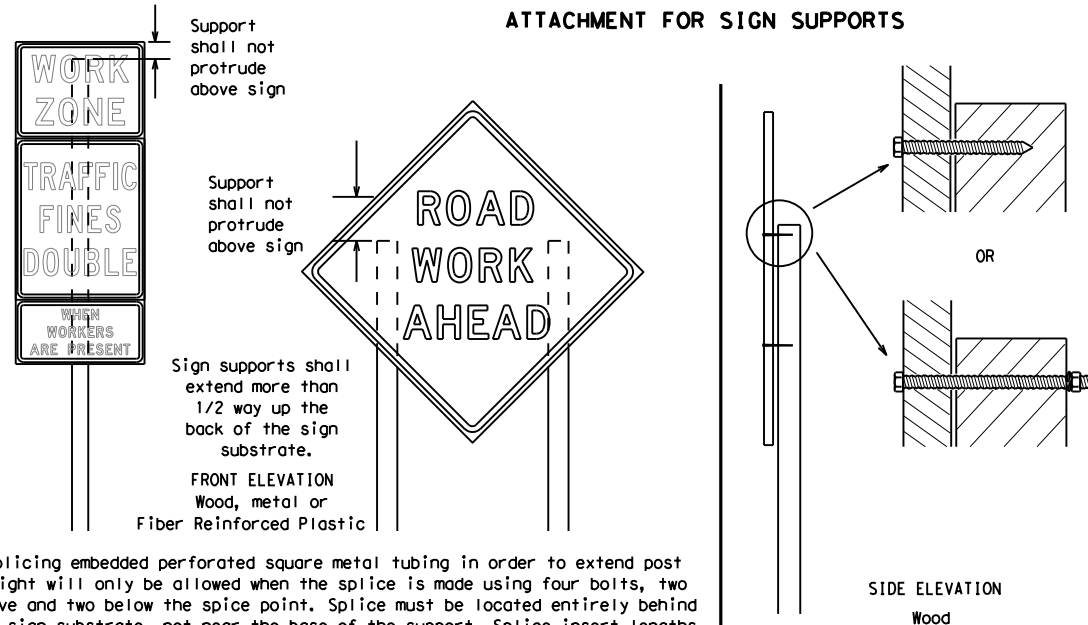
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



\* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

\*\* When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

**ATTACHMENT FOR SIGN SUPPORTS**



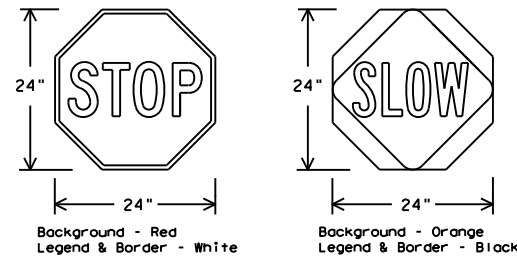
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

**Nails shall NOT be allowed.**  
 Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the splice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

**STOP/SLOW PADDLES**

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflective when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

**CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS**

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRs standard sheets or the CWZTC list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

**GENERAL NOTES FOR WORK ZONE SIGNS**

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTC) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. 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 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

**DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)**

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
  - a. Long-term stationary - work that occupies a location more than 3 days.
  - b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
  - c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
  - d. Short, duration - work that occupies a location up to 1 hour.
  - e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

**SIGN MOUNTING HEIGHT**

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

**SIZE OF SIGNS**

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

**SIGN SUBSTRATES**

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTC lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

**REFLECTIVE SHEETING**

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B<sub>FL</sub> or Type C<sub>FL</sub>, shall be used for rigid signs with orange backgrounds.

**SIGN LETTERS**

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

**REMOVING OR COVERING**

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. 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.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

**SIGN SUPPORT WEIGHTS**

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. 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 CWZTC list.
7. 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.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

**FLAGS ON SIGNS**

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

SHEET 4 OF 12



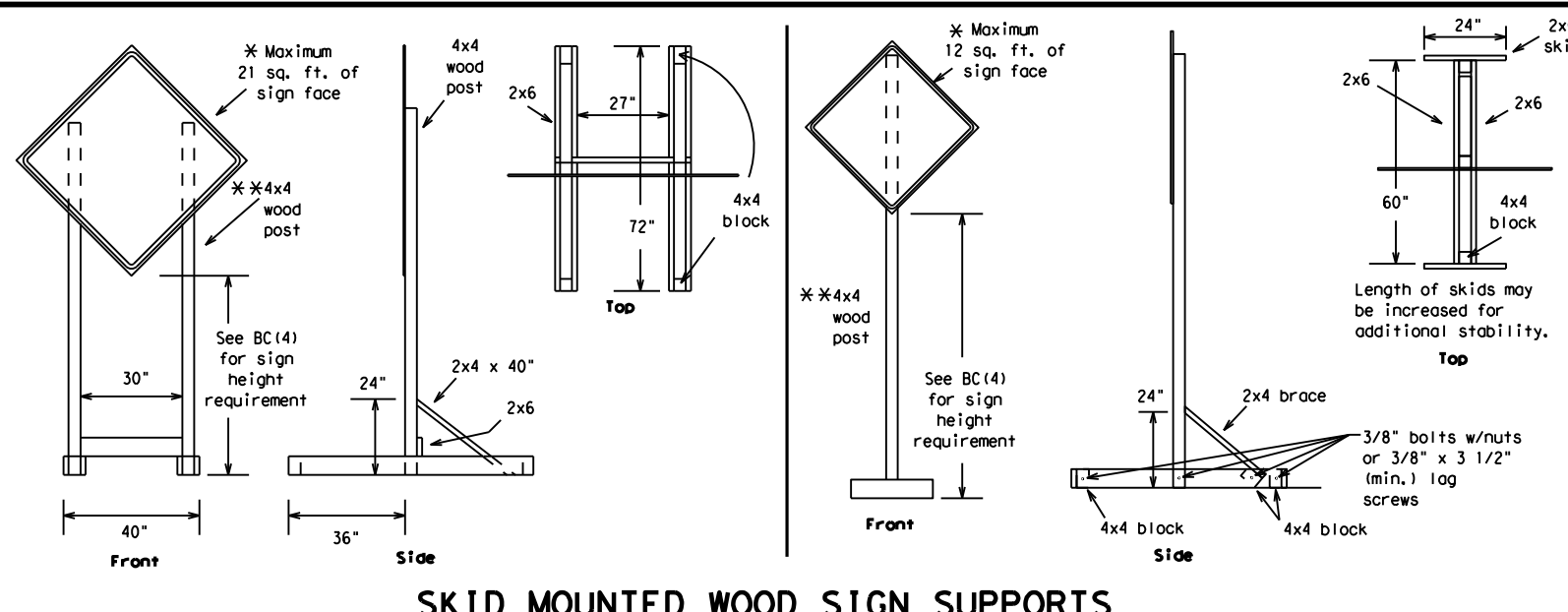
**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

**BC (4) - 21**

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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0087	02	059, ETC.		SH	359, ETC.		
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	CRP	JIM WELLS, ETC.		14				

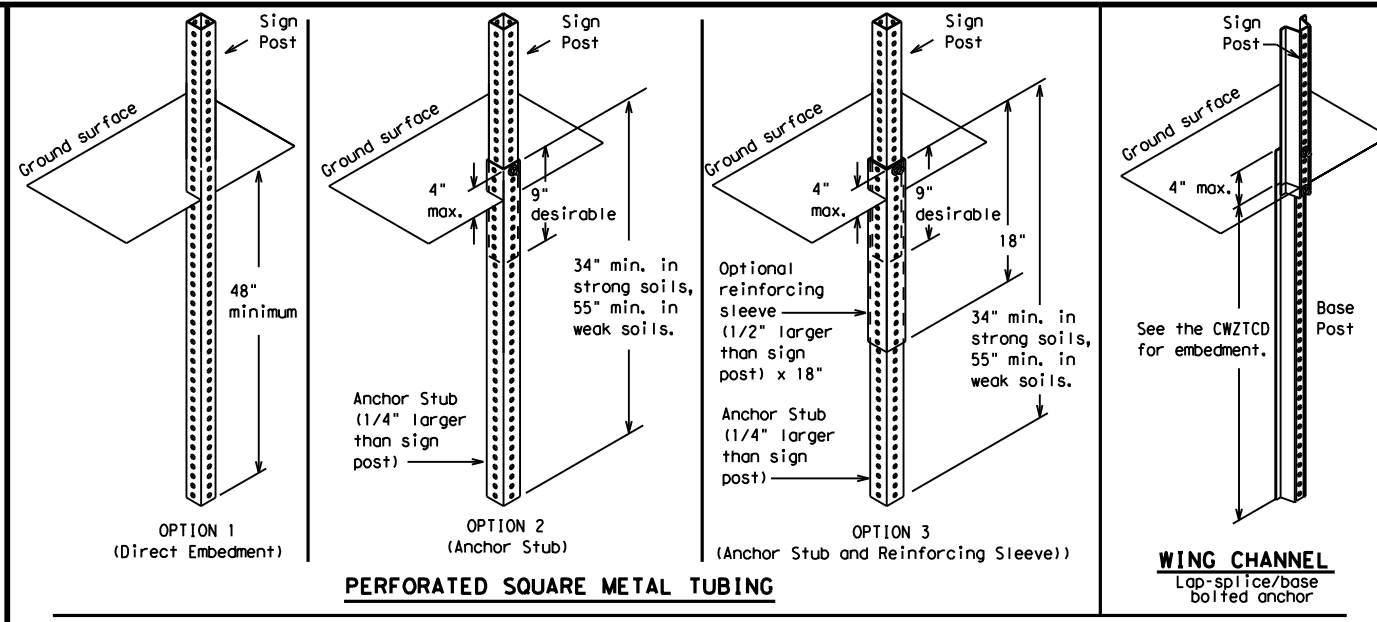
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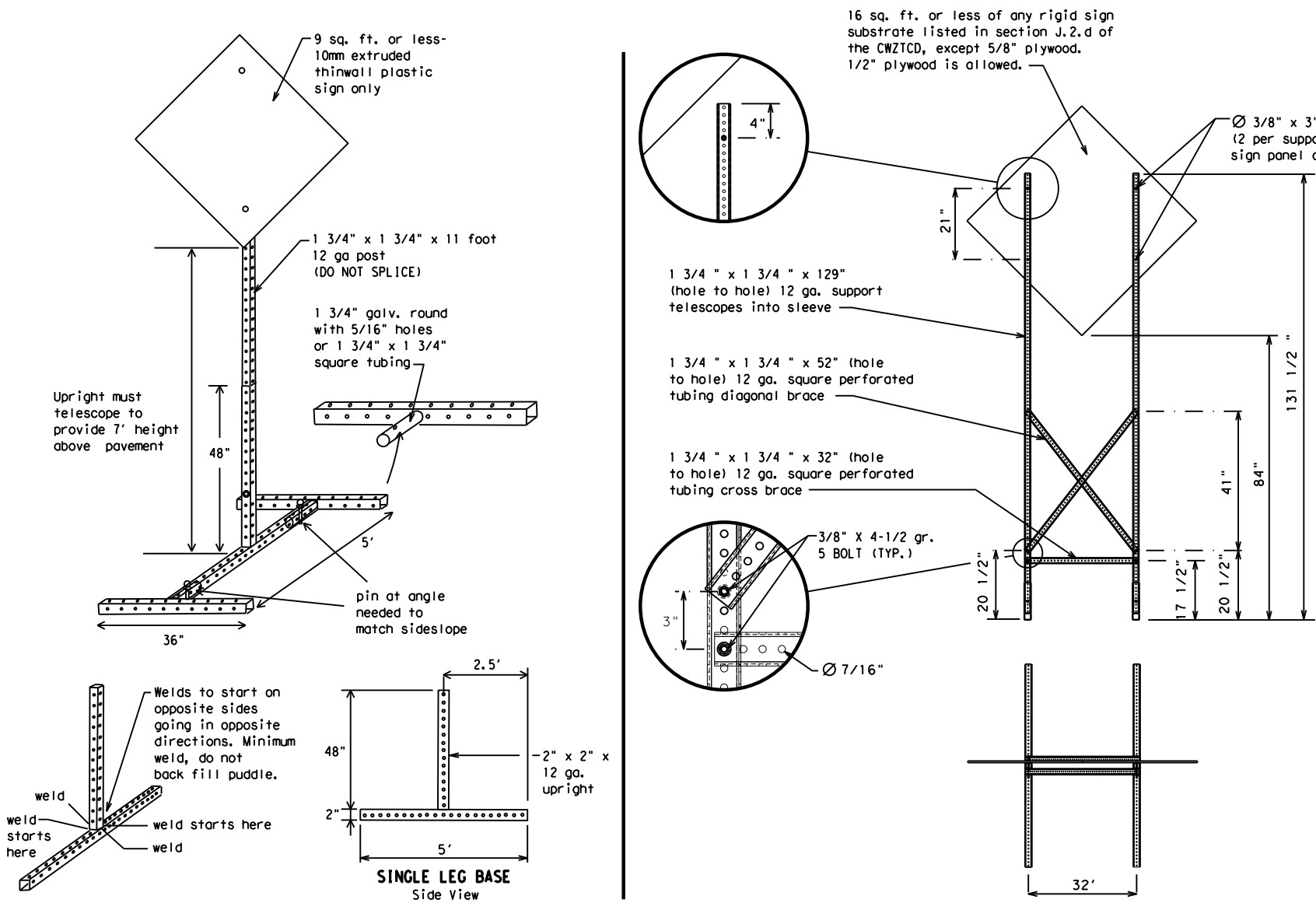
### SKID MOUNTED WOOD SIGN SUPPORTS

\* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



### GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support. The maximum sign square footage shall adhere to the manufacturer's recommendation. Two post installations can be used for larger signs.



### SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

\* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

**WEDGE ANCHORS**  
 Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

**OTHER DESIGNS**  
 MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

- GENERAL NOTES**
- Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
  - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
  - When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
- \* See BC(4) for definition of "Work Duration."  
 \*\* Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.  
 See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

## BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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7-13	5-21	CRP:	JIM WELLS, ETC.	15					



WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

## PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
- Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- Each line of text should be centered on the message board rather than left or right justified.
- If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

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WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

Roadway designation # IH-number, US-number, SH-number, FM-number

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

### Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI
ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT
ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
LANES SHIFT *

\* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

MERGE RIGHT
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

### Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXXX TO XXXXXXX
US XXX TO FM XXXX

### Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

### \*\* Advance Notice List

TUE-FRI XX AM-X PM
APR XX-XX X PM-X AM
BEGINS MONDAY
BEGINS MAY XX
MAY X-X XX PM-XX AM
NEXT FRI-SUN
XX AM TO XX PM
NEXT TUE AUG XX
TONIGHT XX PM-XX AM

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
- For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

## WORDING ALTERNATIVES

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

## FULL MATRIX PCMS SIGNS

- When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
- When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
- When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
- A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

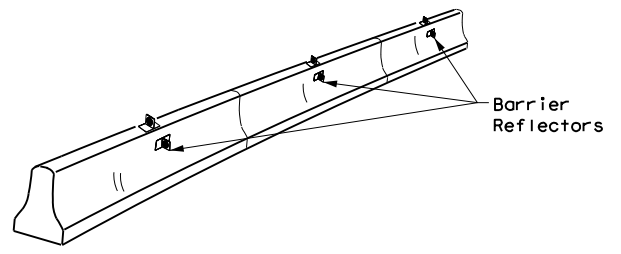
SHEET 6 OF 12

<h3>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</h3>			
<h2>BC (6) - 21</h2>			
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© TxDOT	November 2002	CONT:	SECT:
REVISIONS	0087 02	JOB	HIGHWAY
9-07 8-14	059, ETC.	SH 359, ETC.	
7-13 5-21	DIST:	COUNTY:	SHEET NO.
	CRP	JIM WELLS, ETC.	16

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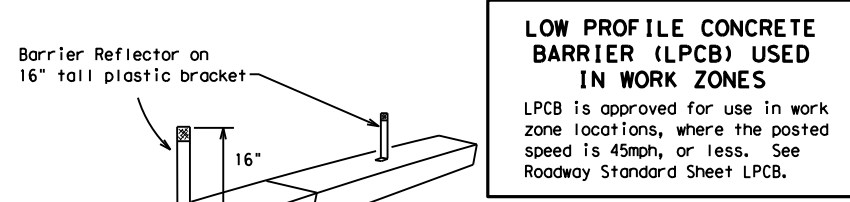
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



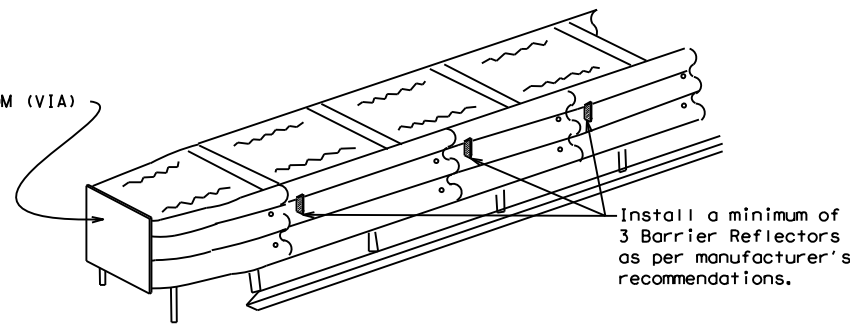
**CONCRETE TRAFFIC BARRIER (CTB)**

- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
- Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.



**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**  
 LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

**LOW PROFILE CONCRETE BARRIER (LPCB)**



**DELINEATION OF END TREATMENTS**

**END TREATMENTS FOR CTB'S USED IN WORK ZONES**  
 End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

**BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS**

**WARNING LIGHTS**

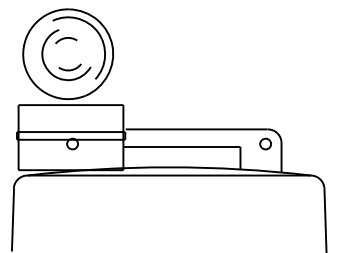
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B<sub>FL</sub> or C<sub>FL</sub> Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

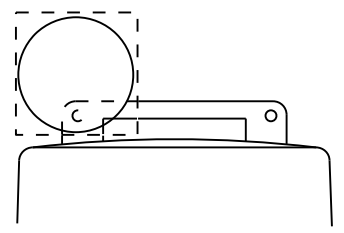
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
- Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

**WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS**

- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



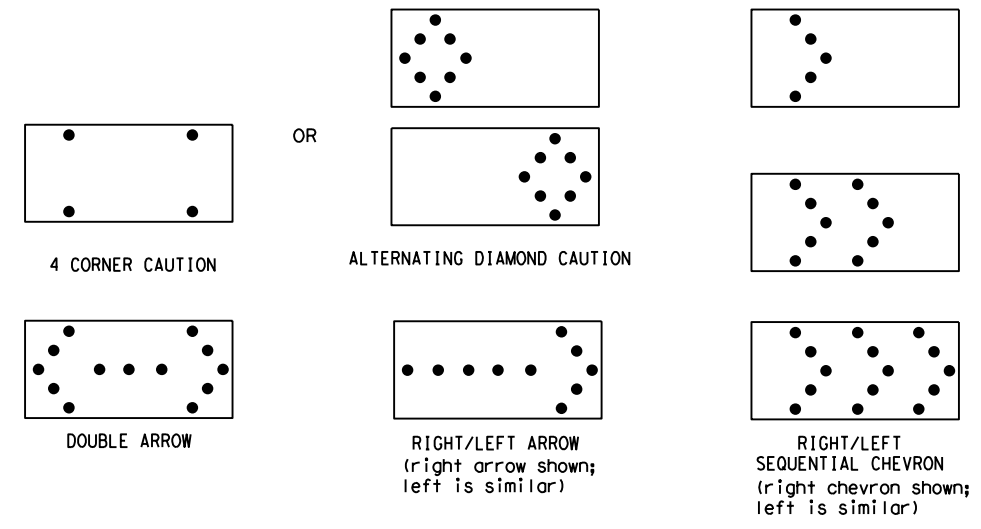
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

- The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
- Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
- The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
- Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

**ATTENTION**  
 Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

**FLASHING ARROW BOARDS**

SHEET 7 OF 12

**TRUCK-MOUNTED ATTENUATORS**

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation  
 Traffic Safety Division Standard

**BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR**

**BC (7) - 21**

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0087	02	059, ETC.		SH	359, ETC.		
9-07	8-14	DIST		COUNTY	SHEET NO.				
7-13	5-21	CRP	JIM WELLS, ETC.		17				

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**GENERAL NOTES**

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
- For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
- 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 Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

**GENERAL DESIGN REQUIREMENTS**

Pre-qualified plastic drums shall meet the following requirements:

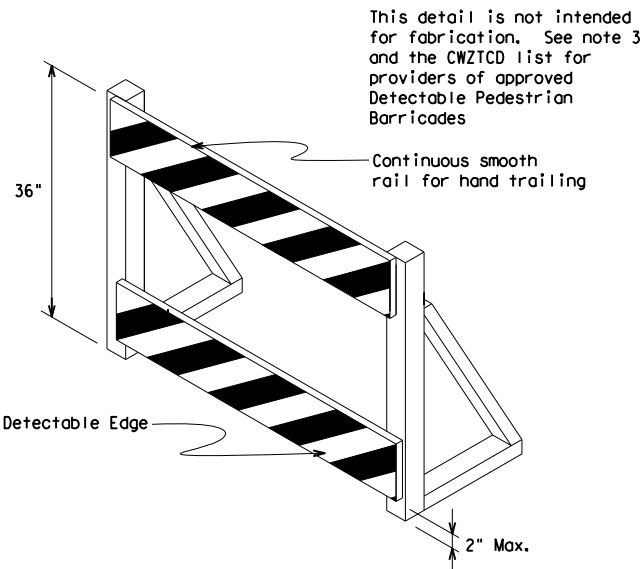
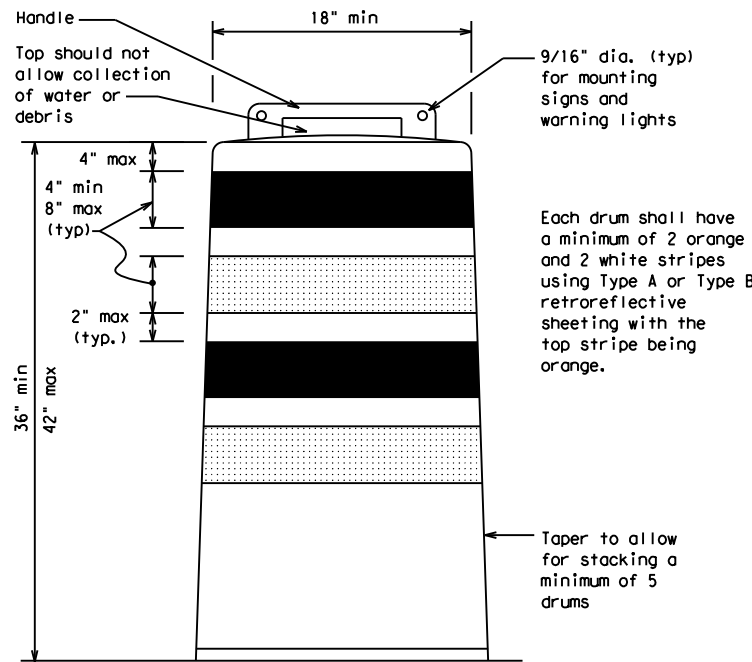
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
- Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
- The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
- The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectORIZED space between any two adjacent stripes shall not exceed 2 inches in width.
- Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

**RETROREFLECTIVE SHEETING**

- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

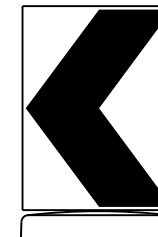
**BALLAST**

- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.

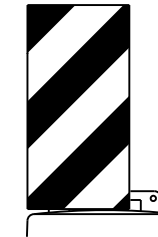


**DETECTABLE PEDESTRIAN BARRICADES**

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign  
(Maximum Sign Dimension)  
Chevron CW1-8, Opposing Traffic Lane  
Divider, Driveway sign D70a, Keep Right  
R4 series or other signs as approved  
by Engineer



12" x 24"  
Vertical Panel  
mount with diagonals  
sloping down towards  
travel way

Plywood, Aluminum or Metal sign  
substrates shall NOT be used on  
plastic drums

**SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS**

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12



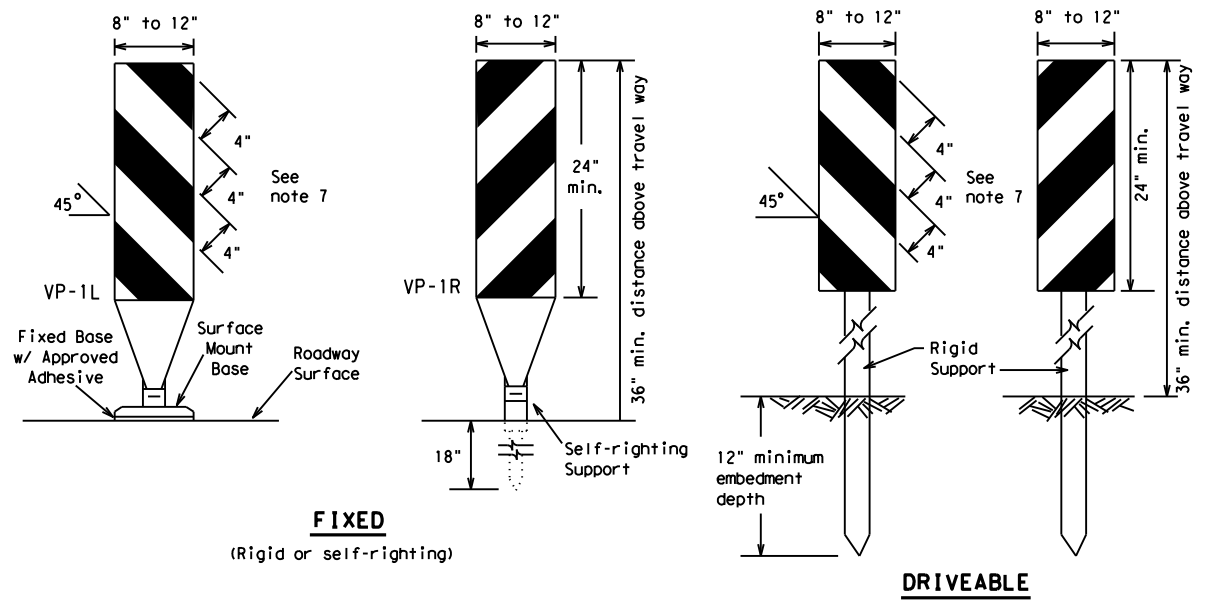
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 21**

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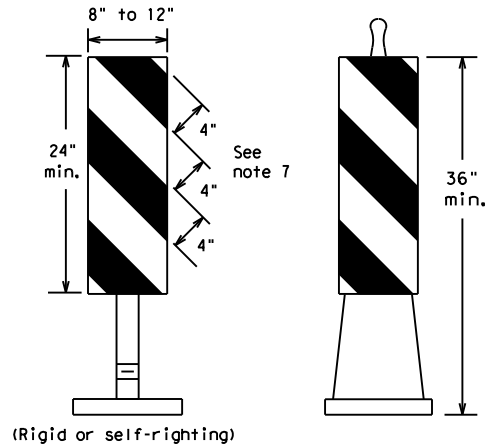
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**FIXED**  
(Rigid or self-righting)

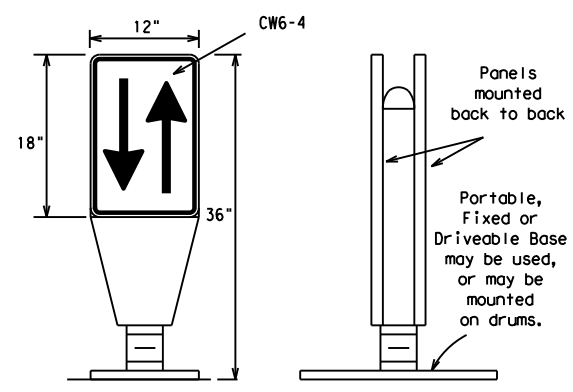
**DRIVEABLE**



**PORTABLE**

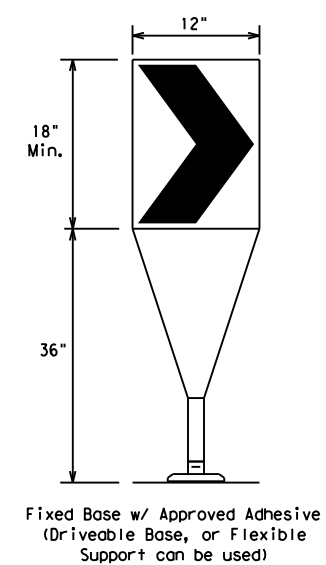
**VERTICAL PANELS (VPs)**

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
- VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



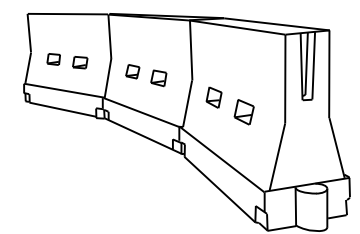
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

- LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

**HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS**

**GENERAL NOTES**

- Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
- Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed	Formula	Minimum Desirable Taper Lengths * *			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

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

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (9) - 21**

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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	JIM WELLS, ETC.	19	

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**TYPE 3 BARRICADES**

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. 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 for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

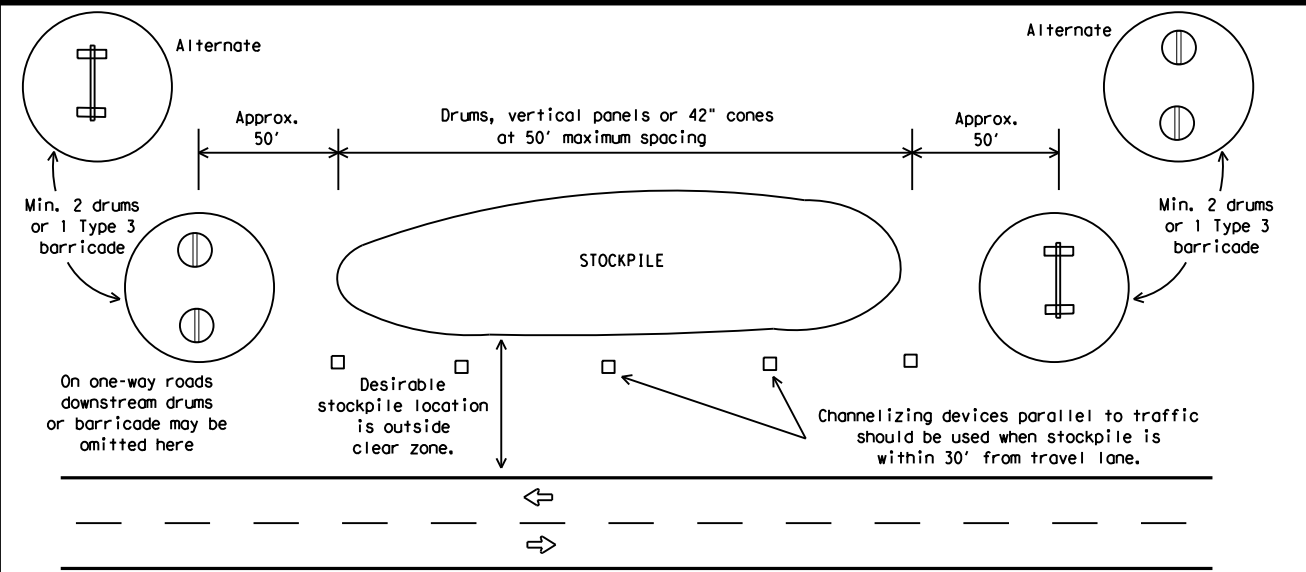
Barricades shall NOT be used as a sign support.



**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**

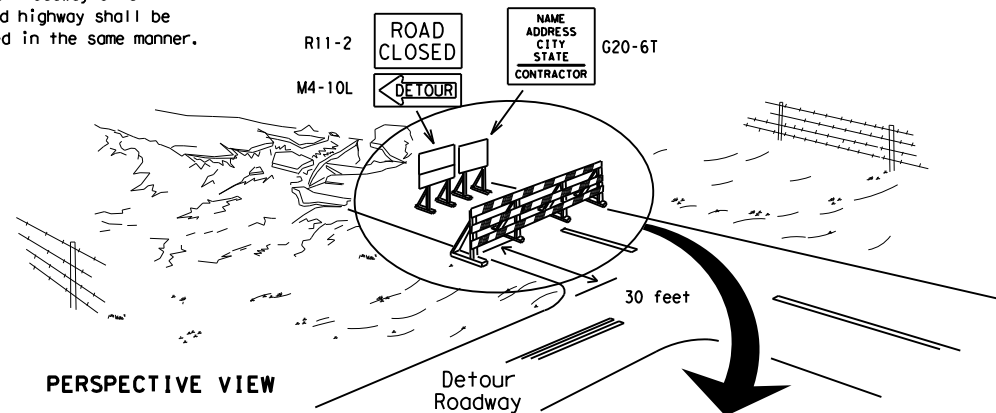


**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

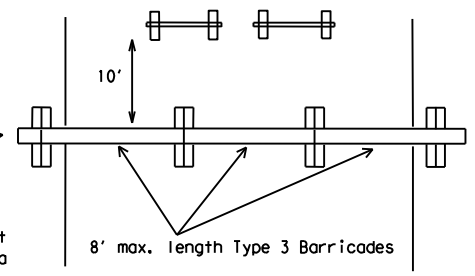
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

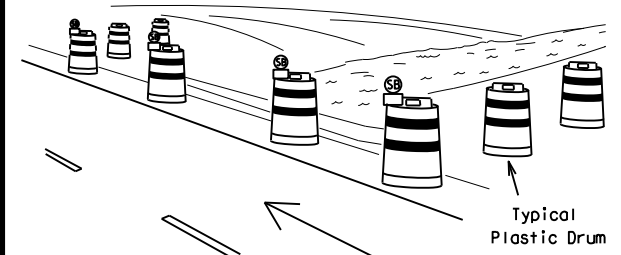
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

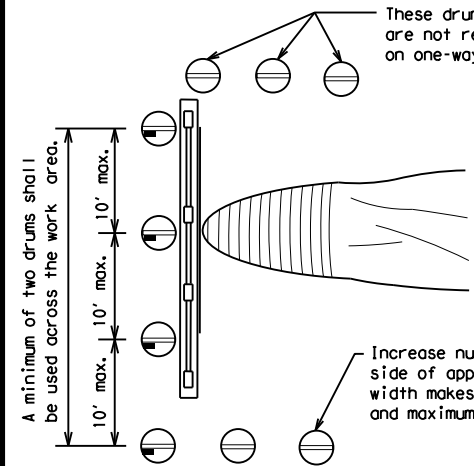


PLAN VIEW

**TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION**



PERSPECTIVE VIEW

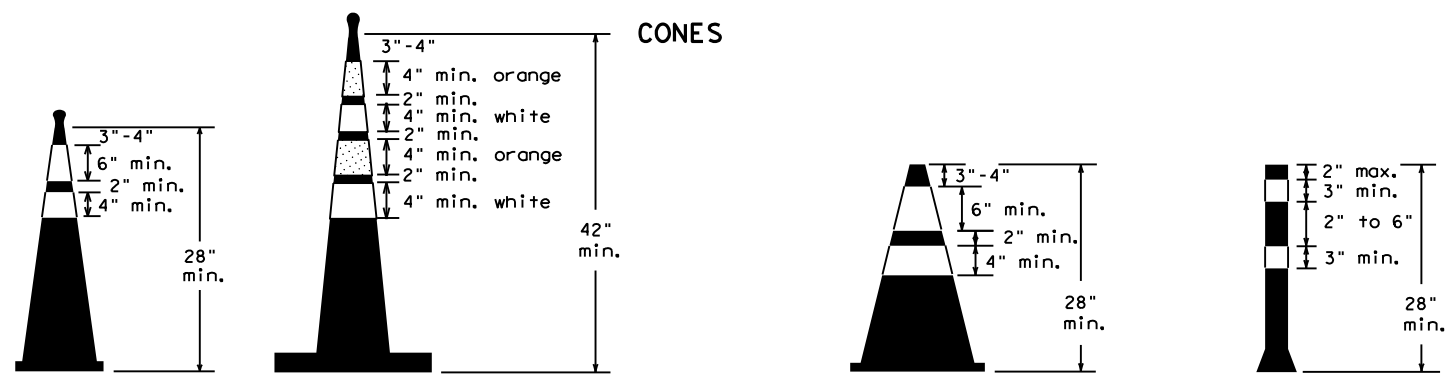


PLAN VIEW

1. Where positive redirection capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
	Steady burn warning light or yellow warning reflector

**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**



Two-Piece cones

One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.  
 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) -21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	CRP	JIM WELLS, ETC.	20	

## WORK ZONE PAVEMENT MARKINGS

### GENERAL

- The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

### RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

### PREFABRICATED PAVEMENT MARKINGS

- Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
- Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

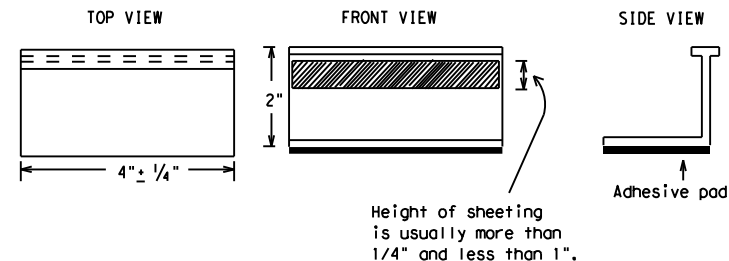
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

### REMOVAL OF PAVEMENT MARKINGS

- Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
- The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
- Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
- Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

## Temporary Flexible-Reflective Roadway Marker Tabs



**STAPLES OR NAILS SHALL NOT BE USED TO SECURE  
TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER  
TABS TO THE PAVEMENT SURFACE**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
  - Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
  - Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- Small design variances may be noted between tab manufacturers.
- See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:  
 YELLOW - (two amber reflective surfaces with yellow body).  
 WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

**BC(11)-21**

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS		0087	02	059, ETC. SH 359, ETC.
2-98	9-07	5-21		
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11-02	8-14			
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	CRP	JIM WELLS, ETC.		21

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## PAVEMENT MARKING PATTERNS



REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.



RAISED PAVEMENT MARKERS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN B

## CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



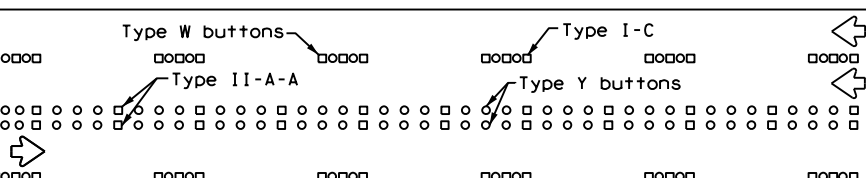
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



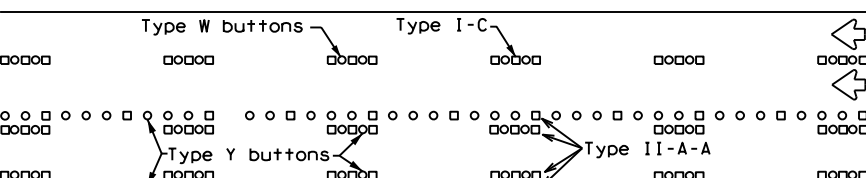
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

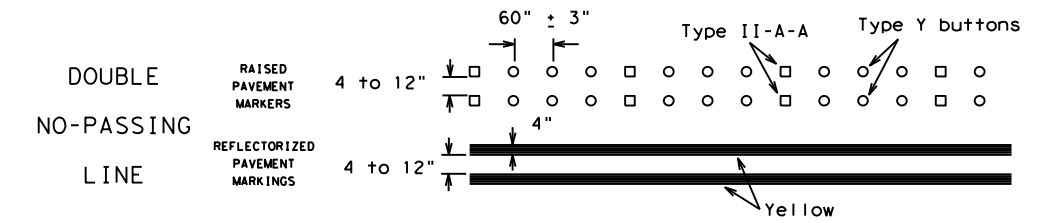
Prefabricated markings may be substituted for reflectorized pavement markings.



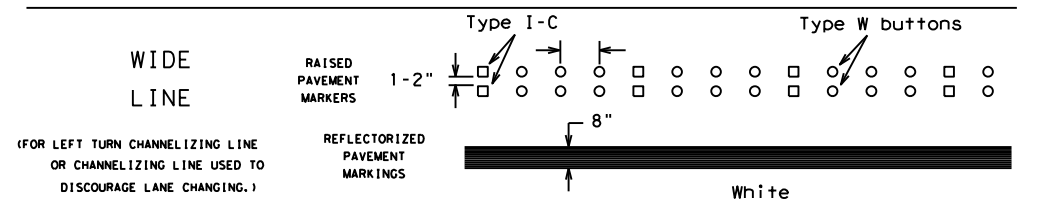
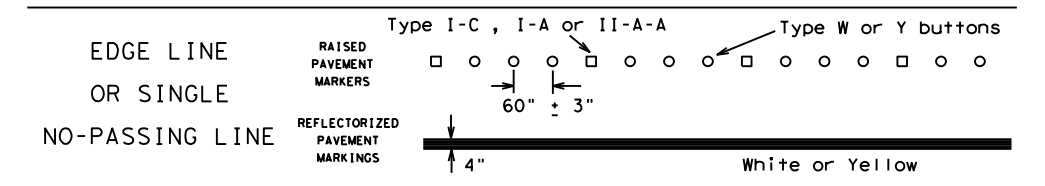
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

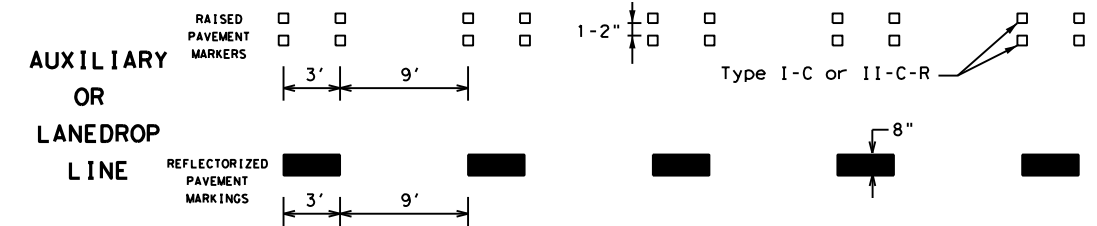
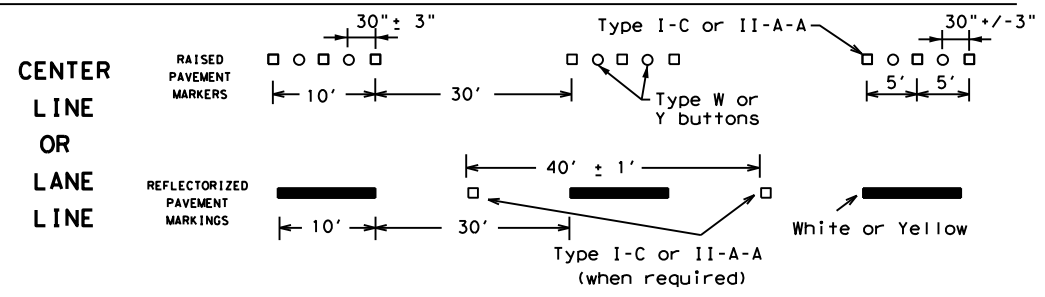
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### SOLID LINES

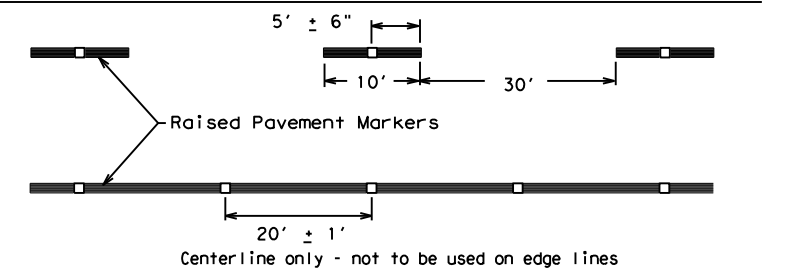


### BROKEN LINES



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
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REVISIONS	0087	02	059, ETC.	SH 359, ETC.
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	CRP	JIM WELLS, ETC.	22	
11-02 8-14				

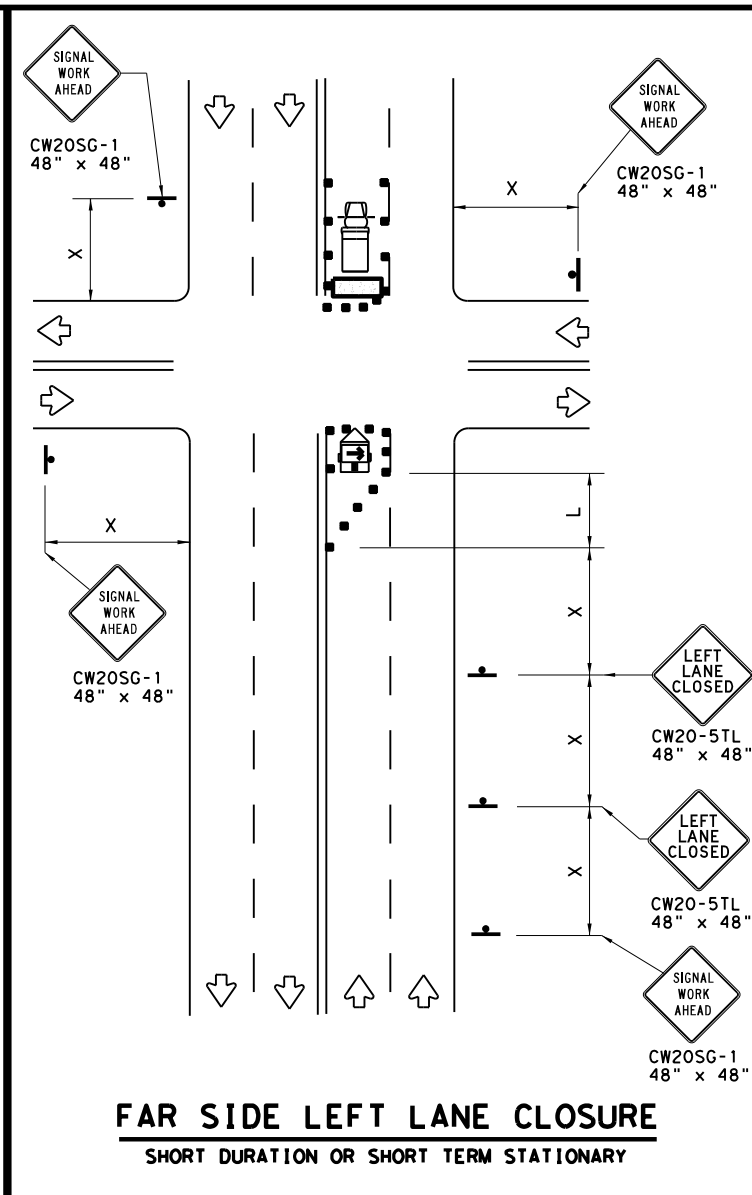
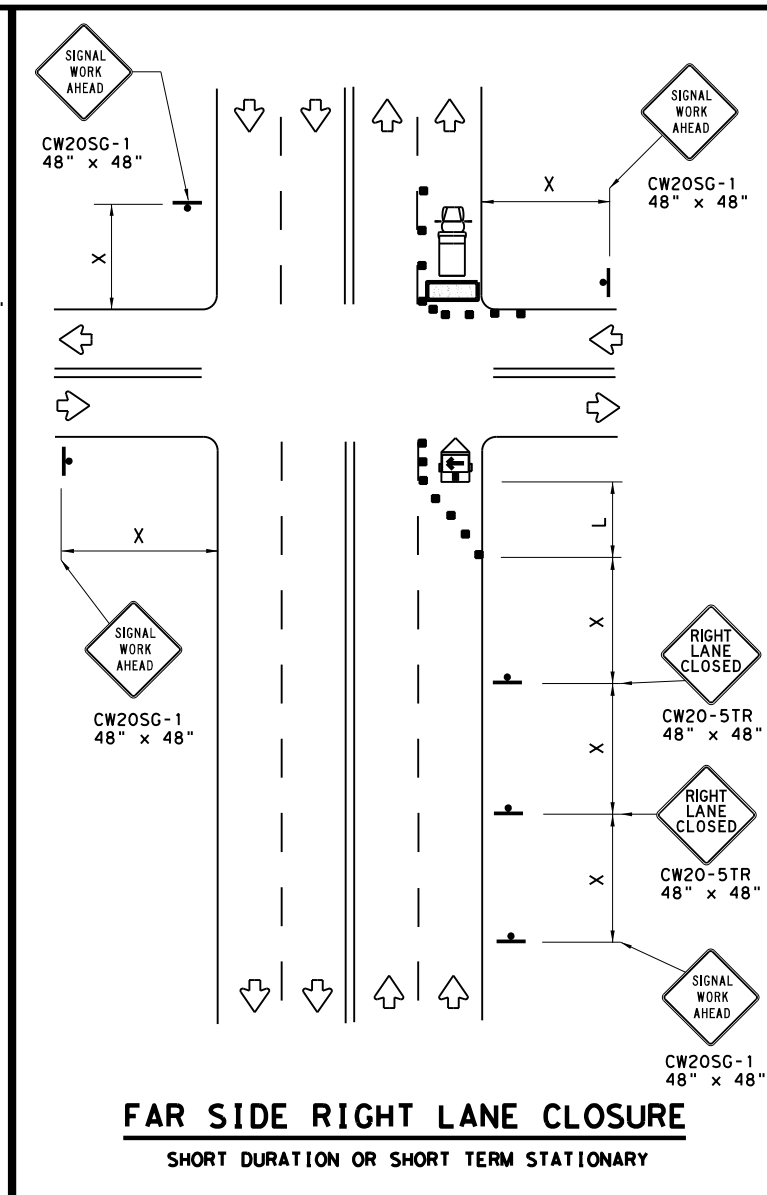
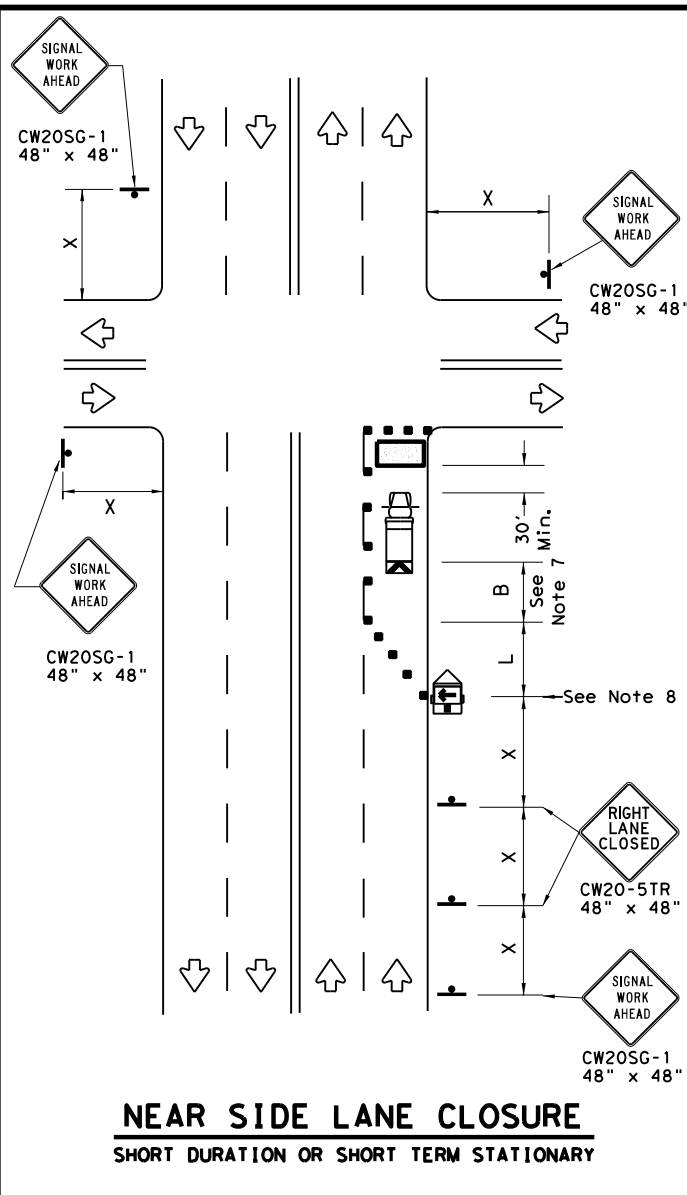
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

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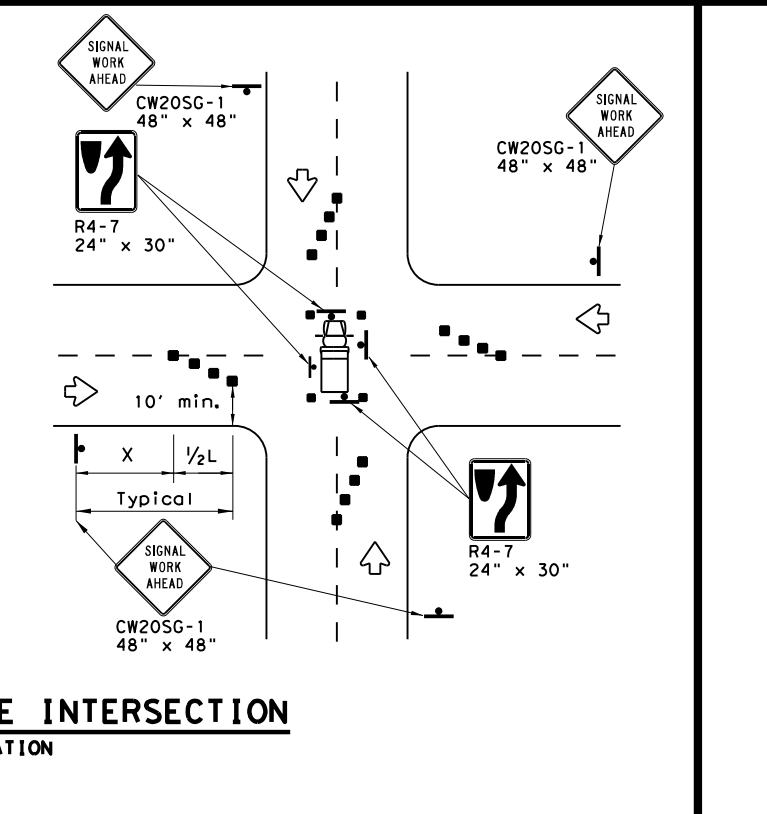
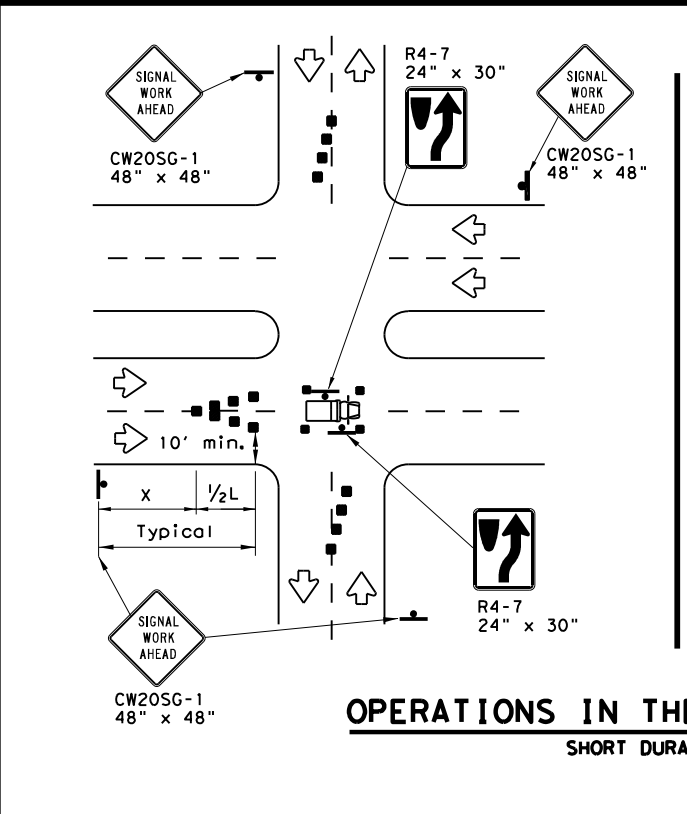
**LEGEND**

	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 **			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.**



**GENERAL NOTES**

1. 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.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. 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.
7. 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.
8. 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.
9. 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.

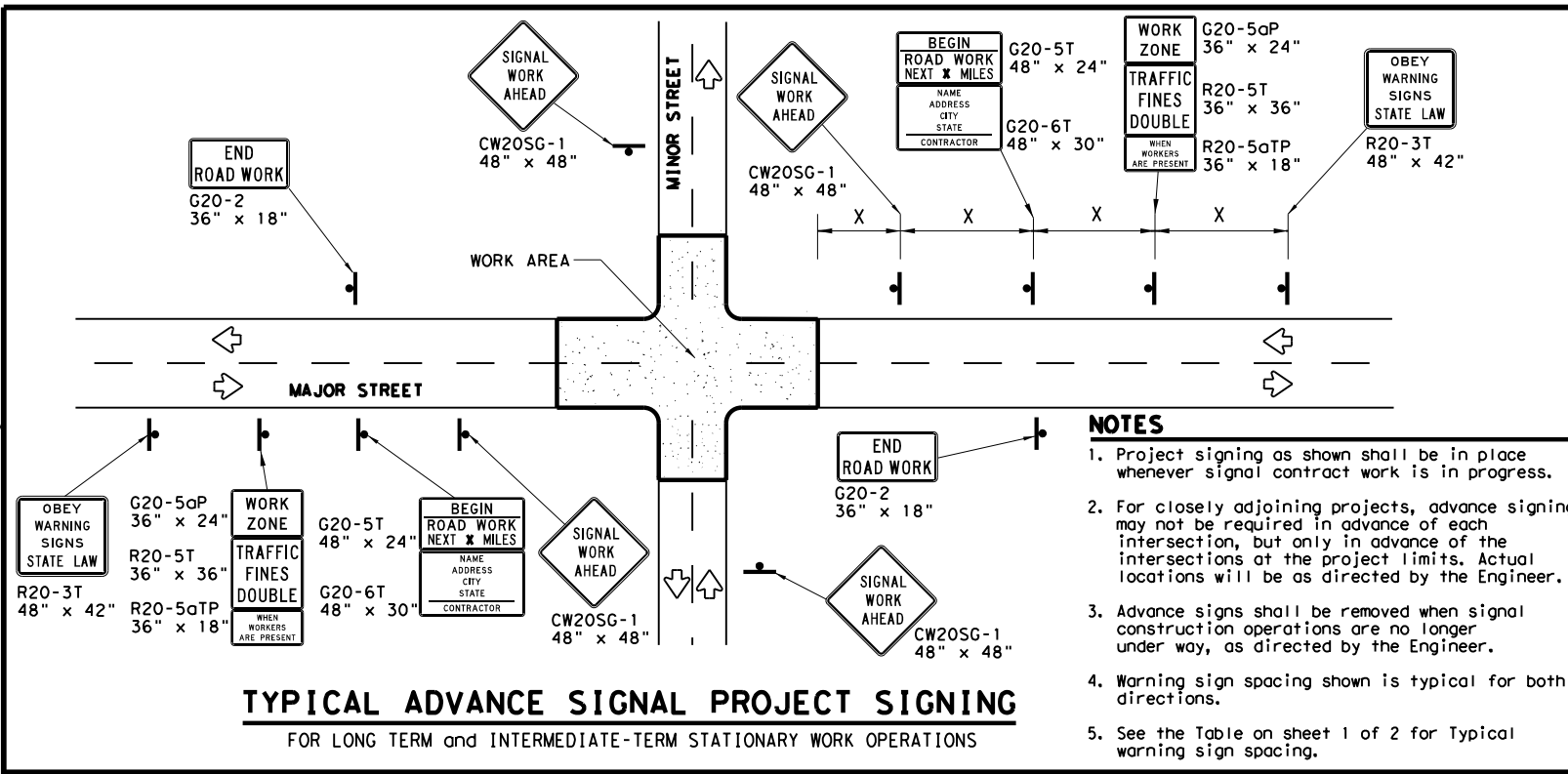
Texas Department of Transportation Traffic Operations Division Standard

**TRAFFIC SIGNAL WORK TYPICAL DETAILS**

**WZ(BTS-1)-13**

FILE: wzbts-13.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03	CRP	JIM WELLS, ETC.	23	

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

- NOTES**
1. Project signing as shown shall be in place whenever signal contract work is in progress.
  2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
  3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
  4. Warning sign spacing shown is typical for both directions.
  5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

**GENERAL NOTES FOR WORK ZONE SIGNS**

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. 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.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

**DURATION OF WORK**

1. Work zone durations are defined in Part 6, Section 60.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

**SIGN MOUNTING HEIGHT**

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. 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**

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. 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.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

**REFLECTIVE SHEETING**

1. 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**

1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
6. 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.
7. 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.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

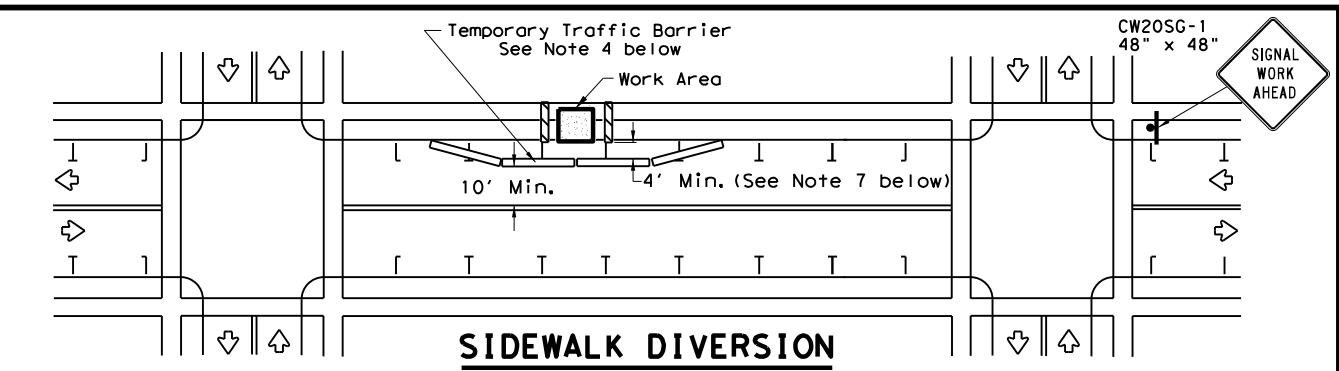
LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

**DEPARTMENTAL MATERIAL SPECIFICATIONS**

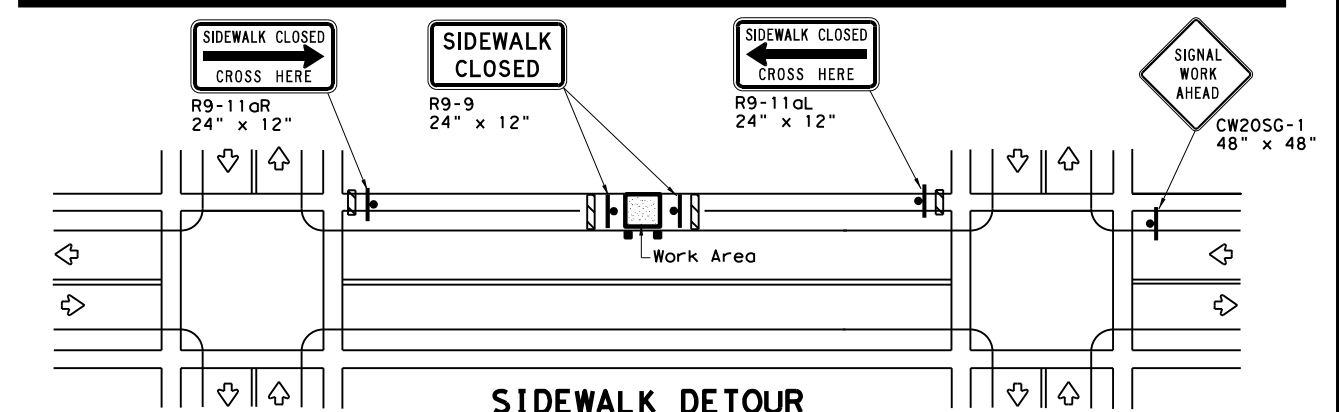
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B <sub>FL</sub> OR TYPE C <sub>FL</sub> SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

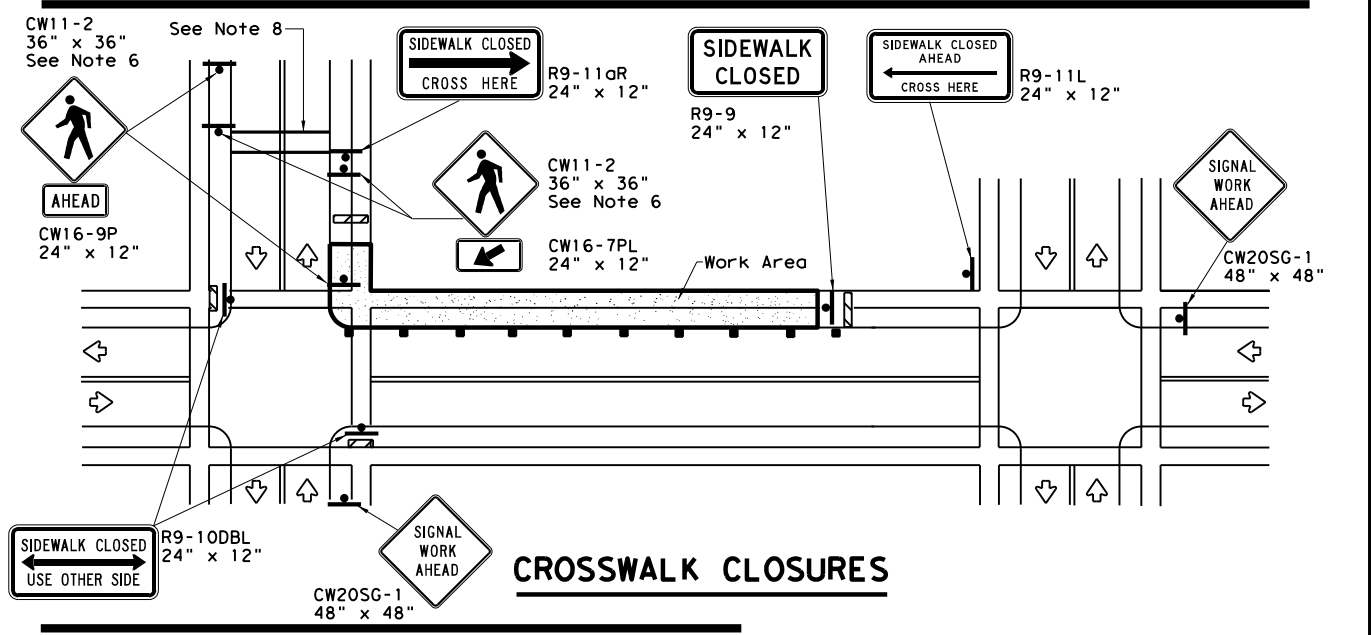
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:  
[http://www.txdot.gov/txdot\\_library/publications/construction.htm](http://www.txdot.gov/txdot_library/publications/construction.htm)



**SIDEWALK DIVERSION**



**SIDEWALK DETOUR**



**CROSSWALK CLOSURES**

**PEDESTRIAN CONTROL**

1. 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.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. 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.
4. 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.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. 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.

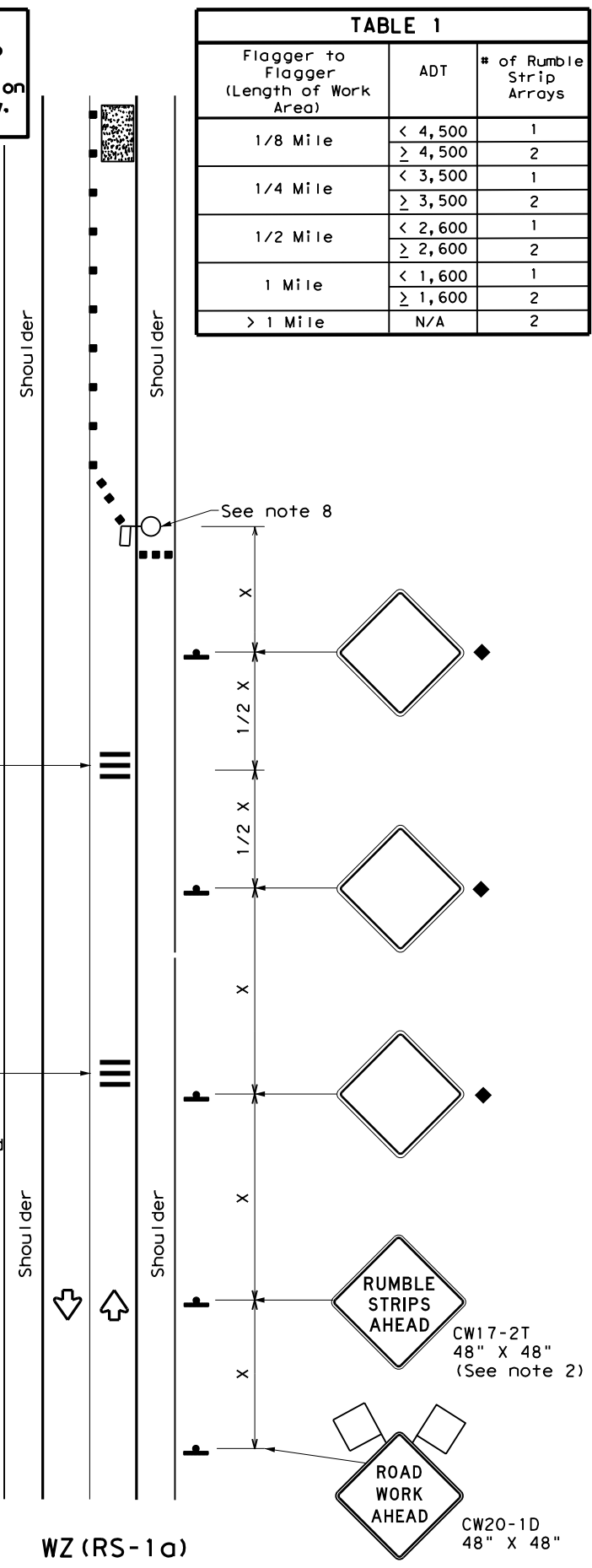
SHEET 2 OF 2

		Traffic Operations Division Standard	
<h2>TRAFFIC SIGNAL WORK BARRICADES AND SIGNS</h2>			
<h3>WZ (BTS-2) - 13</h3>			
FILE: wzbts-13.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT
© TxDOT April 1992	CONT	SECT	JOB
REVISIONS	0087	02	059, ETC.SH 359, ETC.
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.
4-98 3-03	CRP	JIM WELLS, ETC.	24

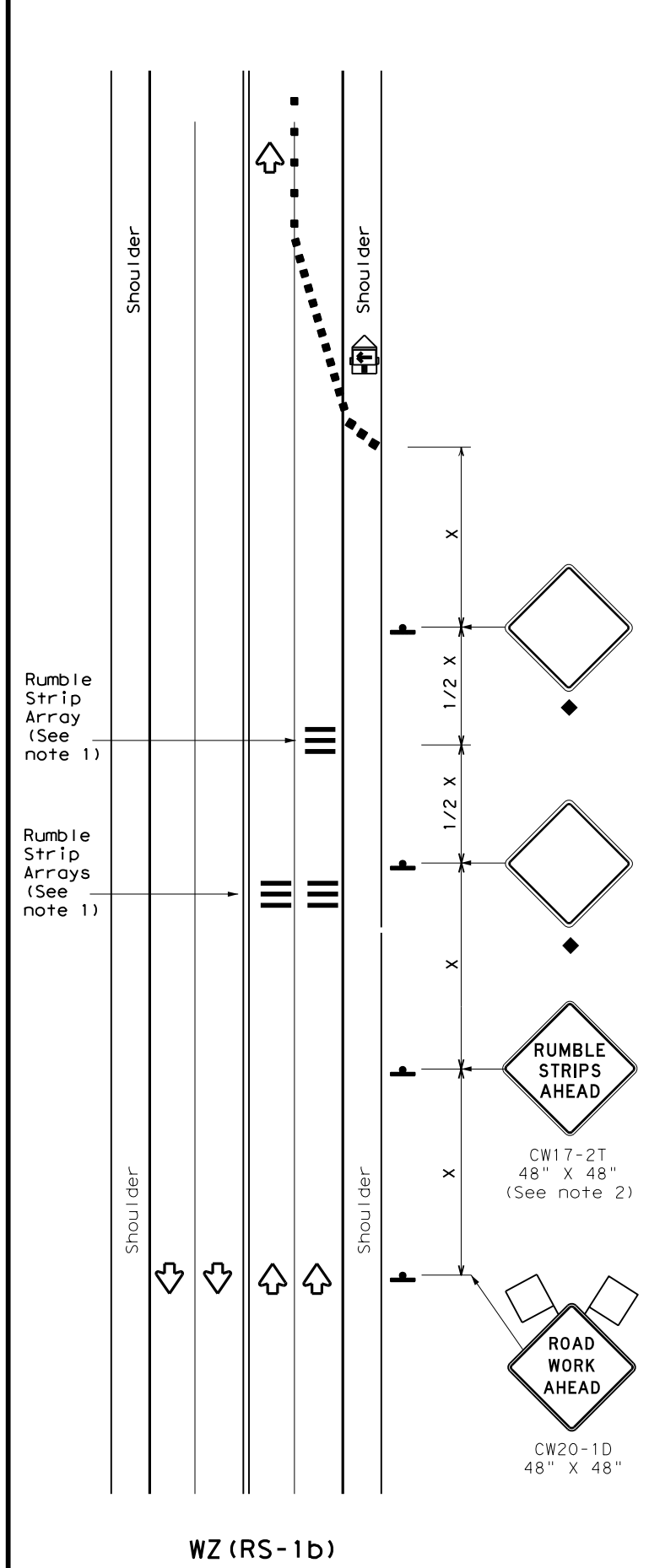
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Warning sign and rumble strip sequence in opposite direction is same as below.

Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



**RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION**



**RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY**

**GENERAL NOTES**

- Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
- The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD" sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
- Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
- Remove Temporary Rumble Strips before removing the advanced warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
- Replace defective Temporary Rumble Strips as directed by the Engineer.
- Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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 = WS / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40	L = WS	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L = WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60	L = WS	600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	L = WS	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)

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.  
 \* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

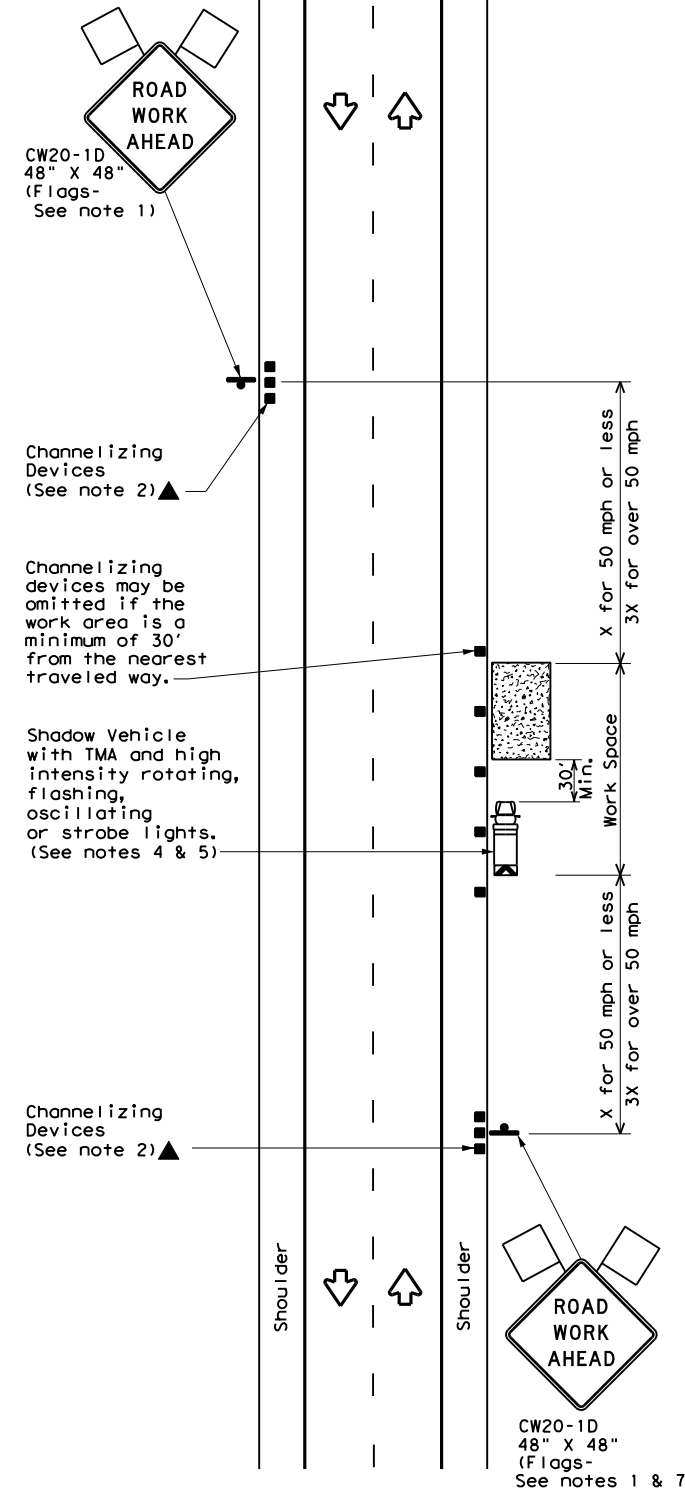
Texas Department of Transportation  
 Traffic Safety Division Standard

**TEMPORARY RUMBLE STRIPS**

**WZ (RS) - 22**

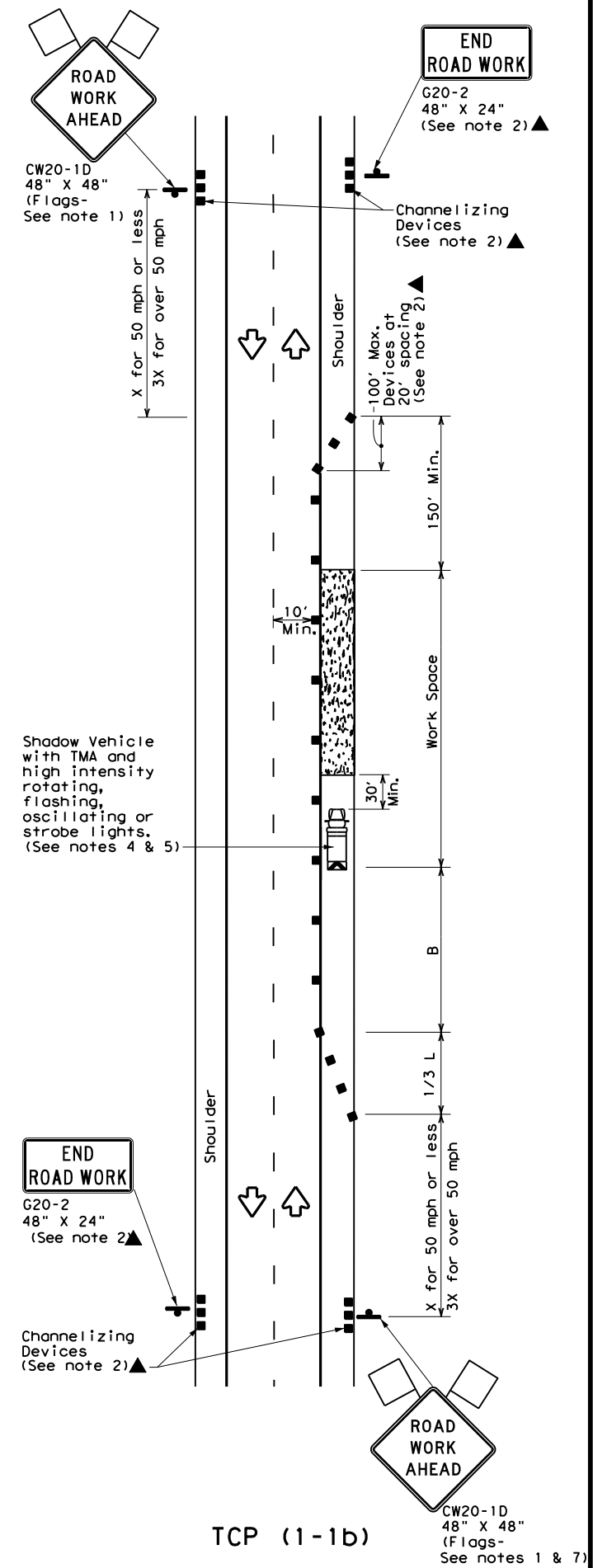
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© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
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2-14 1-22	DIST	COUNTY	SHEET NO.	
4-16	CRP	JIM WELLS, ETC.	25	

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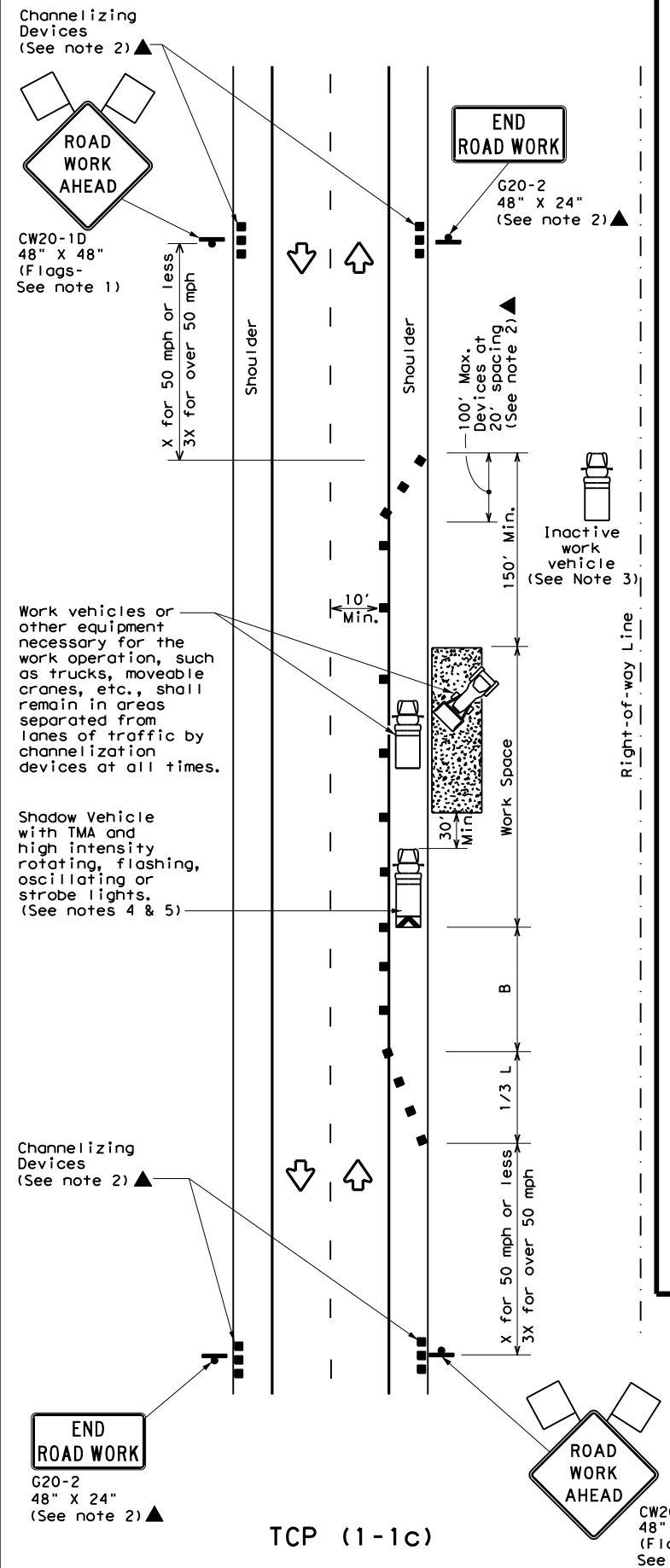
TCP (1-1a)

**WORK SPACE NEAR SHOULDER**  
 Conventional Roads



TCP (1-1b)

**WORK SPACE ON SHOULDER**  
 Conventional Roads



TCP (1-1c)

**WORK VEHICLES ON SHOULDER**  
 Conventional Roads

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 **			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)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
  - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
  - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

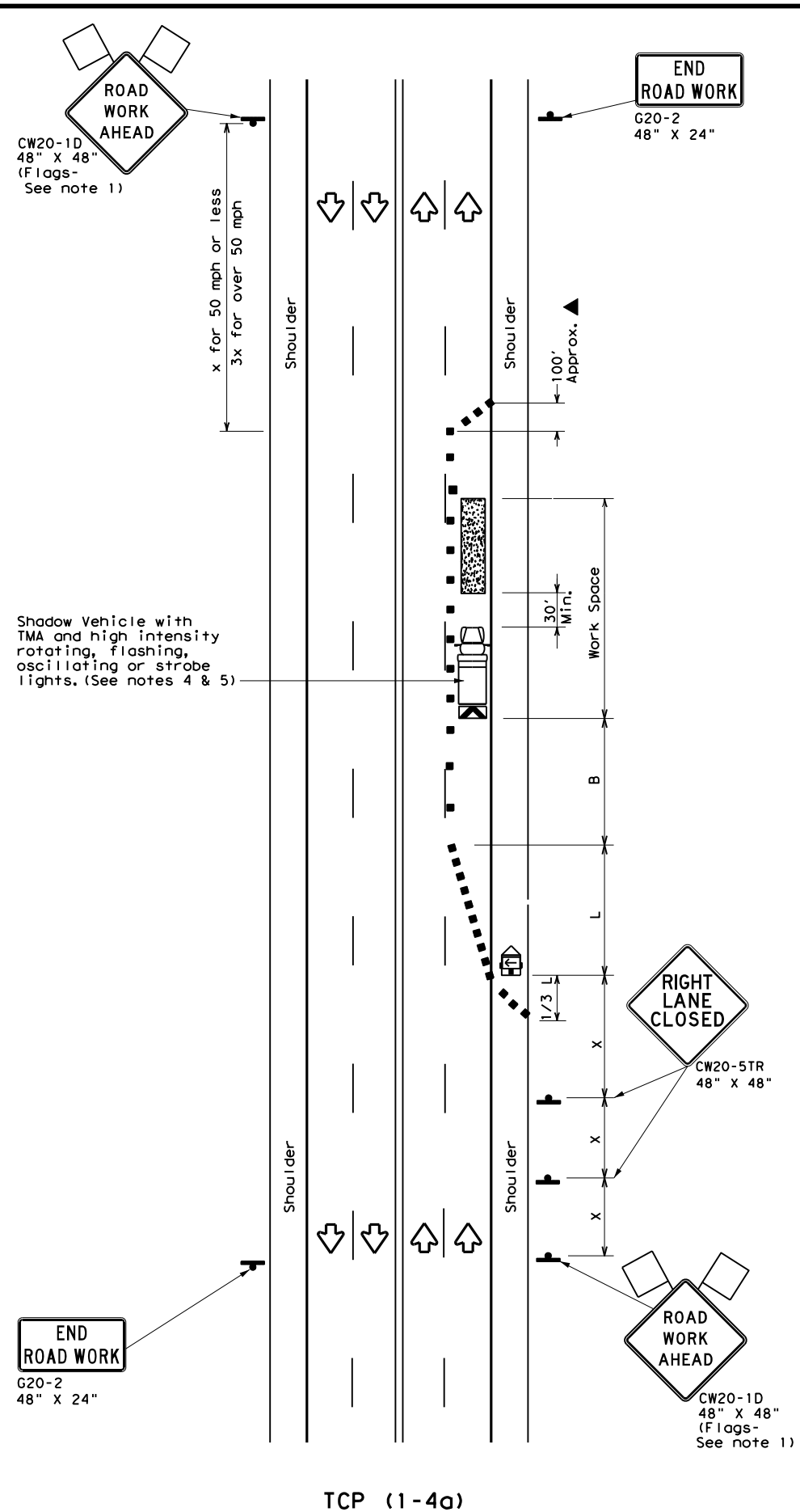


**TRAFFIC CONTROL PLAN**  
**CONVENTIONAL ROAD**  
**SHOULDER WORK**

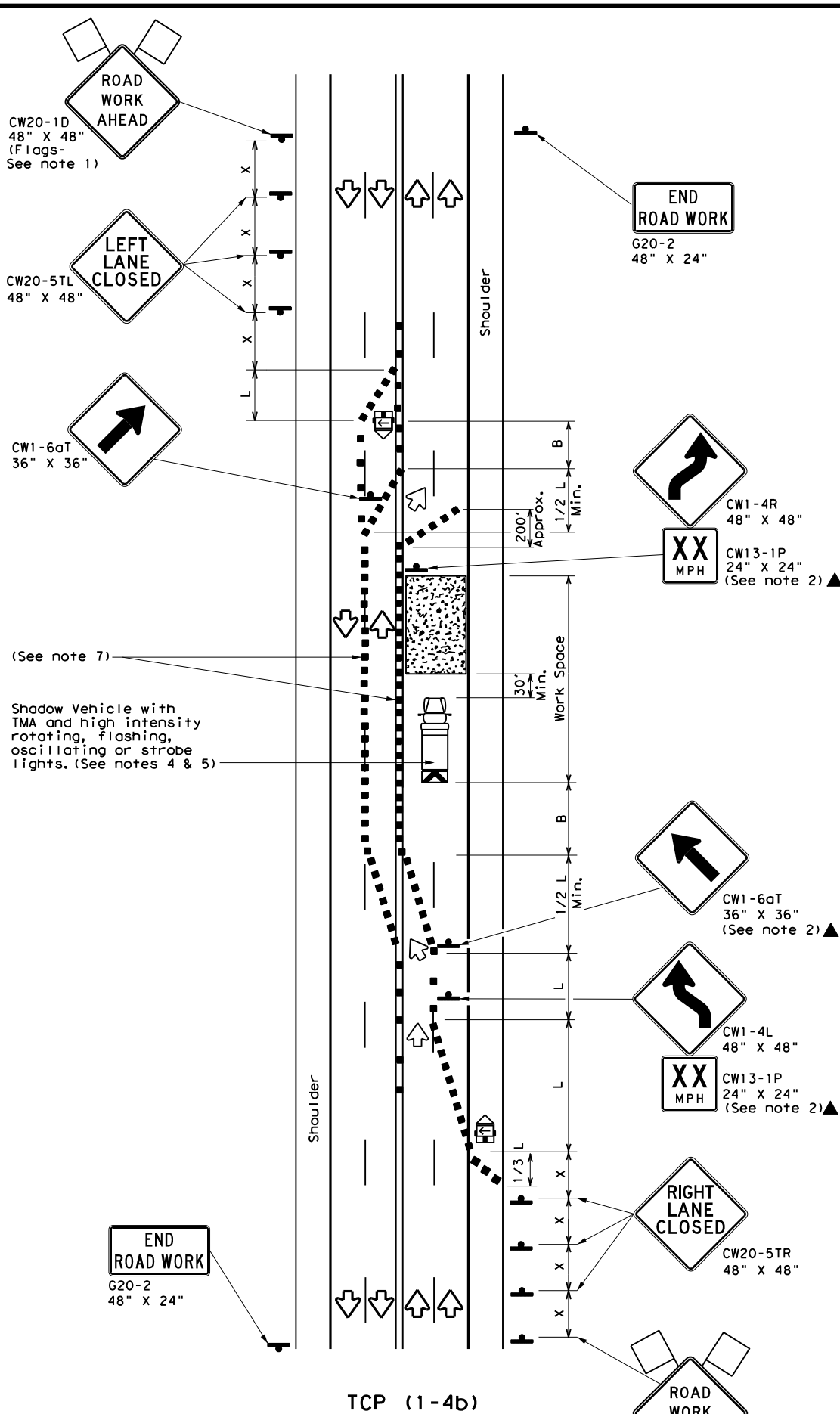
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2-94 4-98				
8-95 2-12				
1-97 2-18				
CRP	JIM WELLS, ETC.			26

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TCP (1-4a)  
**ONE LANE CLOSED**



TCP (1-4b)  
**TWO LANES CLOSED**

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 **			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)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

**TCP (1-4a)**

- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

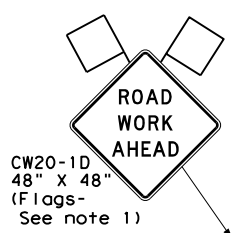
**TCP (1-4b)**

- Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

		Traffic Operations Division Standard	
<b>TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS</b>			
<b>TCP (1-4) - 18</b>			
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CRP		JIM WELLS, ETC.	
			SHEET NO. 27

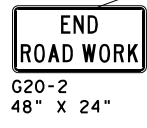
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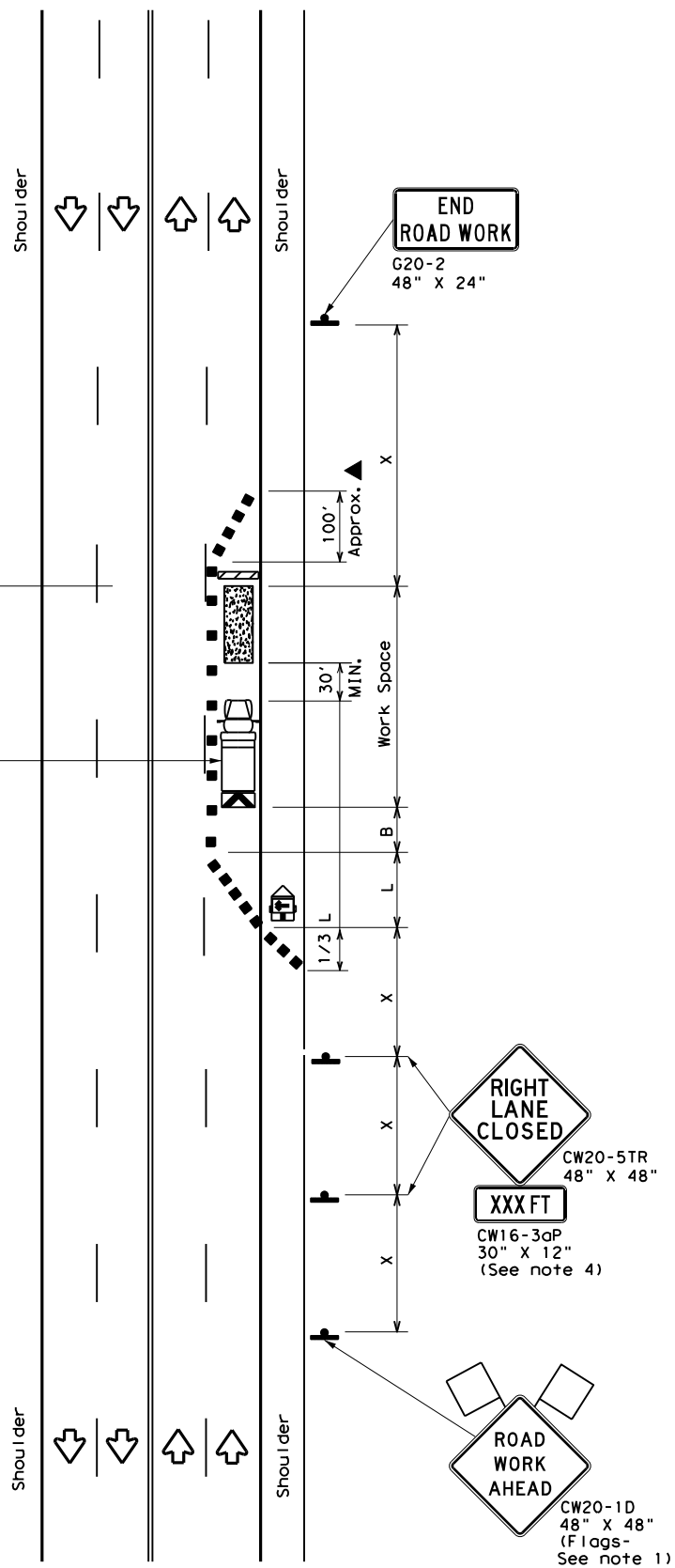


CW20-1D  
48" X 48"  
(Flags-  
See note 1)

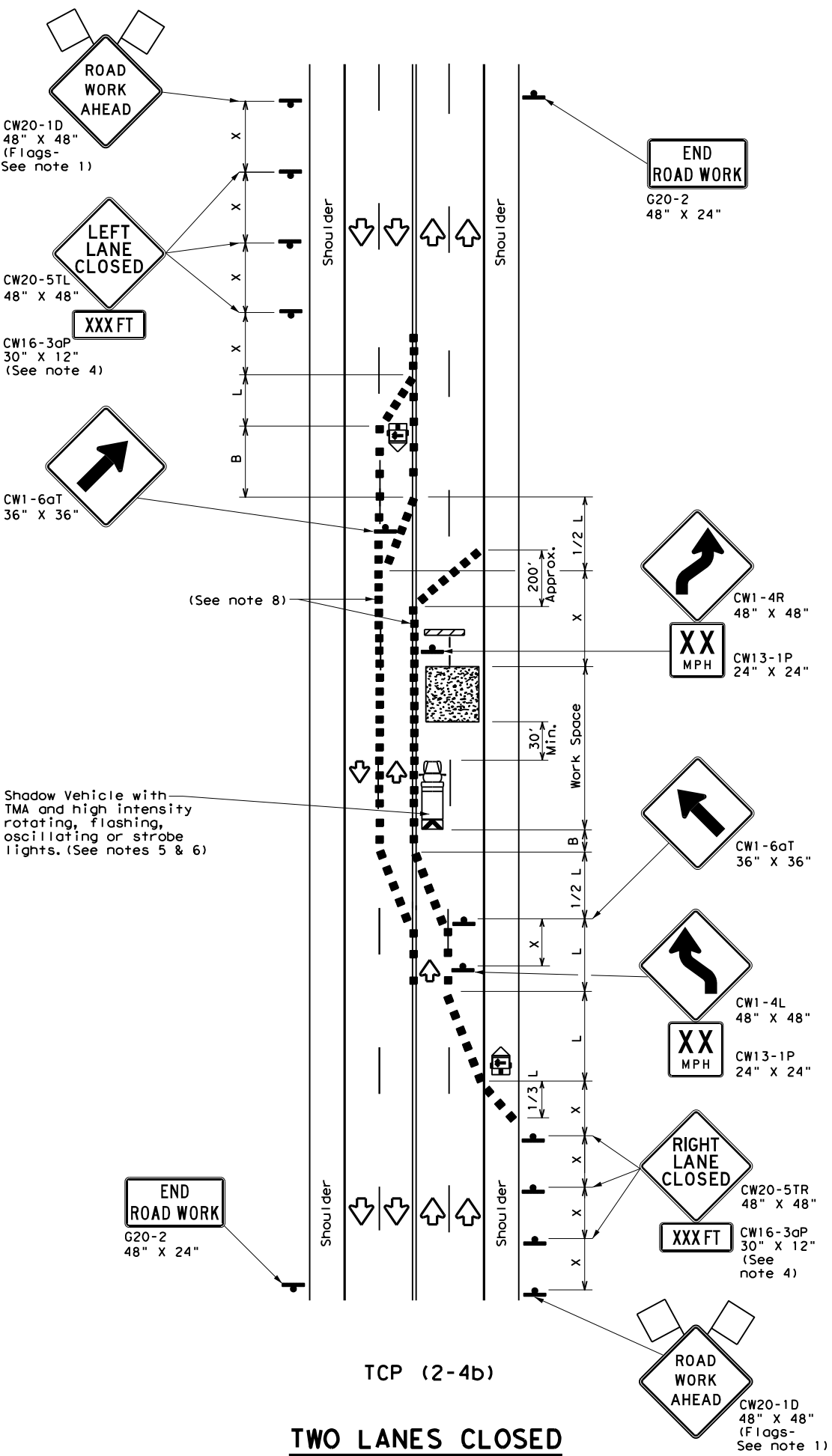
Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. (See notes 5 & 6)



G20-2  
48" X 24"



TCP (2-4a)  
**ONE LANE CLOSED**



TCP (2-4b)  
**TWO LANES CLOSED**

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 **			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 = WS <sup>2</sup> / 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)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓	✓	

**GENERAL NOTES**

- Flags attached to signs where shown, are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
- For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

**TCP (2-4a)**

- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

**TCP (2-4b)**

- For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

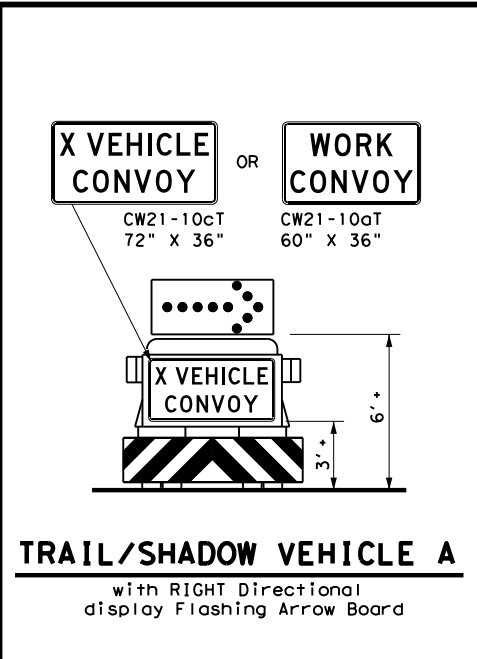
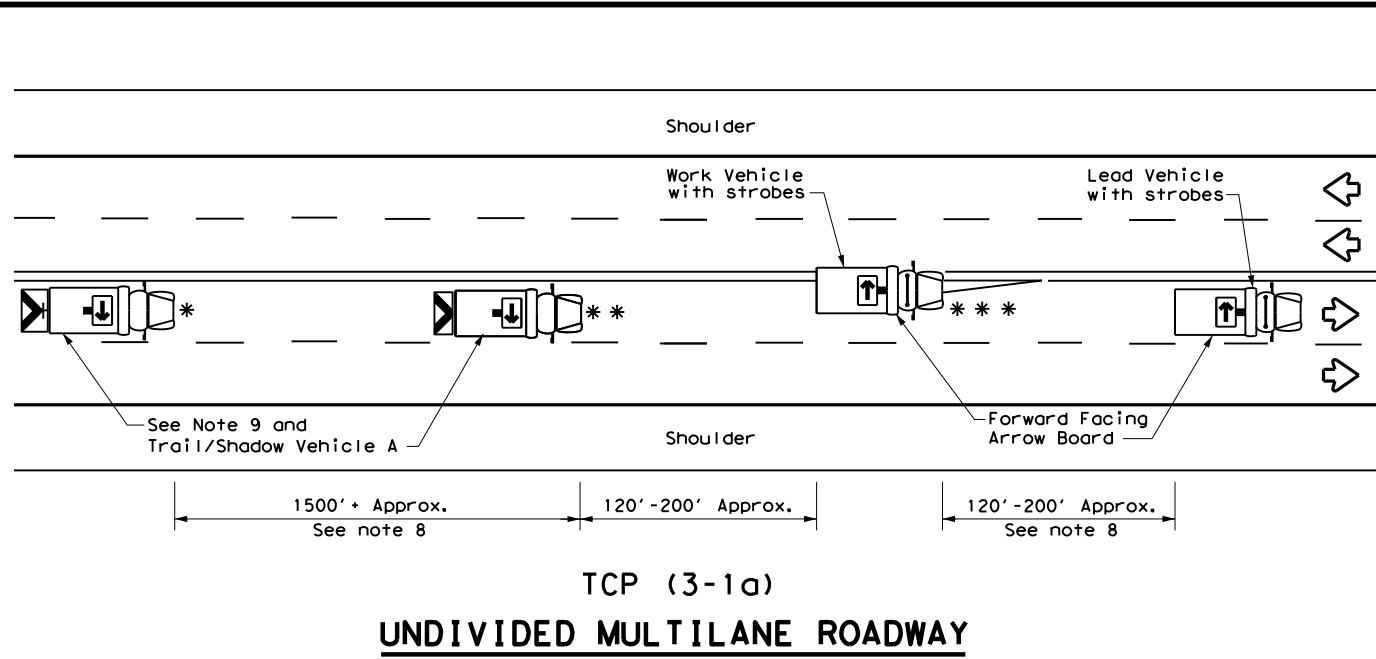


**TRAFFIC CONTROL PLAN  
 LANE CLOSURES ON MULTILANE  
 CONVENTIONAL ROADS**

**TCP (2-4) - 18**

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8-95 3-03	DIST	COUNTY	SHEET NO.	
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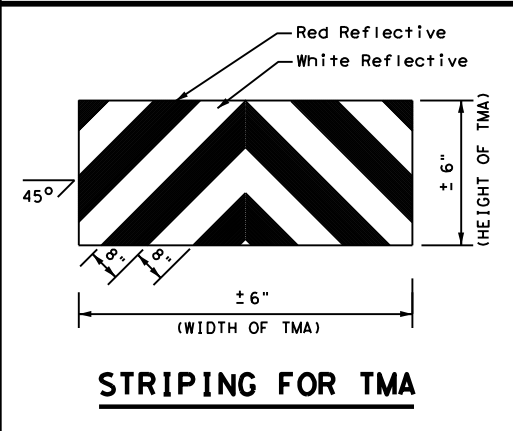
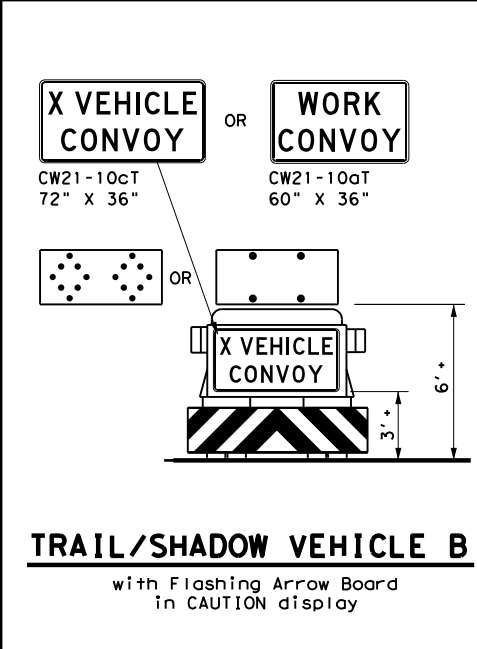
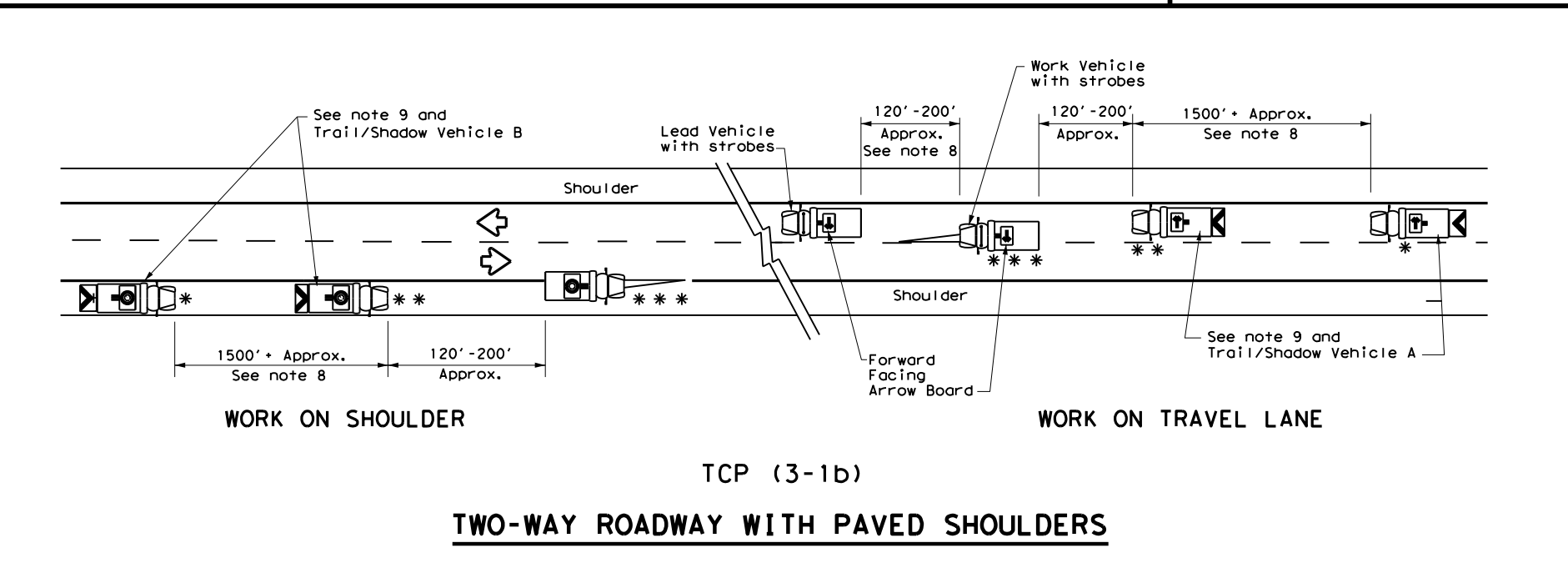


LEGEND		
*	Trail Vehicle	ARROW BOARD DISPLAY
**	Shadow Vehicle	
** *	Work Vehicle	→ RIGHT Directional
☐	Heavy Work Vehicle	← LEFT Directional
☐	Truck Mounted Attenuator (TMA)	↔ Double Arrow
↔	Traffic Flow	⚠ CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

**GENERAL NOTES**

- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
- The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
- Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
- "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY" (CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
- On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



Texas Department of Transportation  
Traffic Operations Division Standard

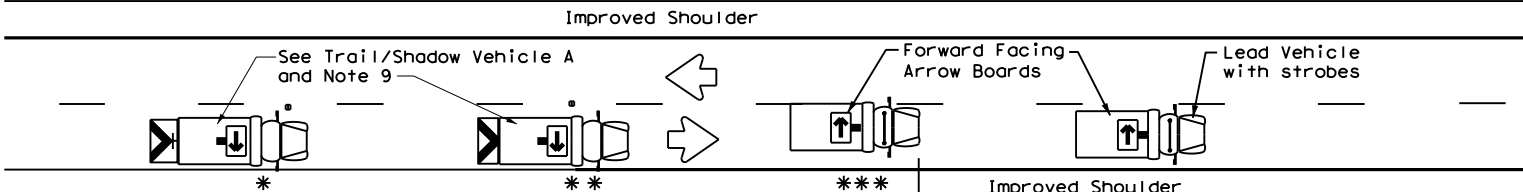
## TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

### TCP (3-1) - 13

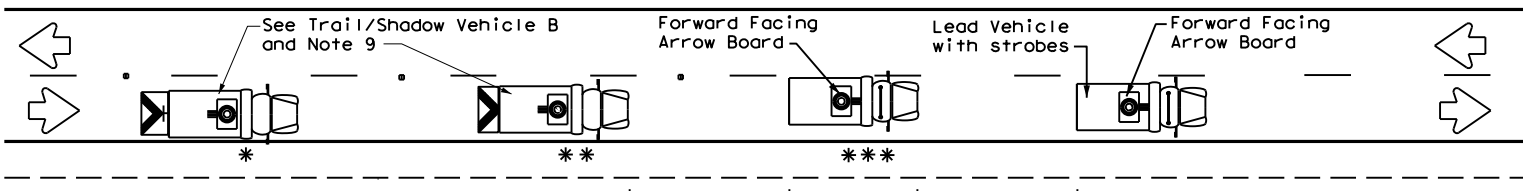
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2-94 4-98				
8-95 7-13				
1-97				
CRP	JIM WELLS, ETC.			29



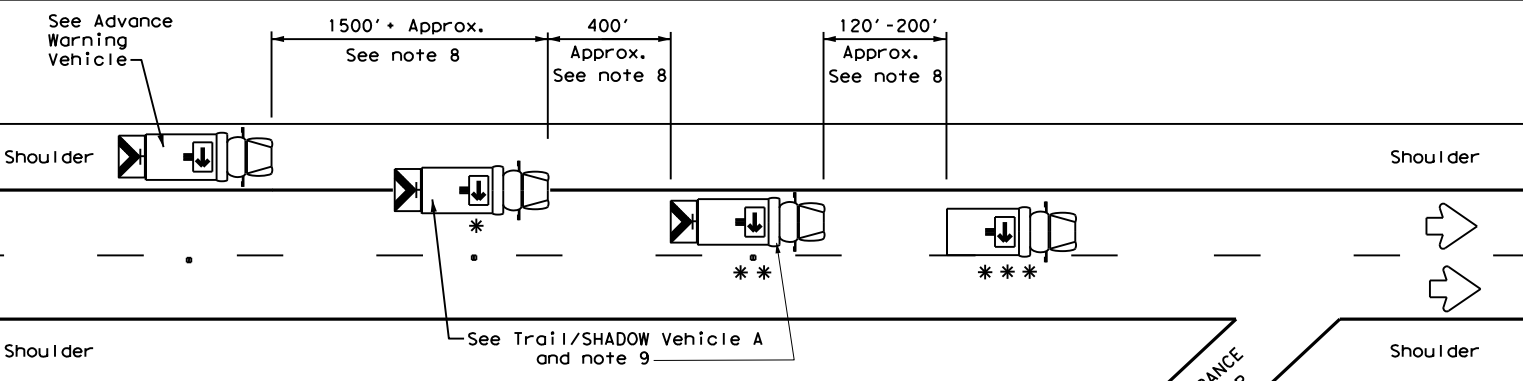
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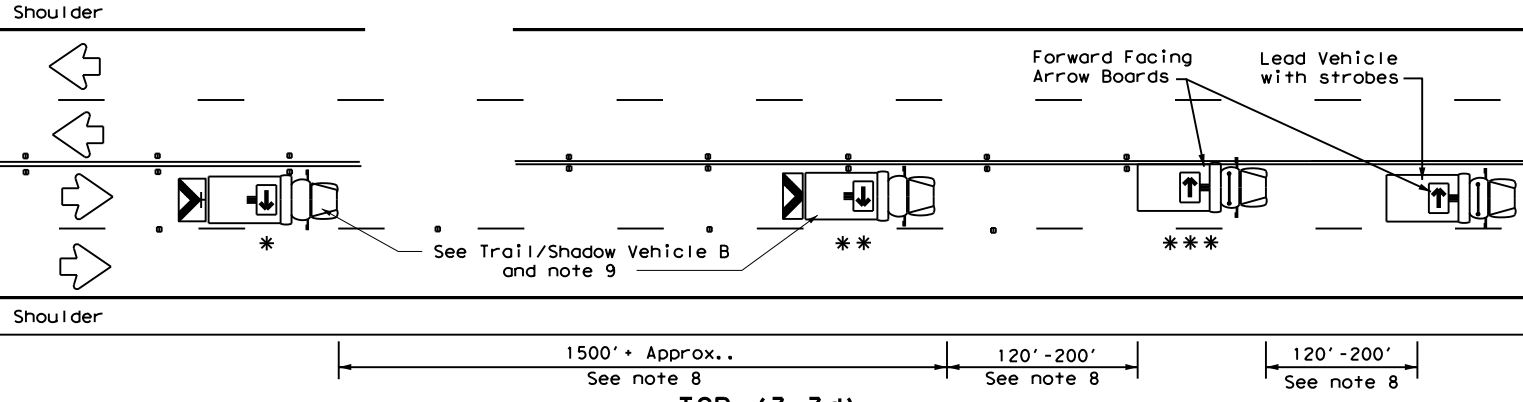
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**TWO LANE HIGHWAY WITH PAVED SHOULDERS**  
**(WORK ON TRAVEL LANE)**



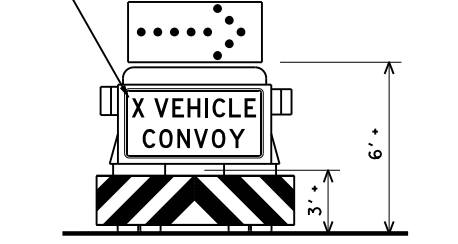
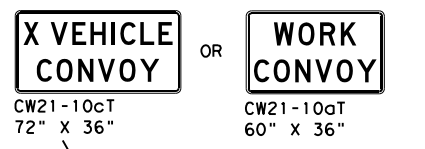
TCP (3-3b)  
**TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS**  
**(WORK ON TRAVEL LANE)**



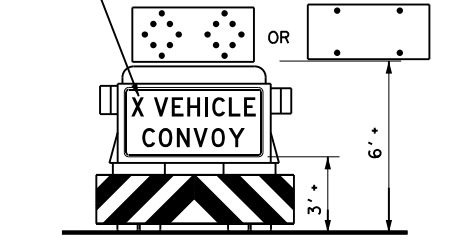
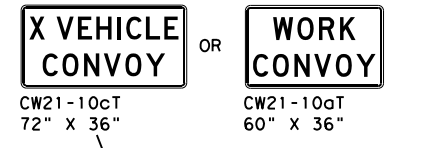
TCP (3-3c)  
**DIVIDED MULTILANE HIGHWAY**



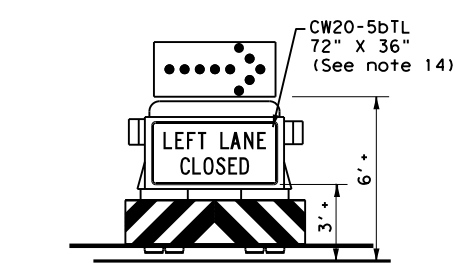
TCP (3-3d)  
**UNDIVIDED MULTILANE HIGHWAY**



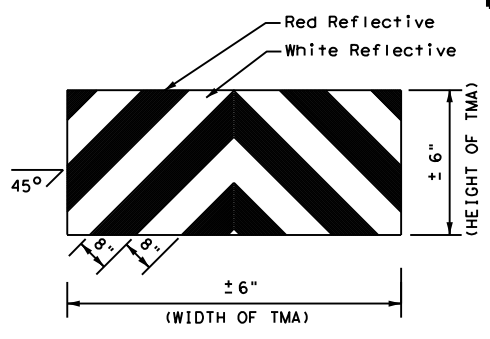
TRAIL/SHADOW VEHICLE A  
 with RIGHT Directional display  
 Flashing Arrow Board



TRAIL/SHADOW VEHICLE B  
 with Flashing Arrow Board  
 in Caution Mode



ADVANCE WARNING  
 VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
** *	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

**Texas Department of Transportation**  
*Traffic Operations Division Standard*

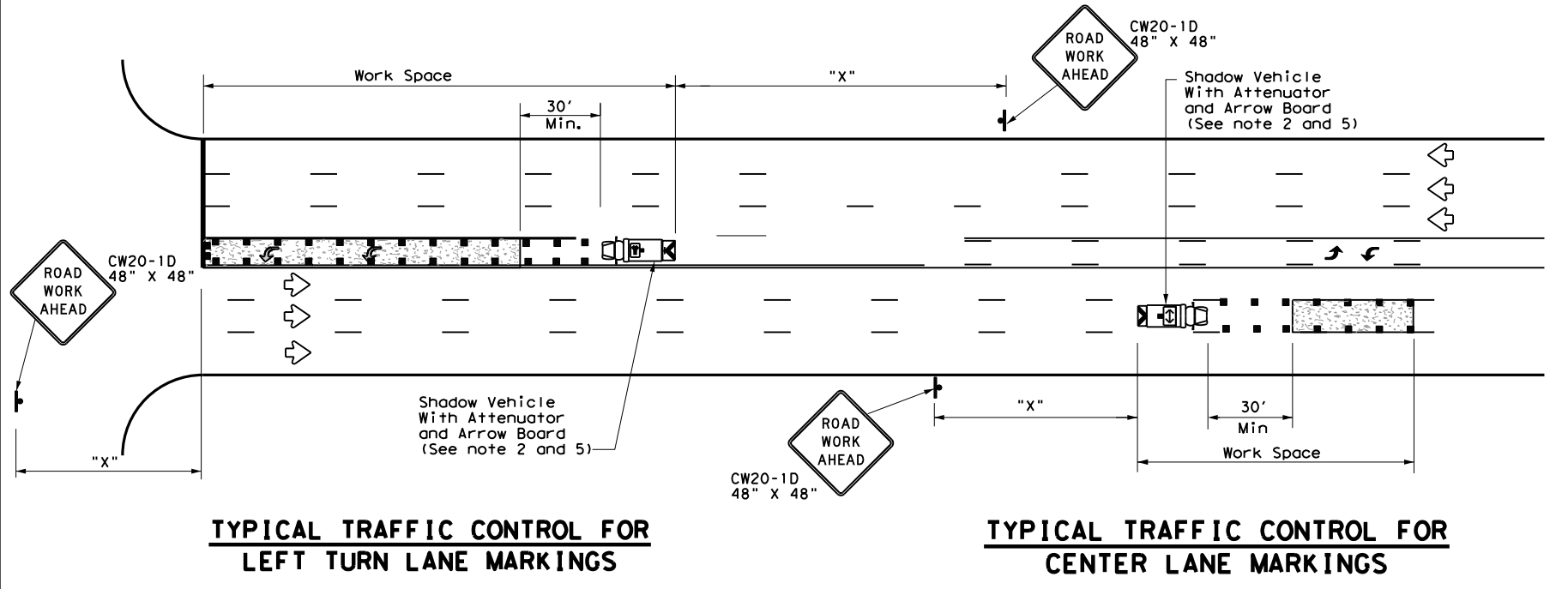
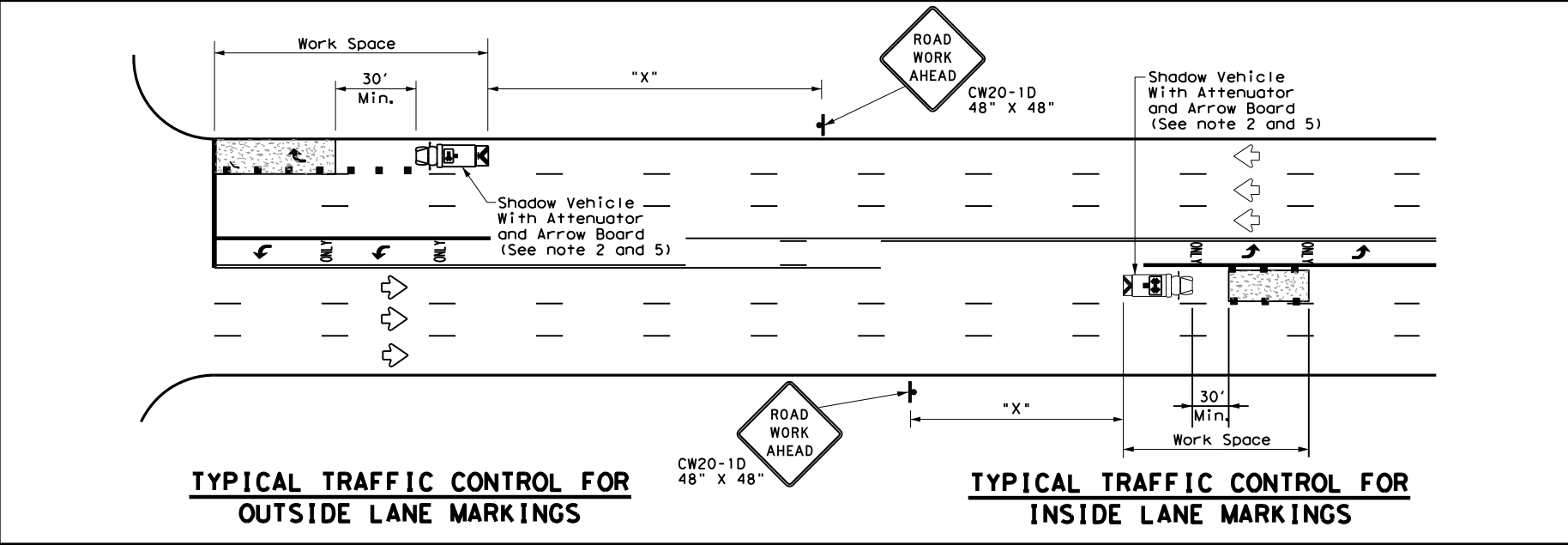
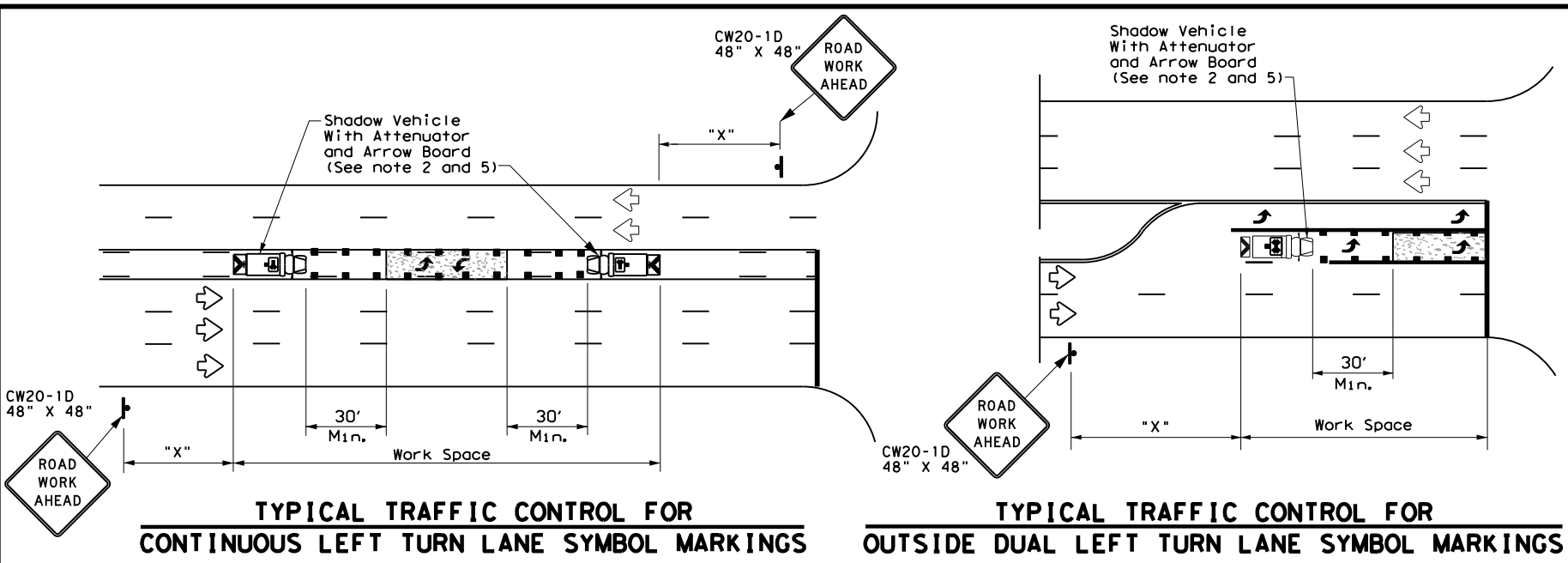
## TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL TCP (3-3) - 14

FILE:	tcp3-3.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CR:	TxDOT
© TxDOT	September 1987	CONT	SECT	JOB	HIGHWAY				
2-94	4-98	0087	02	059, ETC. SH 359, ETC.					
8-95	7-13	DIST	COUNTY						
1-97	7-14	CRP	JIM WELLS, ETC.	30					

177

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LEGEND		
*	Trail Vehicle	ARROW BOARD DISPLAY
**	Shadow Vehicle	
***	Work Vehicle	RIGHT Directional
	Heavy Work Vehicle	LEFT Directional
	Truck Mounted Attenuator (TMA)	Double Arrow
	Traffic Flow	Channelizing Devices

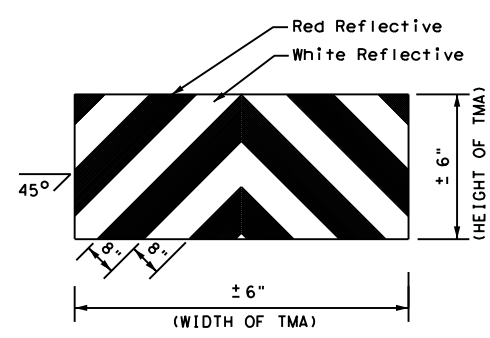
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	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)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

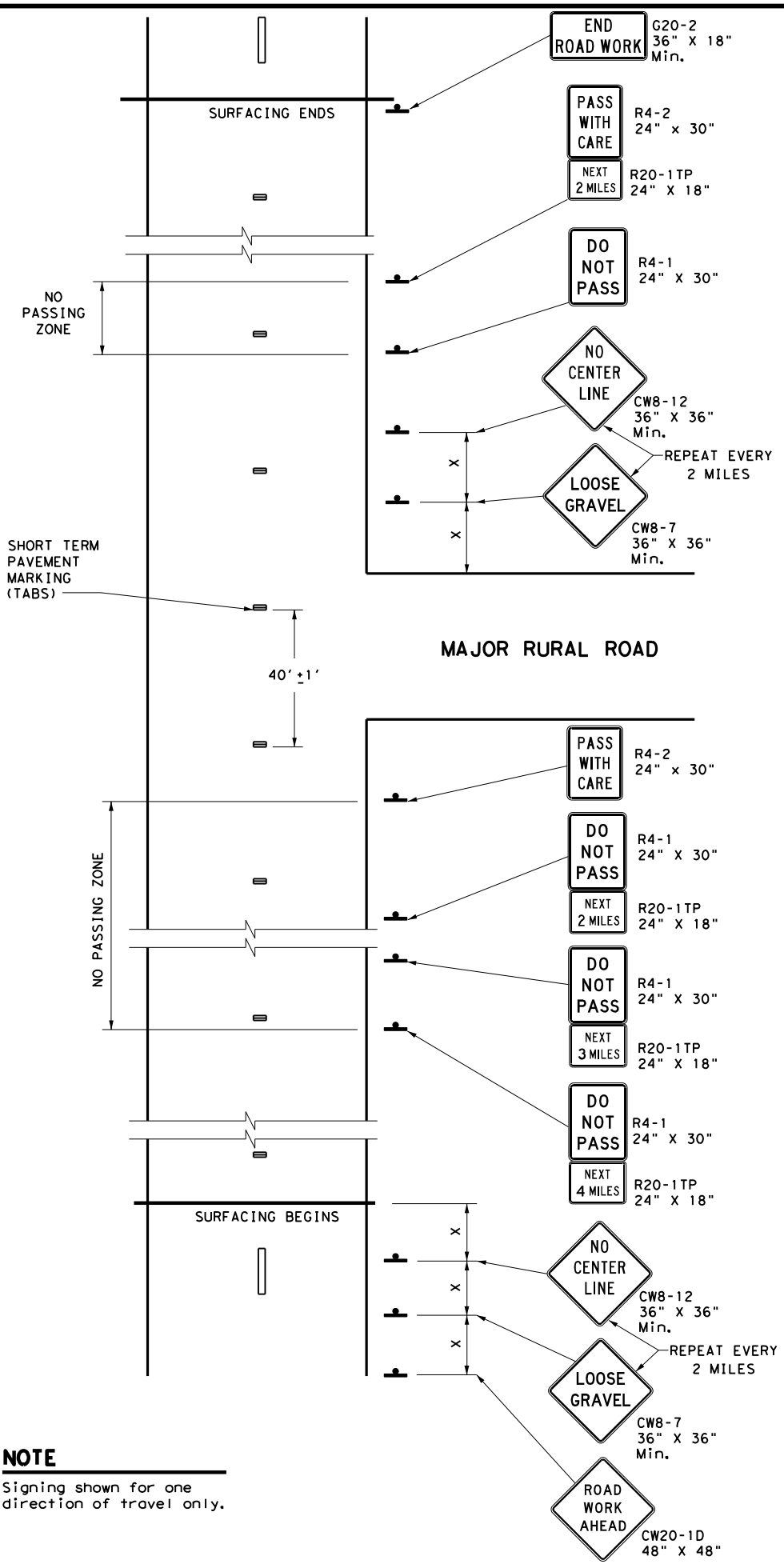
**GENERAL NOTES**

1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



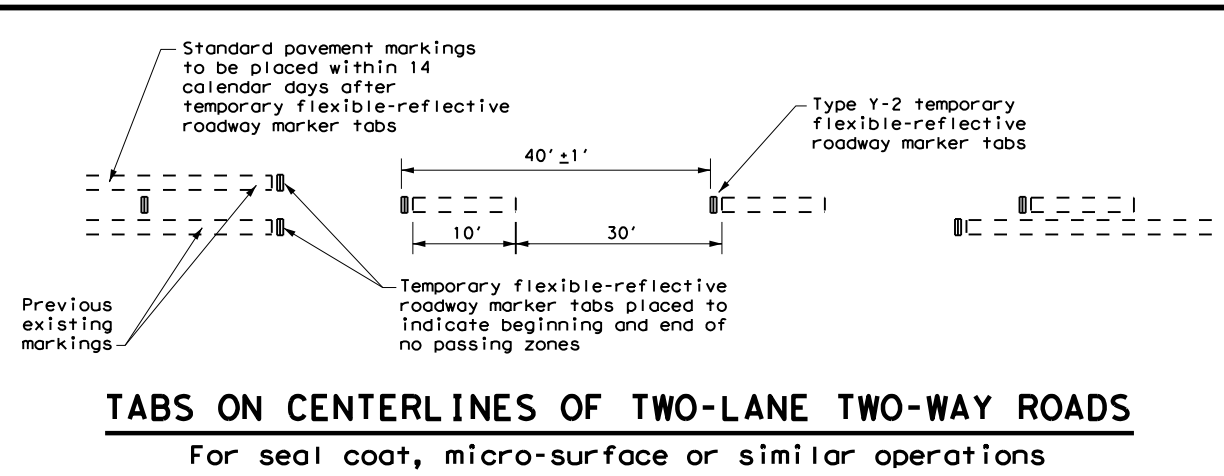
		Traffic Operations Division Standard	
<b>TRAFFIC CONTROL PLAN          MOBILE OPERATIONS FOR          ISOLATED WORK AREAS          UNDIVIDED HIGHWAYS</b>			
<b>TCP (3-4) - 13</b>			
FILE:	tcp3-4.dgn	DN:	TxDOT
© TxDOT	July, 2013	CONT SECT	JOB HIGHWAY
REVISIONS	0087	02	059, ETC. SH 359, ETC.
DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.	31	

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**NOTE**  
 Signing shown for one direction of travel only.

**NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS**



**TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS**  
 For seal coat, micro-surface or similar operations

**"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES**

- A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.
- B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.
- C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.
- D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

**"NO CENTER LINE" SIGN (CW8-12)**

- A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.
- B. At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.
- C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

**"LOOSE GRAVEL" SIGN (CW8-7)**

- A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.
- B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

**PAVEMENT MARKINGS**

- A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.
- B. Tabs shall not be used to simulate edge lines.
- C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

**COORDINATION OF SIGN LOCATIONS**

- A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.
- B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

\* Conventional Roads Only

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

**GENERAL NOTES**

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

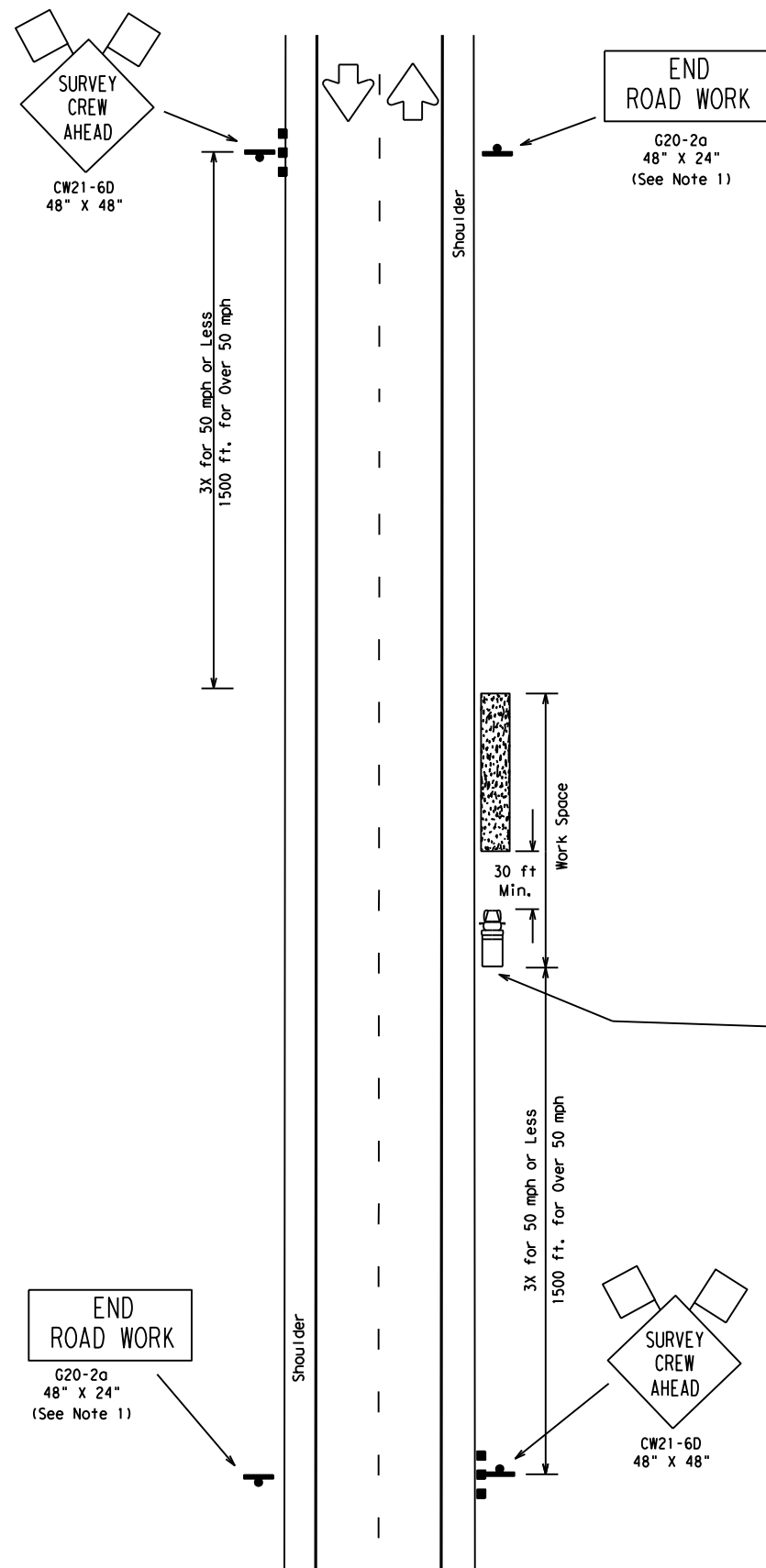


**TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS**  
**TCP (7-1) - 13**

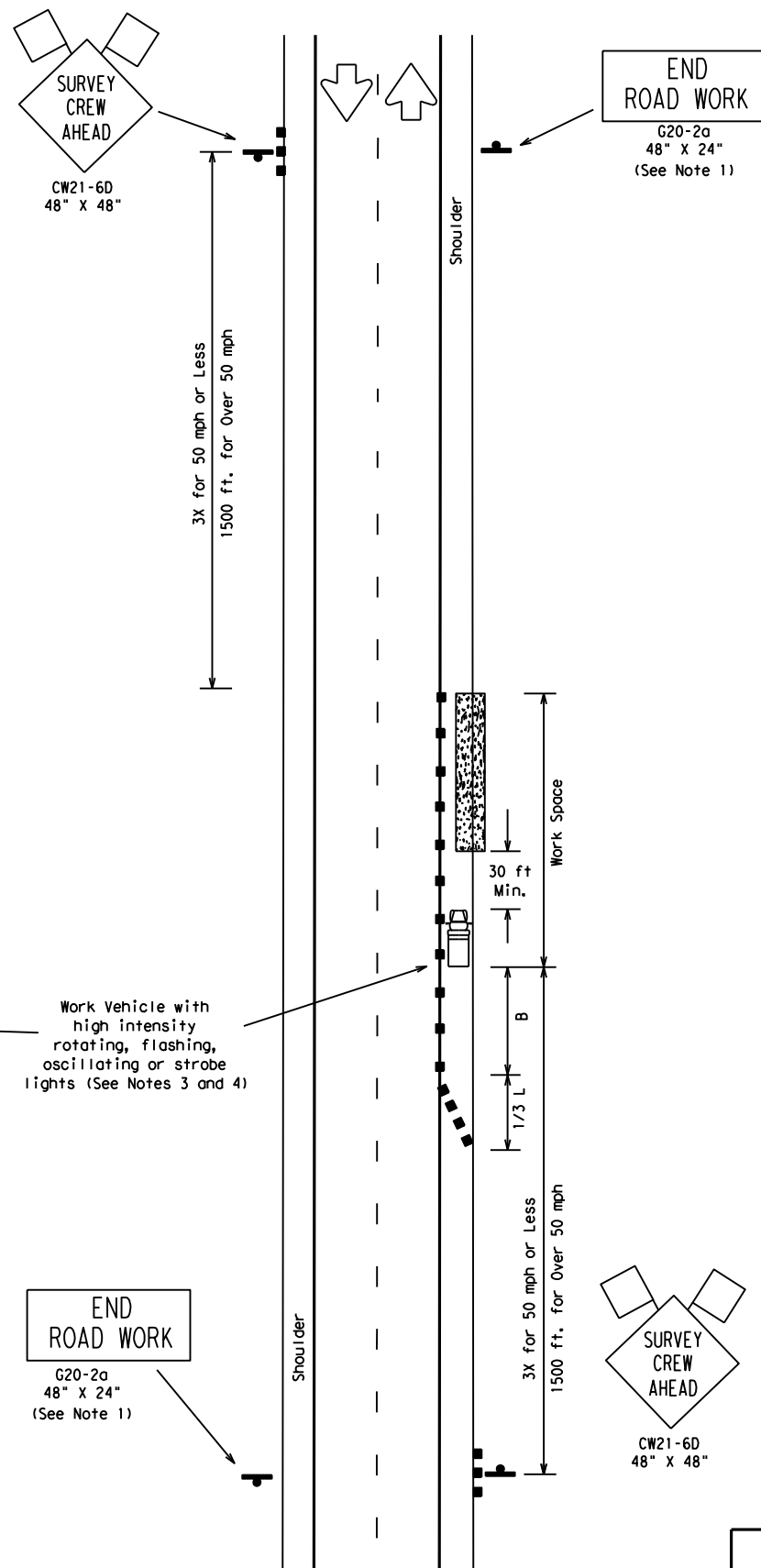
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© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
4-92 4-98	DIST	COUNTY	SHEET NO.	
1-97 7-13	CRP	JIM WELLS, ETC.	32	

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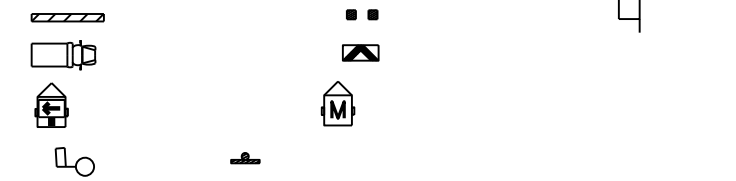
TCP (S-1a)  
 WORK OFF SHOULDER  
 OR PAVED SURFACE



TCP (S-1b)  
 WORK ON SHOULDER

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision  
 Corrected misspelling.



Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Device		Min. Sign Spacing "X" Distance	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' - 75'	120'	90'
35		205'	225'	245'	35'	70' - 90'	160'	120'
40		265'	295'	320'	40'	80' - 100'	240'	155'
45		450'	495'	540'	45'	90' - 110'	320'	195'
50		500'	550'	600'	50'	100' - 125'	400'	240'
55		550'	605'	660'	55'	110' - 140'	500'	295'
60		600'	660'	720'	60'	120' - 150'	600'	350'
65	650'	715'	780'	65'	130' - 165'	700'	410'	
70	700'	770'	840'	70'	140' - 175'	800'	475'	
75	750'	825'	900'	75'	150' - 185'	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)

TYPICAL USAGE:				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

DEFINITIONS:  
 SHORT DURATION - work that occupies a location up to 1 hour.  
 SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

- GENERAL NOTES:
- The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
  - Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
  - If line-of-sight requirements for surveying operations will preclude the placement of the Work Vehicle to protect workers, the channelizing devices mentioned in Note 2 are required.
  - A Shadow Vehicle with a Truck Mounted Attenuator and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
  - The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
  - This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
  - The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP (S-1a)  
 8. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

Texas Department of Transportation  
 Traffic Operations Division

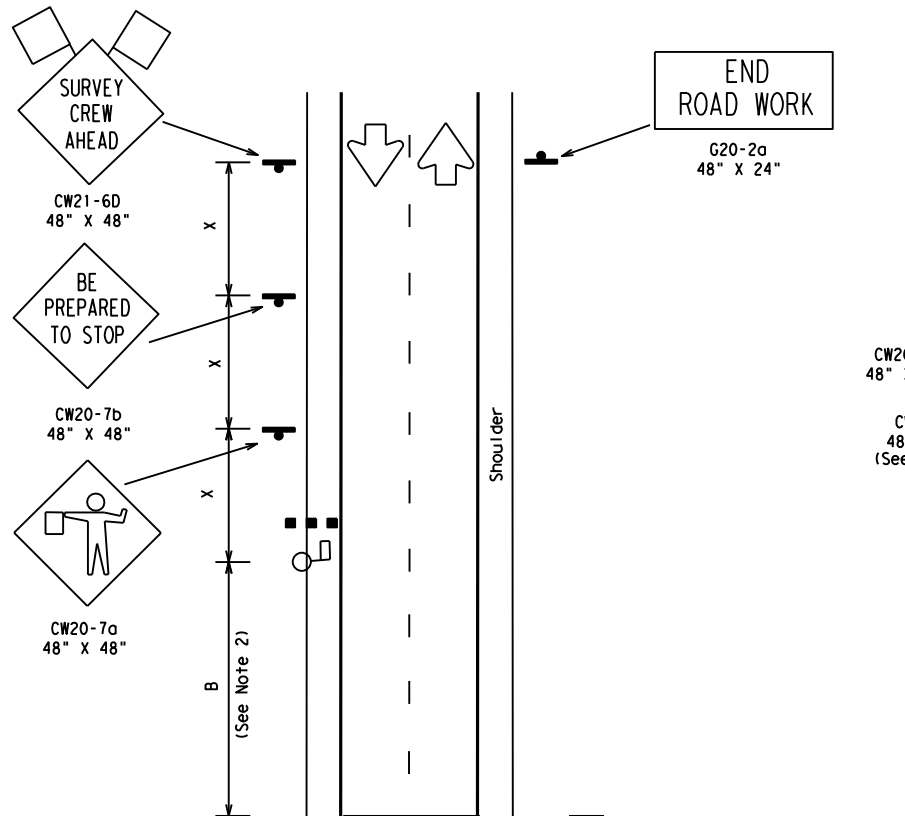
### TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP (S-1) - 08A

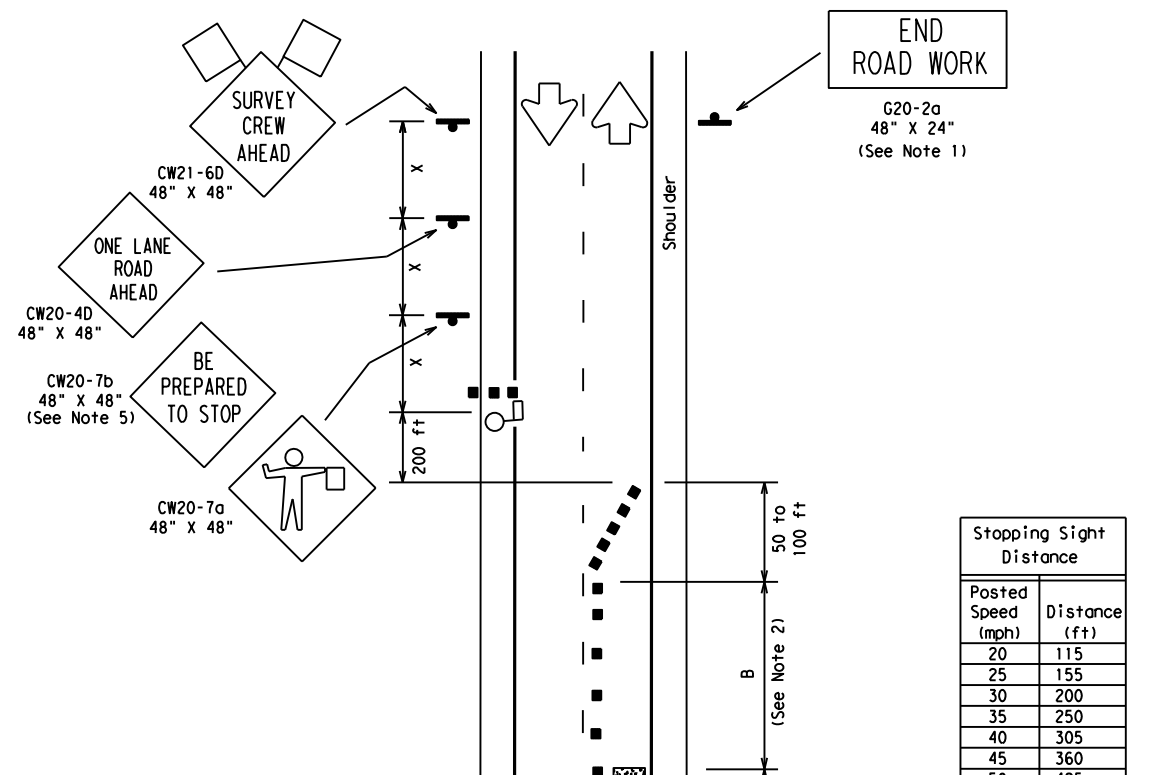
© TxDOT August 2008		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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		DIST	COUNTY	SHEET NO.	
		CRP	JIM WELLS, ETC.	33	

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TCP (S-2a)  
 ROAD CLOSED FOR LESS THAN 20 MINUTES -  
 OFF PEAK TRAFFIC HOURS  
 WITH OR WITHOUT SHOULDERS



TCP (S-2b)  
 WORK IN ROADWAY  
 OFF PEAK TRAFFIC HOURS  
 WITH OR WITHOUT SHOULDERS

Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

Posted Speed $\times$	Formula	Minimum Desirable Taper Lengths $\times$			Suggested Maximum Spacing of Device		Min. Sign Spacing "x" Distance	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' - 75'	120'	90'
35		205'	225'	245'	35'	70' - 90'	160'	120'
40	L=WS	265'	295'	320'	40'	80' - 100'	240'	155'
45		450'	495'	540'	45'	90' - 110'	320'	195'
50	L=WS	500'	550'	600'	50'	100' - 125'	400'	240'
55		550'	605'	660'	55'	110' - 140'	500'	295'
60	L=WS	600'	660'	720'	60'	120' - 150'	600'	350'
65		650'	715'	780'	65'	130' - 165'	700'	410'
70	L=WS	700'	770'	840'	70'	140' - 175'	800'	475'
75		750'	825'	900'	75'	150' - 185'	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)

TYPICAL USAGE:				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

DEFINITIONS:  
 SHORT DURATION - work that occupies a location up to 1 hour.  
 SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

- GENERAL NOTES:
- The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
  - Adequate Stopping Sight Distance (see Stopping Sight Distance table) should be maintained from approaching traffic to the flagger or a queue of stopped vehicles. The Buffer Space "B" should be extended around curves or other obstacles, when necessary, to have adequate Stopping Sight Distance to the flagger station.
  - Flaggers should use two-way radios or other means of communication while flagging.
  - The length of the work space should be based on the ability of the flaggers to communicate.
  - CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
  - The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.
- TCP (S-2a)
- Road closures shall be less than 20 minutes. Closures less than 5 minutes are desirable.
  - Sign spacing should be increased if traffic repeatedly queues past the CW20-7b "BE PREPARED TO STOP" sign.
  - The surveying instrument should not be located on the paved surface.
- TCP (S-2b)
- For short duration work the Shadow Vehicle with a TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
  - Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
  - The CW20-7b "BE PREPARED TO STOP" sign is optional. When used, it should be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision  
 ⚠ Corrected reference to notes.

Texas Department of Transportation  
 Traffic Operations Division

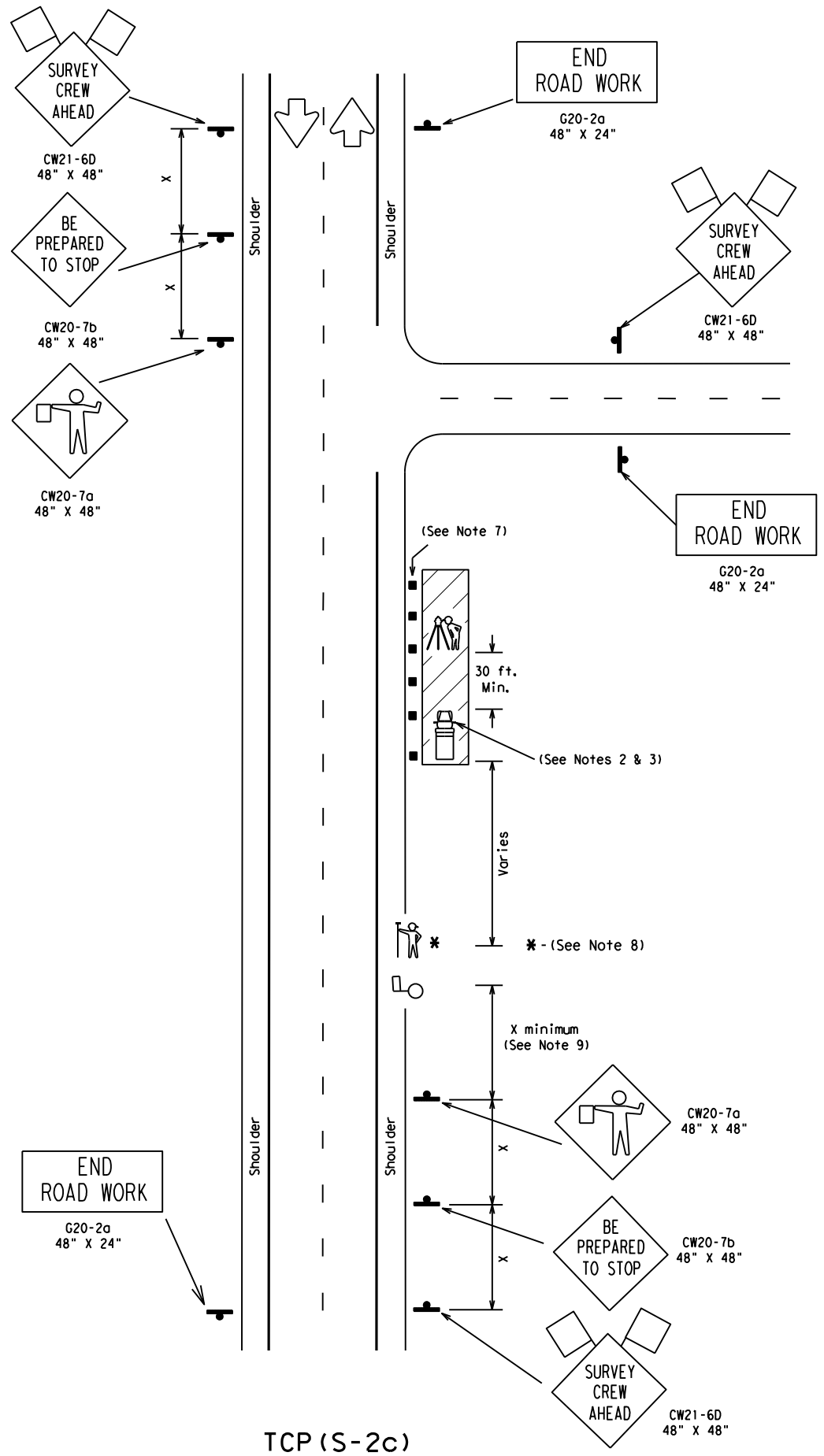
## TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

### TCP (S-2) - 08A

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8-08	REVISIONS	CON: 0087	SECT: 02	JOB: 059, ETC.	HIGHWAY: SH 359, ETC.
		DIST: CRP	COUNTY: JIM WELLS, ETC.	SHEET NO. 34	

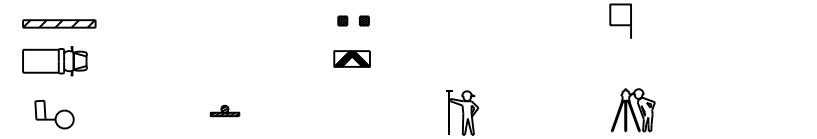
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DATE: 4/6/2023 11:52:02 AM  
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TCP (S-2c)

Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910



Posted Speed %	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Device		Min. Sign Spacing "x" Distance	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' - 75'	120'	90'
35		205'	225'	245'	35'	70' - 90'	160'	120'
40		265'	295'	320'	40'	80' - 100'	240'	155'
45	L=WS	450'	495'	540'	45'	90' - 110'	320'	195'
50		500'	550'	600'	50'	100' - 125'	400'	240'
55		550'	605'	660'	55'	110' - 140'	500'	295'
60		600'	660'	720'	60'	120' - 150'	600'	350'
65		650'	715'	780'	65'	130' - 165'	700'	410'
70		700'	770'	840'	70'	140' - 175'	800'	475'
75		750'	825'	900'	75'	150' - 185'	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)

	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
MOBILE	✓	✓		

DEFINITIONS:  
 MOBILE - work that moves continuously or intermittently (stopping up to approximately 15 minutes).  
 SHORT DURATION - work that occupies a location up to 1 hour.  
 SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

- GENERAL NOTES:
- The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
  - Work Vehicle with high intensity rotating, flashing, oscillating or strobe lights should be used to protect work space.
  - When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Heavy Work Vehicle.
  - CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" SIGNS.
  - The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads may be omitted when approved by the Engineer.
  - The Surveying Instrument shall not be located on the paved surface.
  - Cones at edge of pavement adjacent to instrument person may be omitted when approved by the Engineer.
  - Rodman may only enter roadway when accompanied by flagger and as traffic allows.
  - The distance between the advance warning signs and the work should not exceed a two mile maximum.
  - Flaggers and Survey Crew should use two-way radios or other means of communication.
  - Survey Crew and Flaggers shall wear high-visibility apparel meeting the ANSI 107-2007 standard performance for Class 2 or Class 3 risk exposure.
  - Additional traffic control devices may be required to address local site conditions.
  - Stopping Sight Distance shall be maintained from approaching traffic to the flagger. See "Stopping Sight Distance" table.

SURVEY PARTIES SHOULD AVOID ANY UNNECESSARY PERIODS OF TIME ON THE ROAD SURFACE.

This TCP is to cover two lane rural type roadways as determined by the Engineer. All other type roadways will be covered by other established Survey TCP'S.

**Texas Department of Transportation**  
 Traffic Operations Division

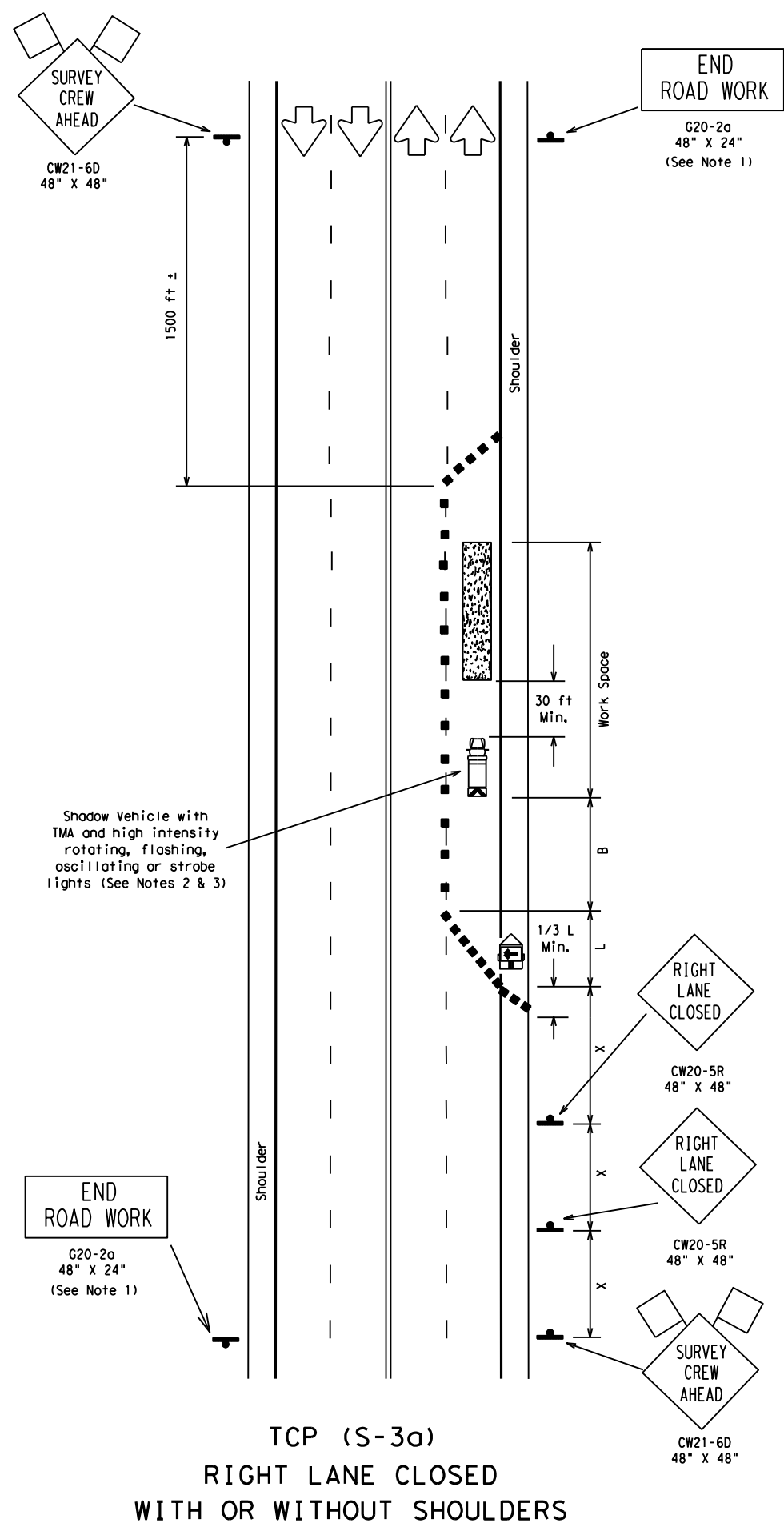
## TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

### TCP (S-2c) - 10

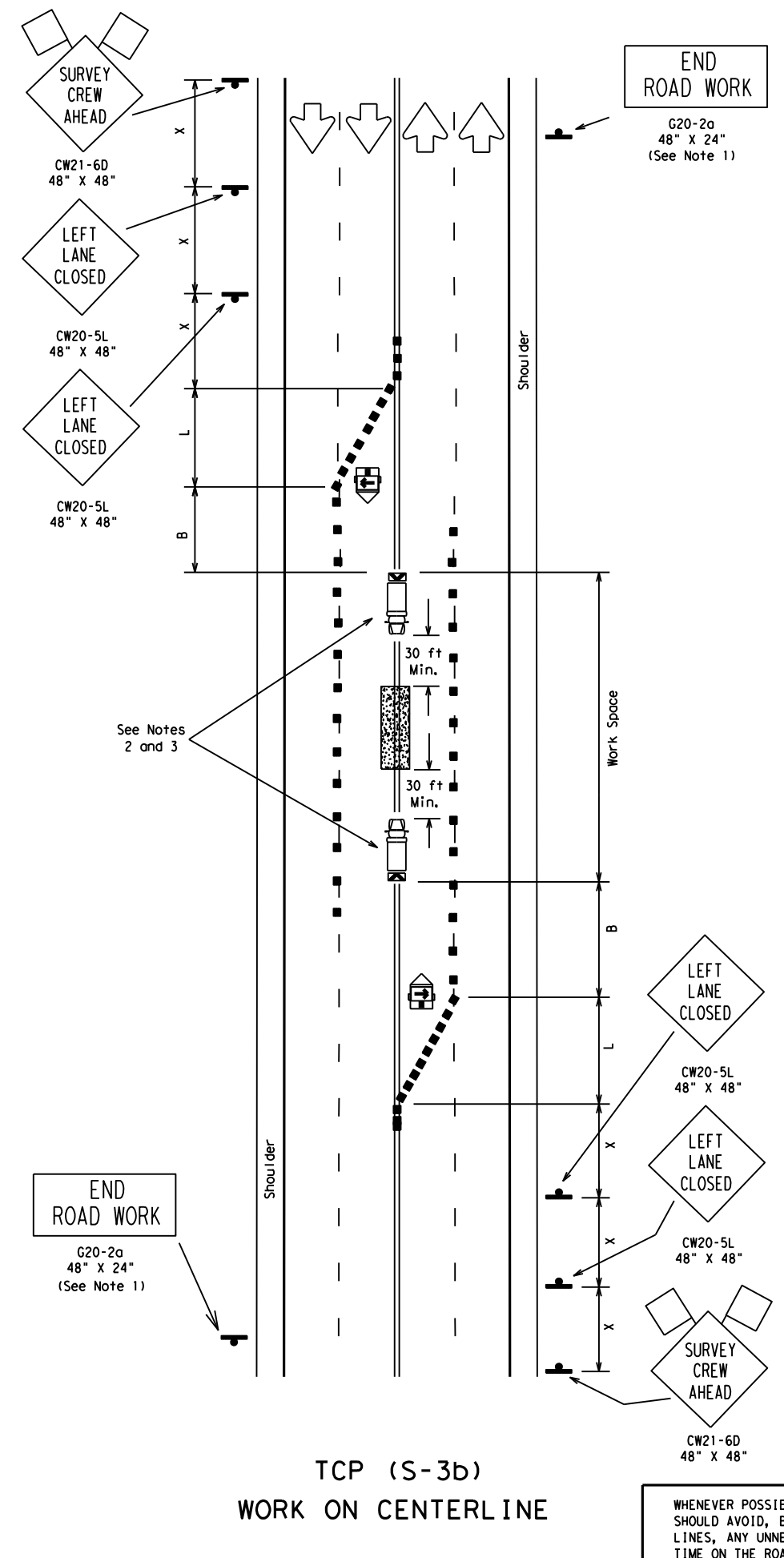
© TxDOT January 2010		DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS					
CONTRACT NO.	SECTION	JOB		HIGHWAY	
0087	02	059, ETC.		SH 359, ETC.	
DISTRICT		COUNTY		SHEET NO.	
CRP		JIM WELLS, ETC.		35	

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TCP (S-3a)  
 RIGHT LANE CLOSED  
 WITH OR WITHOUT SHOULDERS



TCP (S-3b)  
 WORK ON CENTERLINE

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECESSARY PERIODS OF TIME ON THE ROAD SURFACE.

Posted Speed * 30 35 40 45 50 55 60 65 70 75	Formula $L = \frac{WS^2}{60}$	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Device		Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30		150'	165'	180'	30'	60' - 75'	120'	90'
35		205'	225'	245'	35'	70' - 90'	160'	120'
40		265'	295'	320'	40'	80' - 100'	240'	155'
45		450'	495'	540'	45'	90' - 110'	320'	195'
50		500'	550'	600'	50'	100' - 125'	400'	240'
55		550'	605'	660'	55'	110' - 140'	500'	295'
60		600'	660'	720'	60'	120' - 150'	600'	350'
65		650'	715'	780'	65'	130' - 165'	700'	410'
70		700'	770'	840'	70'	140' - 175'	800'	475'
75		750'	825'	900'	75'	150' - 185'	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)

TYPICAL USAGE:				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

DEFINITIONS:  
 SHORT DURATION - work that occupies a location up to 1 hour.  
 SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

- GENERAL NOTES:
- The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
  - For short duration work the Shadow Vehicle with TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
  - Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
  - CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
  - The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP (S-3a)  
 6. If shoulders are not present, the 1/3L shoulder taper is to be omitted and four channelizing devices shall be placed in front of the arrow panel, perpendicular to traffic.

TCP (S-3b)  
 7. One CW20-5L "LEFT LANE CLOSED" sign in each direction may be omitted when the posted speed is less than 45mph and volume is less than 2000 ADT.

Texas Department of Transportation  
 Traffic Operations Division

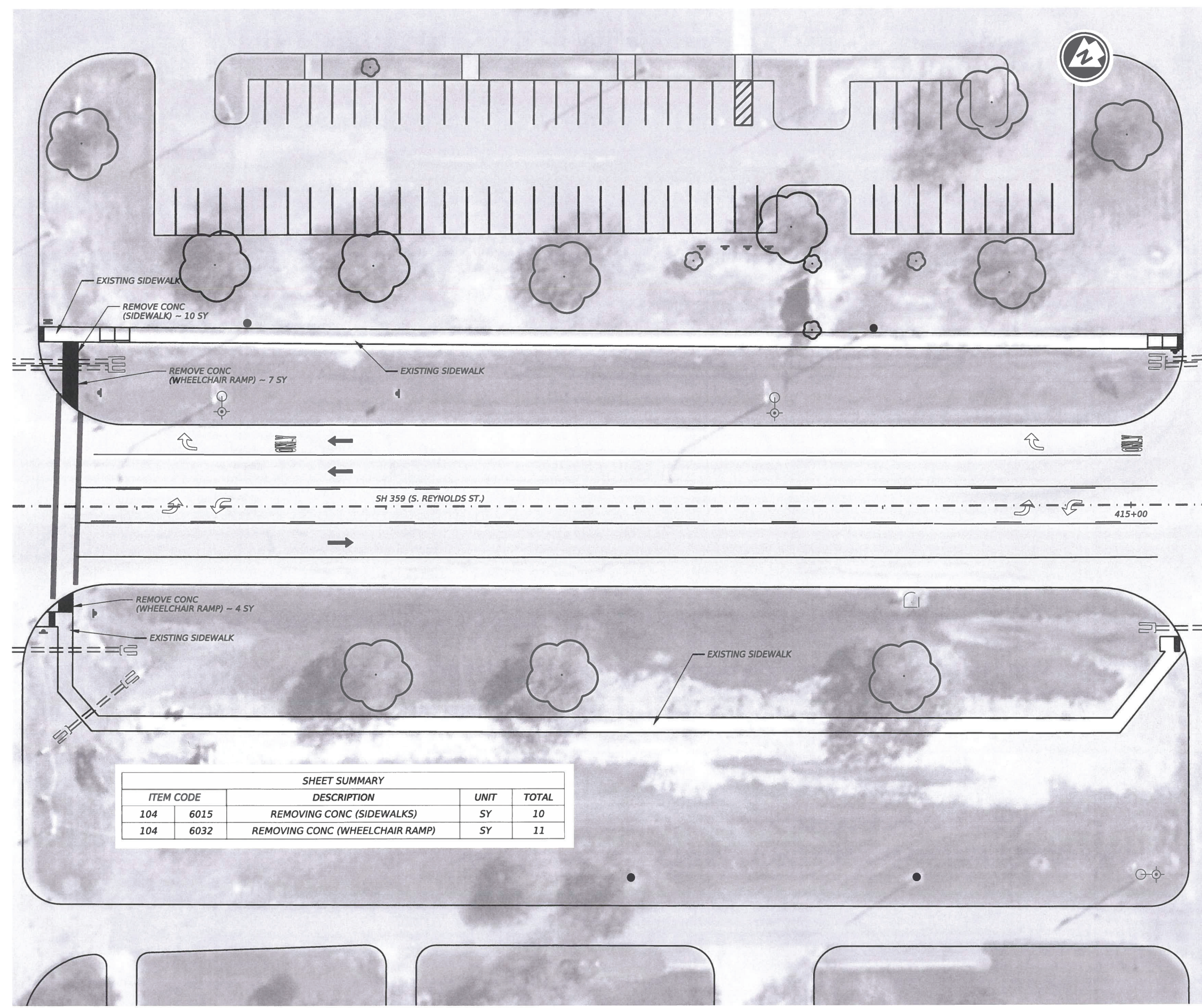
## TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP (S-3) -08

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REVISIONS					
CONTRACT NO.	SECTION	JOB	HIGHWAY		
0087	02	059, ETC.	SH 359, ETC.		
DISTRICT	COUNTY		SHEET NO.		
CRP	JIM WELLS, ETC.		36		



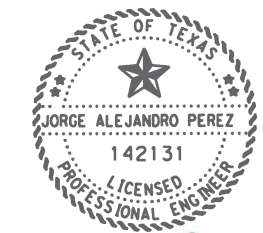
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**LEGEND**

- DIRECTION OF TRAFFIC  
 - CONCRETE REMOVAL

SHEET SUMMARY			
ITEM CODE		DESCRIPTION	TOTAL
104	6015	REMOVING CONC (SIDEWALKS)	10
104	6032	REMOVING CONC (WHEELCHAIR RAMP)	11



*Jorge A. Perez*  
01/07/2024

SCALE 1" = 40'

**Texas Department of Transportation**

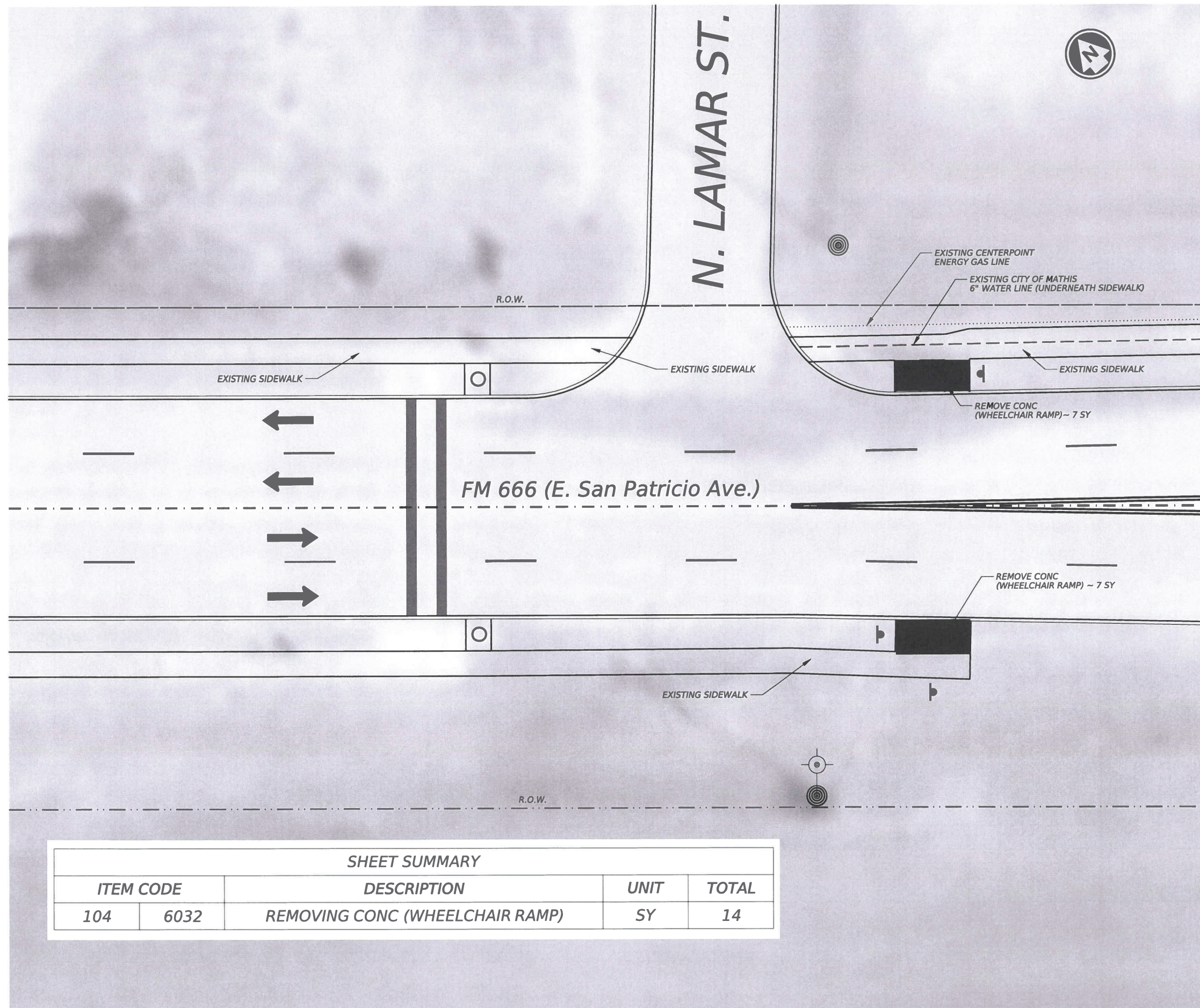
**SH 359**

**CONCRETE REMOVAL LAYOUT SHEET**

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CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		37

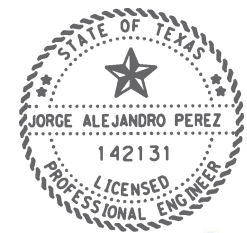


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**LEGEND**

- DIRECTION OF TRAFFIC  
 - CONCRETE REMOVAL



*Jorge A. Perez*  
04/07/2024

SHEET SUMMARY				
ITEM CODE	DESCRIPTION		UNIT	TOTAL
104	6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	14

SCALE 1" = 20'

Texas Department of Transportation

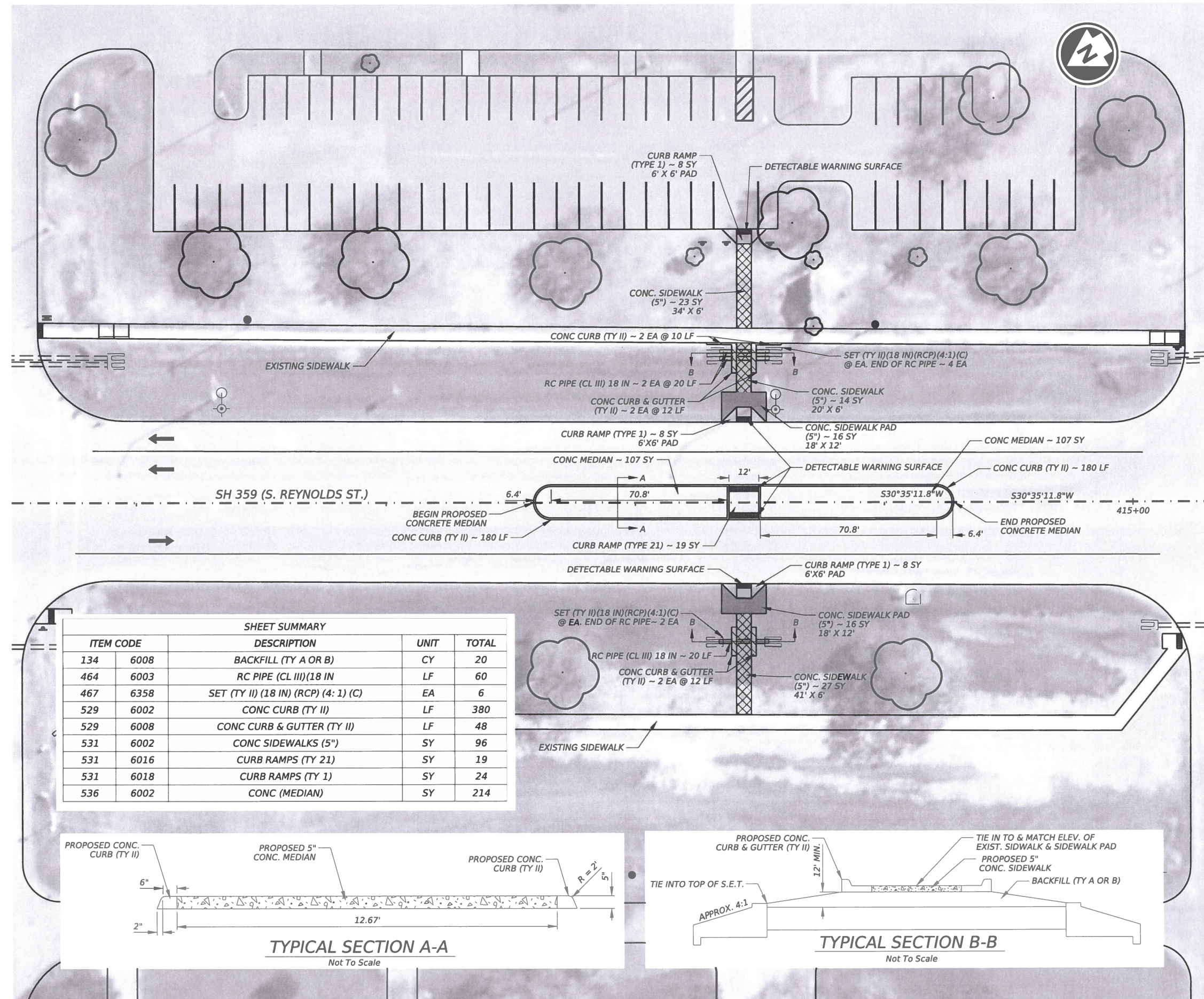
**FM 666**  
**CONCRETE REMOVAL**  
**LAYOUT SHEET**

© TXDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		38



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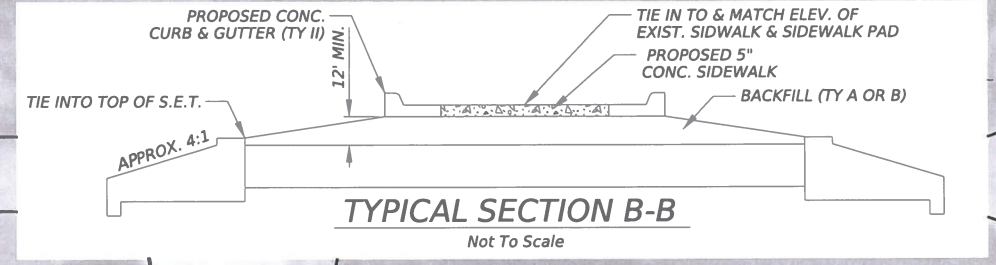
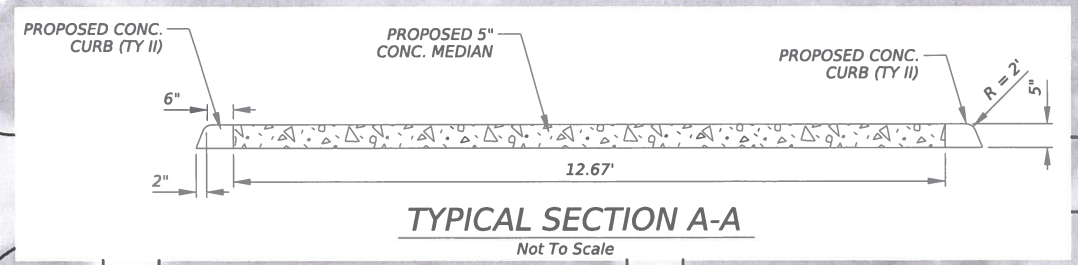
- LEGEND**
- ← → - DIRECTION OF TRAFFIC
  - ▨ - CONC. SIDEWALK PAD
  - ▩ - PROPOSED 6' WIDE SIDEWALK
  - ▧ - CONC. CURB & GUTTER (TY II)

- NOTES:**
1. CURB RAMPS SHALL CONFORM TO TXDOT STANDARDS FOR PEDESTRIAN FACILITIES - CURB RAMPS.
  2. REFER TO STANDARD SHEETS FOR MORE INFORMATION CONCERNING CONCRETE SIDEWALK, CURB RAMPS, CURB & GUTTER, RC PIPE, & SET.
  3. TIE PROPOSED SIDEWALK TO EXISTING SIDEWALK & PROPOSED RAMPS WHERE IT IS SHOWN ON THE LAYOUT. SIDEWALK WILL BE AT A WIDTH OF 6'. CONC. SIDEWALK PAD WILL BE 18' IN LENGTH BY 12' IN WIDTH AS CALLED OUT IN THE LAYOUT SHEET.
  4. MUST HAVE ENGINEER APPROVAL PRIOR TO ANY WORK, SURVEY, MARKINGS, AND CONSTRUCTION OF SIDEWALK, RCP, & SET, WITHIN SCHOOL R.O.W.
  5. TY II CONC CURB & GUTTER ALONG WITH TY II CONC CURB WILL BE CONSTRUCTED ALONG SIDEWALK AS SHOWN IN THE LAYOUT NEAR PROPOSED RC PIPE AS CALLED OUT ON THE LAYOUT SHEET & TYPICAL SECTION B-B.
  5. CONCRETE MEDIAN SHALL BE TIED TO TO PAVEMENT BELOW TO AVOID MOVEMENT. COORDINATE WITH TXDOT AREA OFFICE FOR FURTHER INFORMATION.
  6. MUST HAVE ENGINEER APPROVAL PRIOR TO CONSTRUCTION OF MEDIAN FOR VERIFICATION OF PLACEMENT IN THE FIELD.

SHEET SUMMARY			
ITEM CODE		DESCRIPTION	TOTAL
134	6008	BACKFILL (TY A OR B)	20
464	6003	RC PIPE (CL III) (18 IN)	60
467	6358	SET (TY II) (18 IN) (RCP) (4:1) (C)	6
529	6002	CONC CURB (TY II)	380
529	6008	CONC CURB & GUTTER (TY II)	48
531	6002	CONC SIDEWALKS (5")	96
531	6016	CURB RAMPS (TY 21)	19
531	6018	CURB RAMPS (TY 1)	24
536	6002	CONC (MEDIAN)	214



*Jorge A. Perez*  
 04/10/2024



SCALE 1" = 40'

**Texas Department of Transportation**

**SH 359**

**CONCRETE MEDIAN & MISCELLANEOUS DETAIL SHEET**

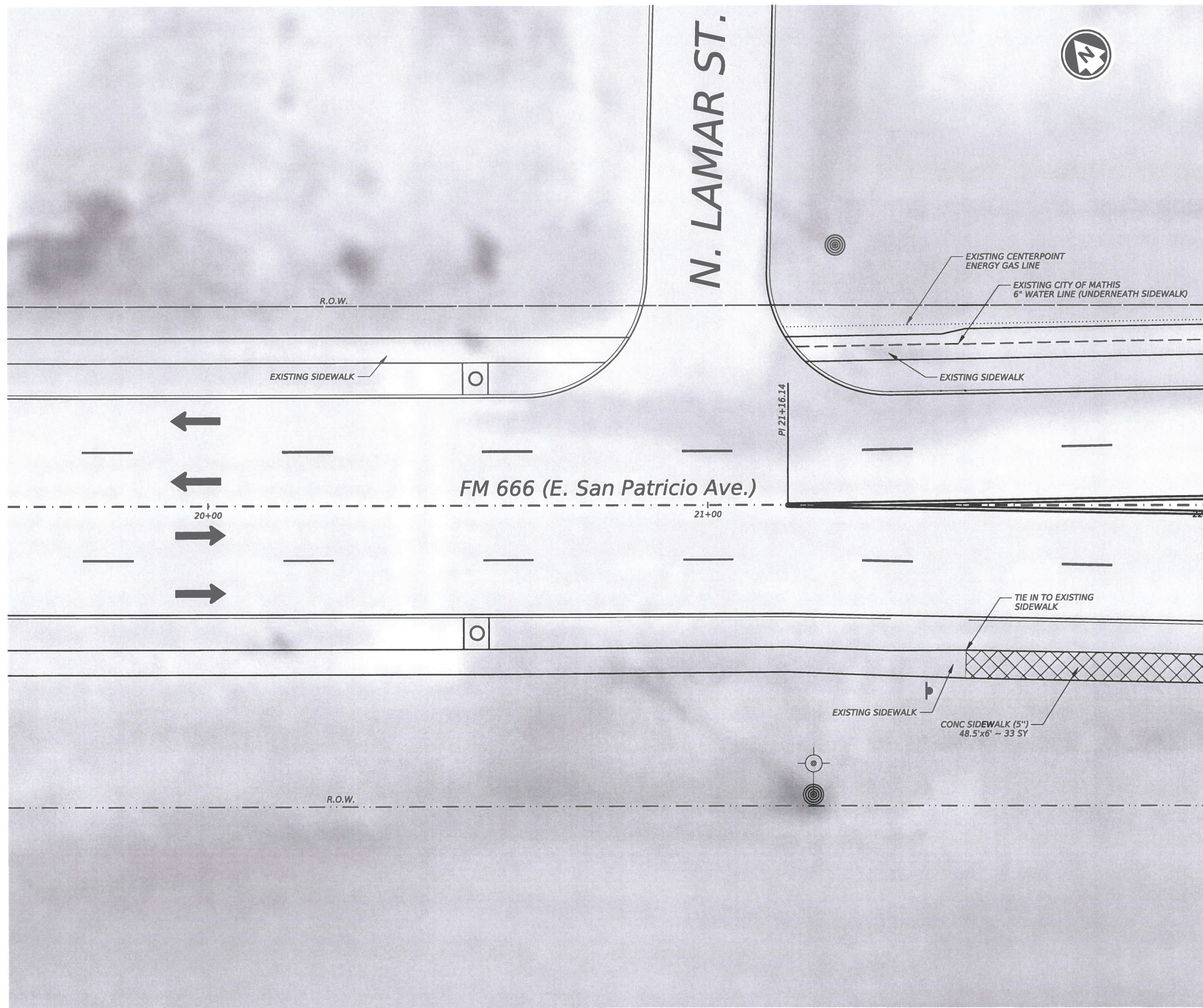
© TXDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		39



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CK  
 DW  
 CK  
 DN



**LEGEND**

- DIRECTION OF TRAFFIC
- PROPOSED 6' WIDE SIDEWALK

**NOTES:**

1. CURB RAMP SHALL CONFORM TO TXDOT STANDARDS FOR PEDESTRIAN FACILITIES --CURB RAMP.
2. REFER TO STANDARD SHEETS FOR MORE INFORMATION CONCERNING CONCRETE SIDEWALK.
3. TIE PROPOSED SIDEWALK TO EXISTING SIDEWALK WHERE IT IS SHOWN ON THE LAYOUT. SIDEWALK WILL BE AT A WIDTH OF 6'.

MATCHLINE STA 22+00



*Jorge A. Perez*  
 04/07/2024

SCALE 1" = 20'



**FM 666**  
**CONCRETE MEDIAN**  
**& MISCELLANEOUS**  
**DETAIL SHEET**

© TxDOT 2024		SHEET 1 OF 2	
CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		40



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# PIRATE STADIUM PARKING LOT



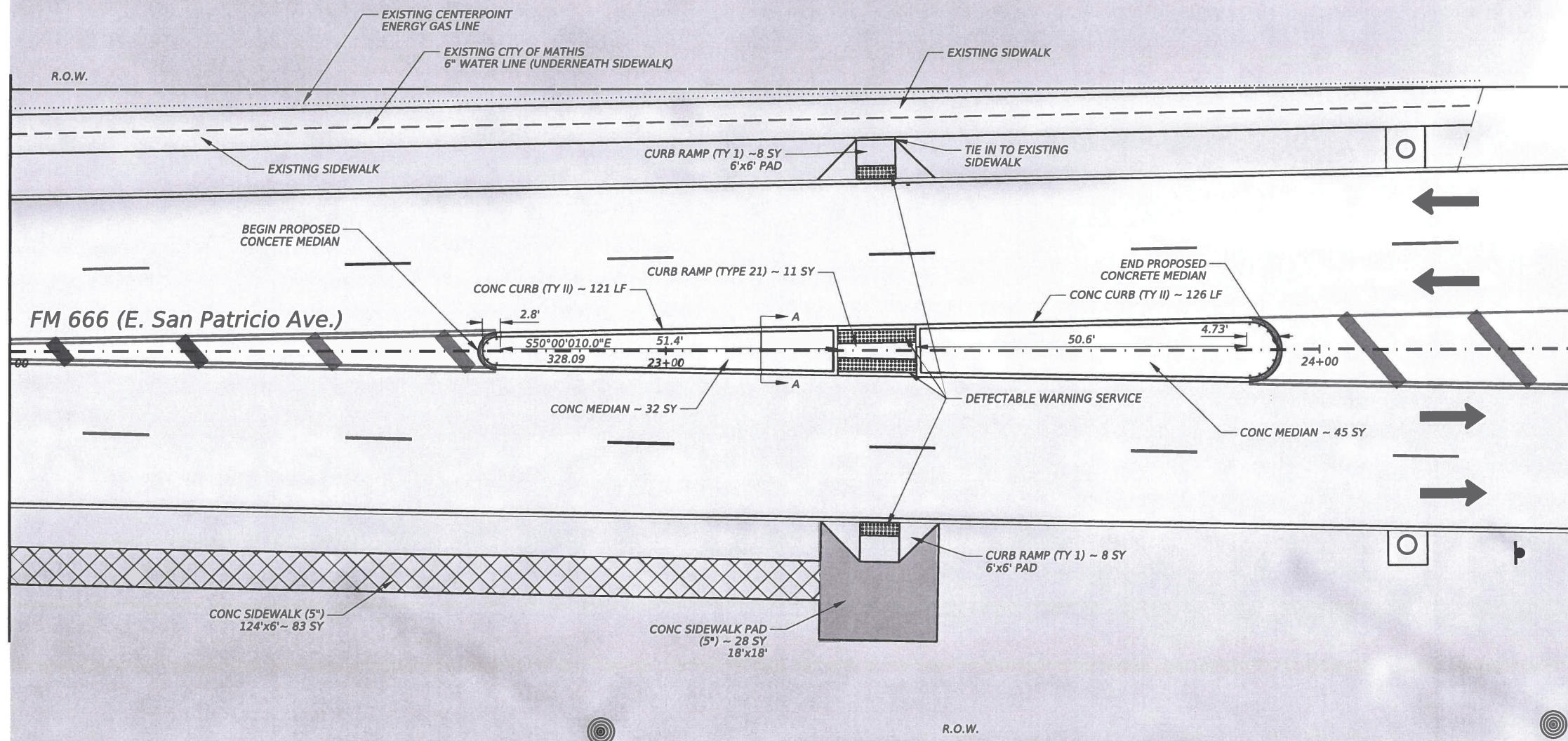
### LEGEND

- DIRECTION OF TRAFFIC
- PROPOSED 6' WIDE SIDEWALK
- CONC. SIDEWALK PAD

### NOTES:

1. CURB RAMPS SHALL CONFORM TO TXDOT STANDARDS FOR PEDESTRIAN FACILITIES --CURB RAMPS.
2. REFER TO STANDARD SHEETS FOR MORE INFORMATION CONCERNING CONCRETE SIDEWALK.
3. TIE PROPOSED SIDEWALK TO EXISTING SIDEWALK & PROPOSED RAMPS WHERE IT IS SHOWN ON THE LAYOUT. SIDEWALK WILL BE AT A WIDTH OF 6', CONC. SIDEWALK PAD WILL BE 18' IN LENGTH BY 18' IN WIDTH AS CALLED OUT IN THE LAYOUT SHEET.
4. CONCRETE MEDIAN SHALL BE TIED TO TO PAVEMENT BELOW TO AVOID MOVEMENT. COORDINATE WITH TXDOT AREA OFFICE FOR FURTHER INFORMATION.
5. MUST HAVE ENGINEER APPROVAL PRIOR TO CONSTRUCTION OF MEDIAN FOR VERIFICATION OF PLACEMENT IN THE FIELD.

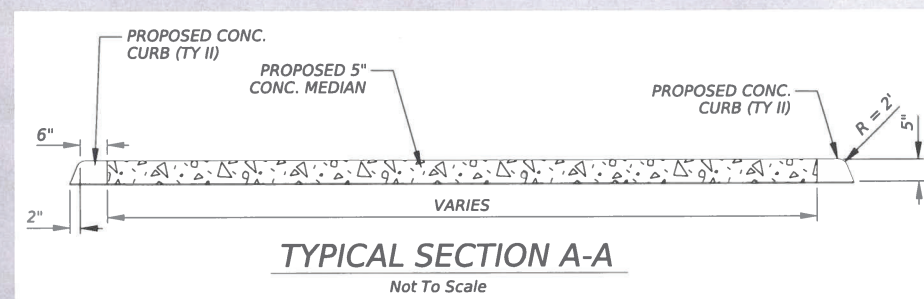
MATCHLINE STA 22+00



Jorge A. Perez  
 04/07/2024

SCALE 1" = 20'

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
529	6002	CONC CURB (TY II)	LF	247
531	6002	CONC SIDEWALKS (5")	SY	144
531	6016	CURB RAMPS (TY 21)	SY	11
531	6018	CURB RAMPS (TY 1)	SY	16
536	6002	CONC (MEDIAN)	SY	77



Texas Department of Transportation

FM 666

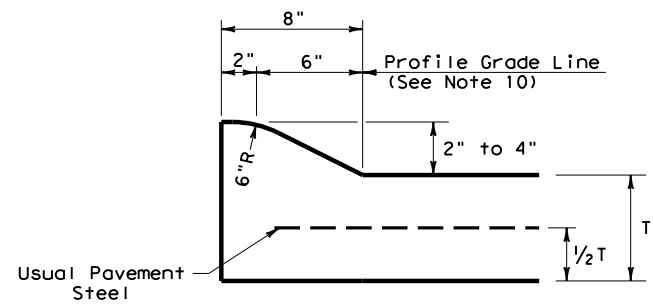
CONCRETE MEDIAN  
& MISCELLANEOUS  
DETAIL SHEET

© TXDOT 2024		SHEET 2 OF 2	
CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST		COUNTY	SHEET NO.
CRP		JIM WELLS, ETC.	41

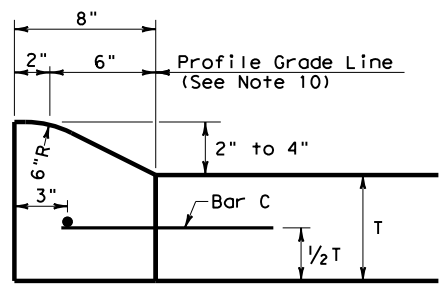


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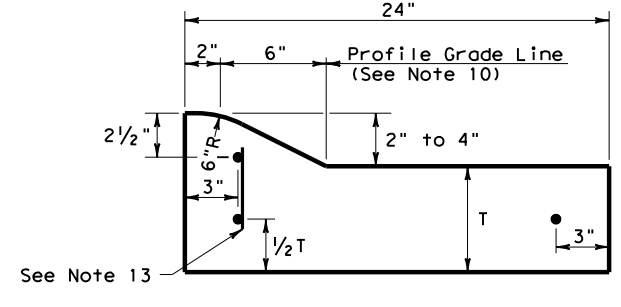
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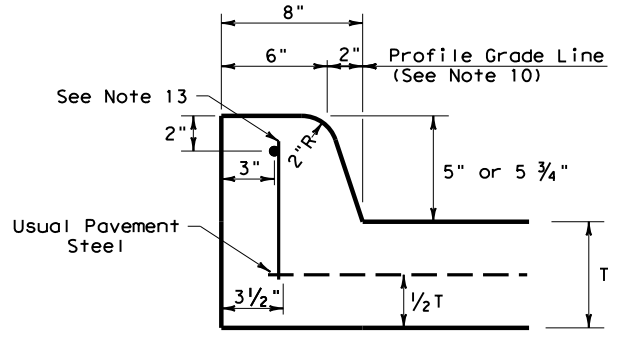
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2" - 4" HEIGHT**



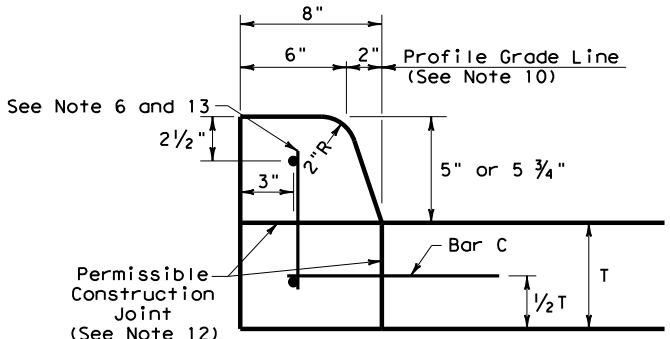
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2" - 4" HEIGHT**



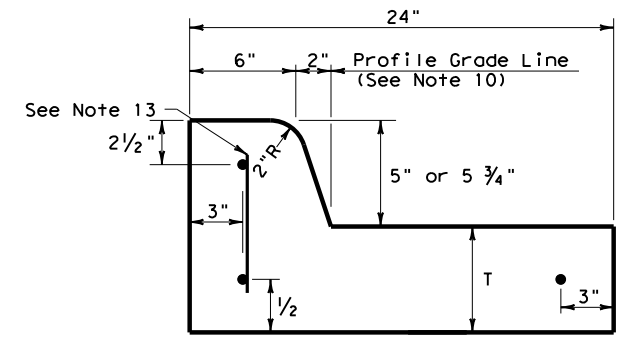
**TYPE I CURB AND GUTTER  
2" - 4" HEIGHT**



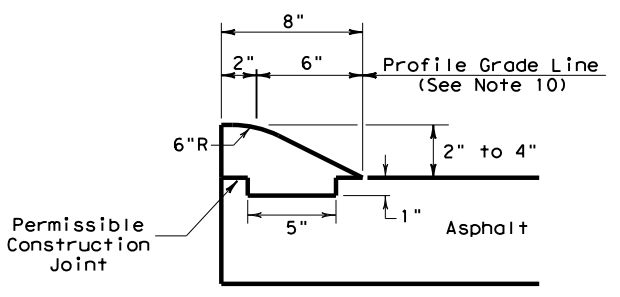
**TYPE II CURB (MONOLITHIC)  
5" - 5 3/4" HEIGHT**



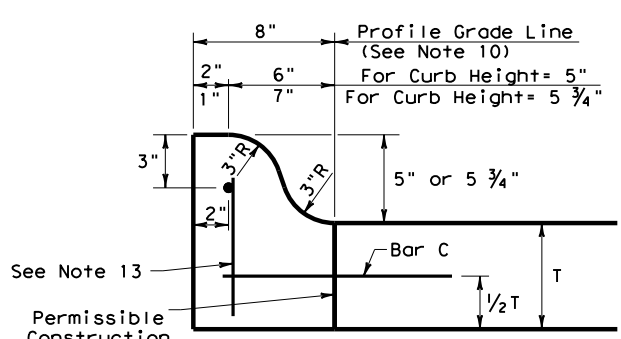
**TYPE II CURB  
5" - 5 3/4" HEIGHT**



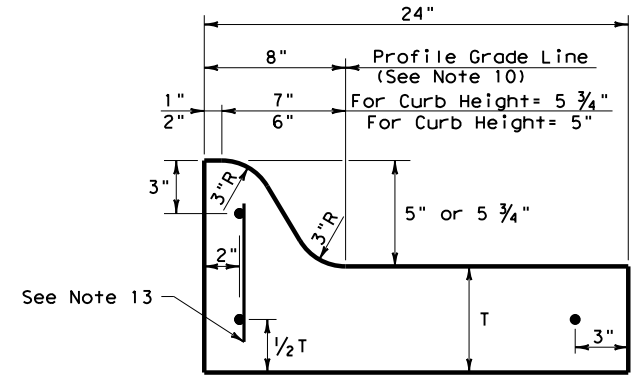
**TYPE II CURB AND GUTTER  
5" - 5 3/4" HEIGHT**



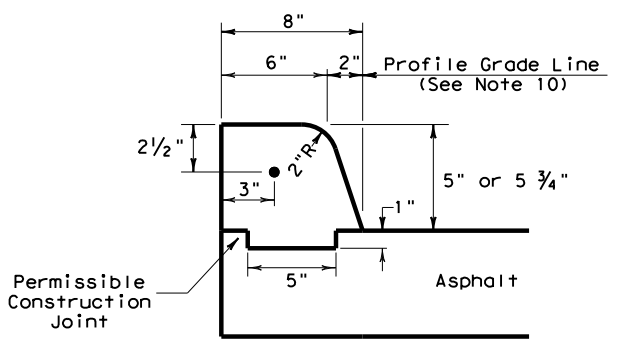
**TYPE III CURB (KEYED)  
2" - 4" HEIGHT**



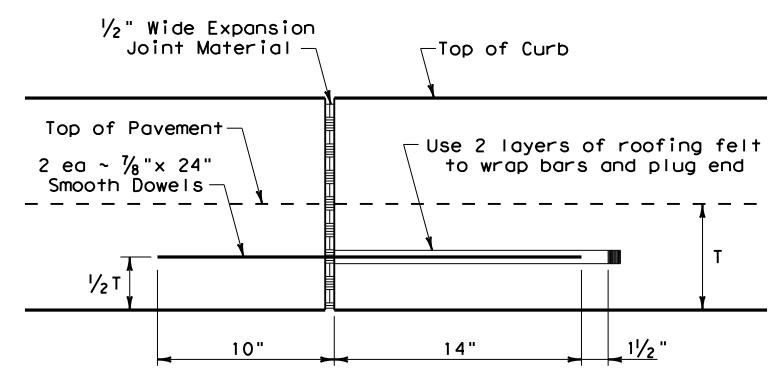
**TYPE IIa CURB  
5" - 5 3/4" HEIGHT**



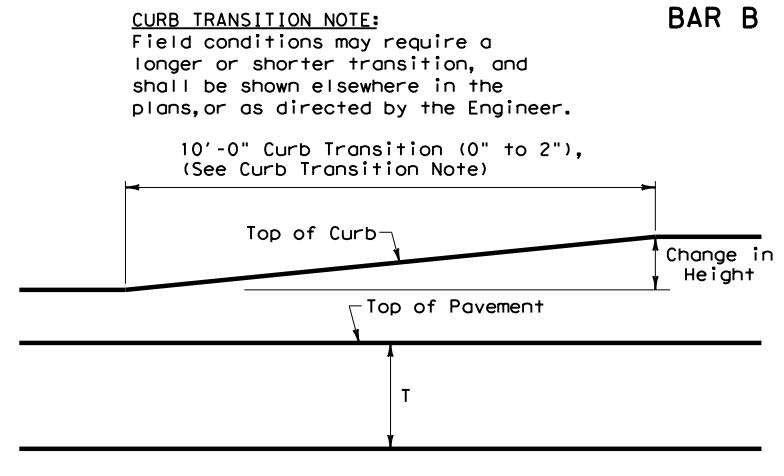
**TYPE IIa CURB AND GUTTER  
5" - 5 3/4" HEIGHT**



**TYPE IV CURB (KEYED)  
5" - 5 3/4" HEIGHT**



**EXPANSION JOINT DETAIL**

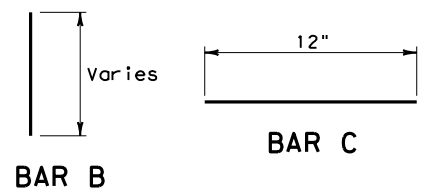


**CURB TRANSITION**

Note: To be paid for as Highest Curb

**GENERAL NOTES**

- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
- All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
- Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
- Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
- One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.

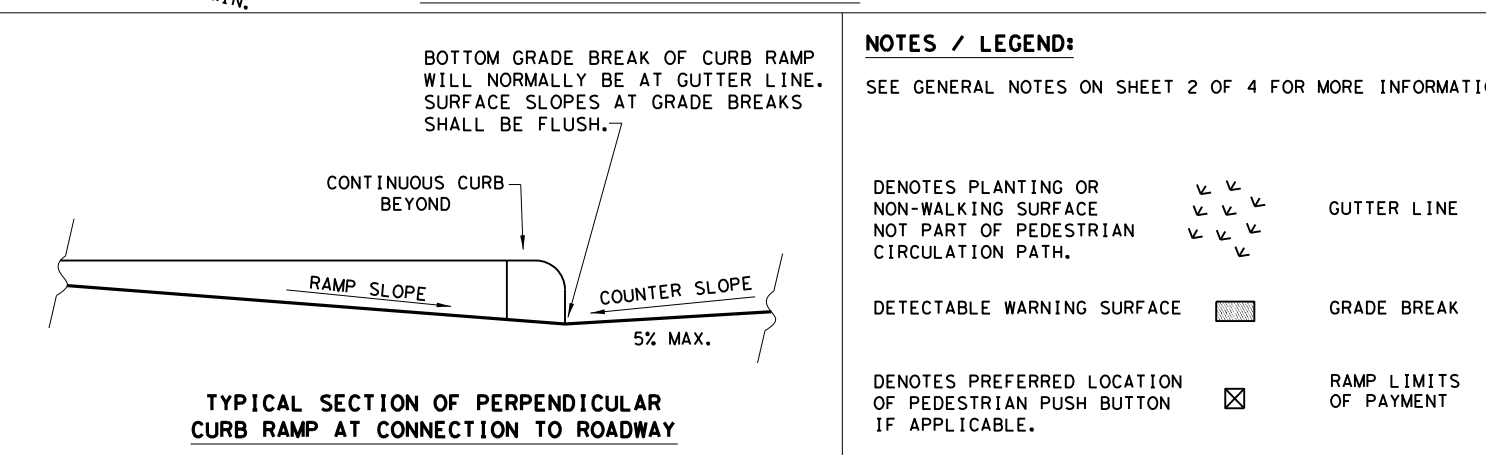
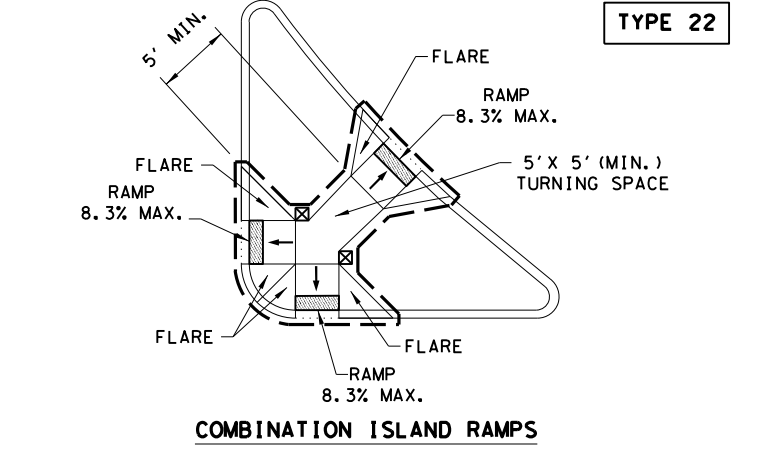
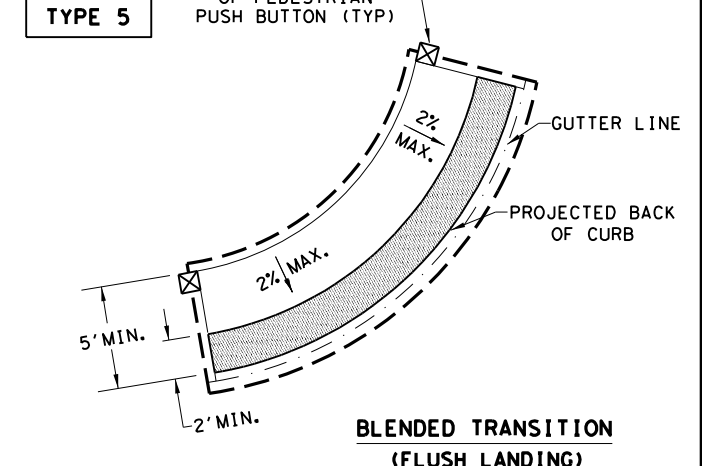
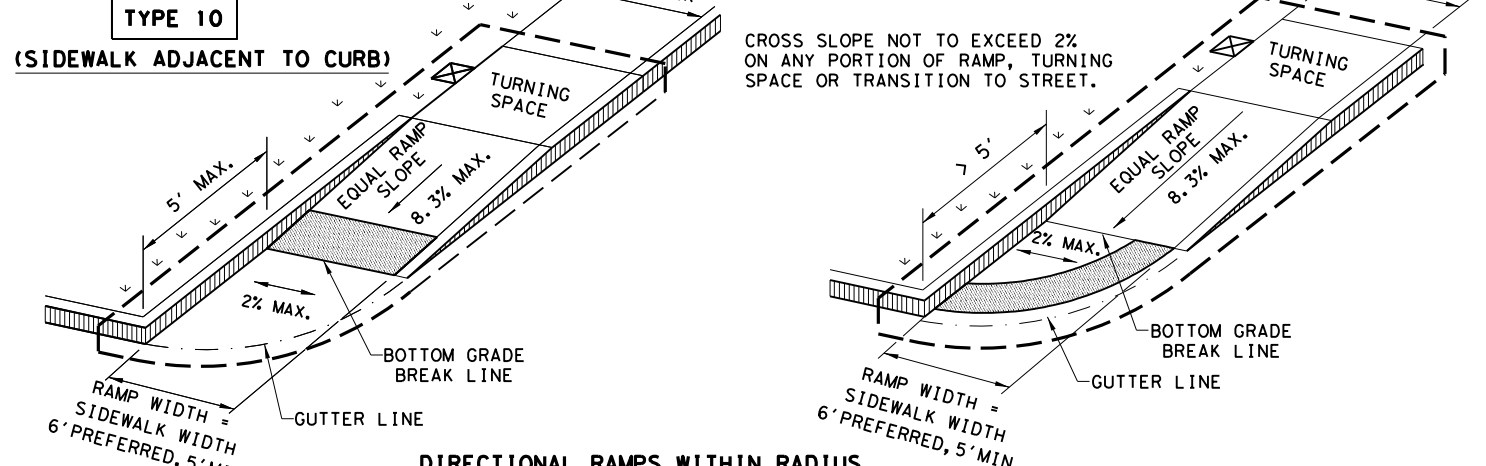
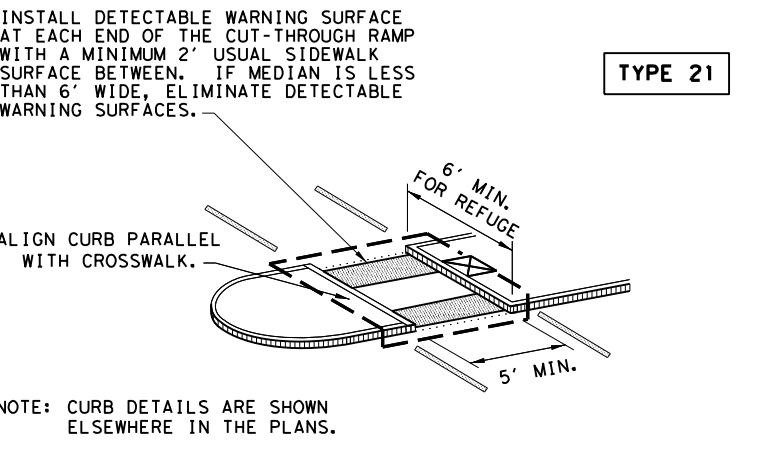
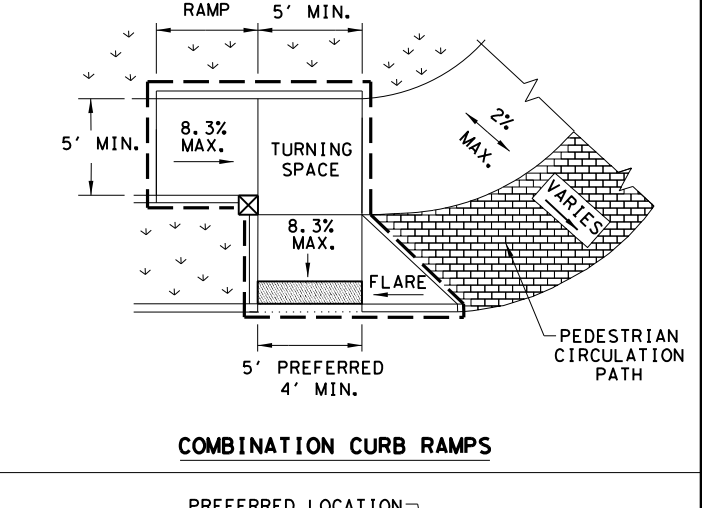
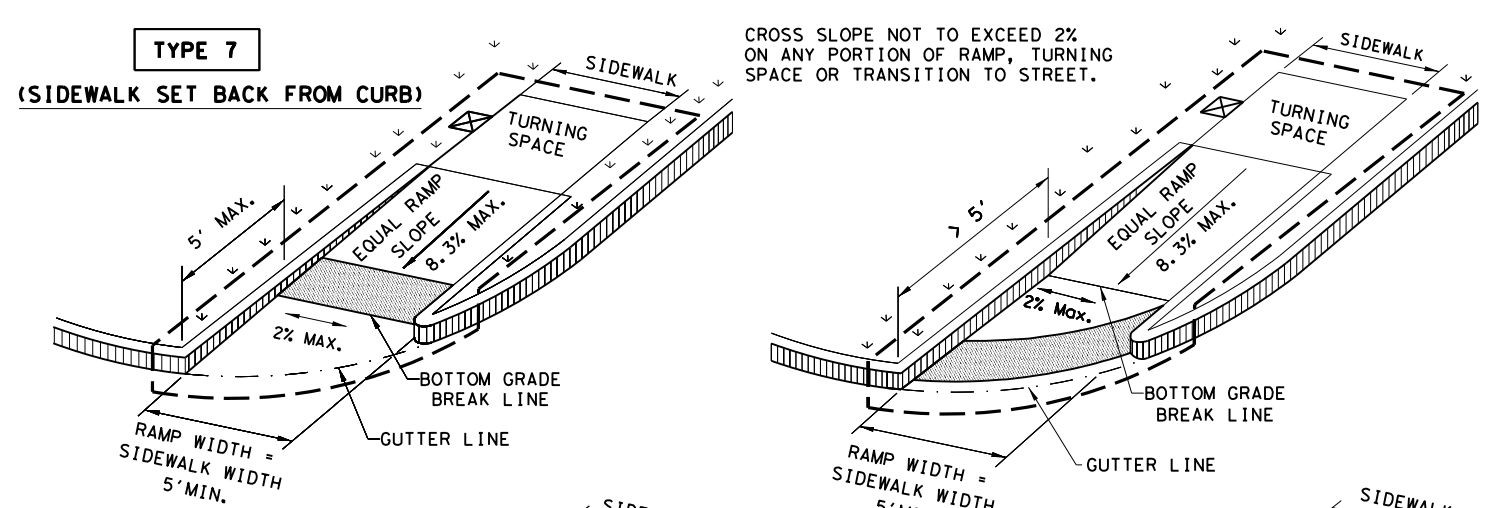
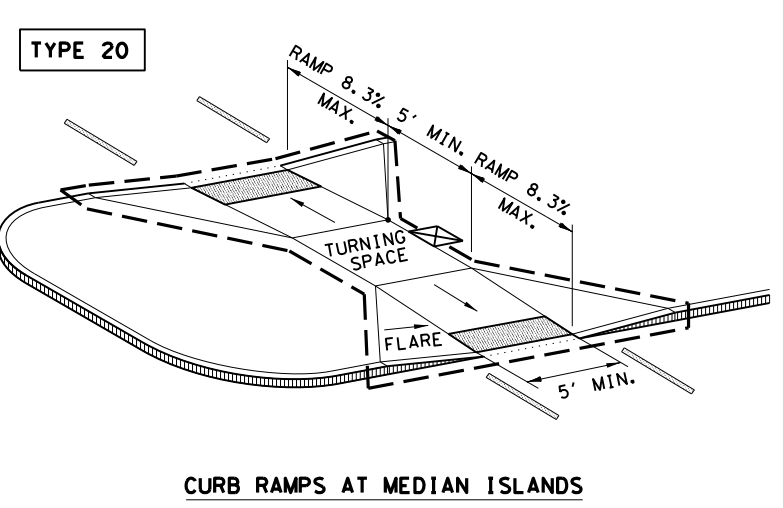
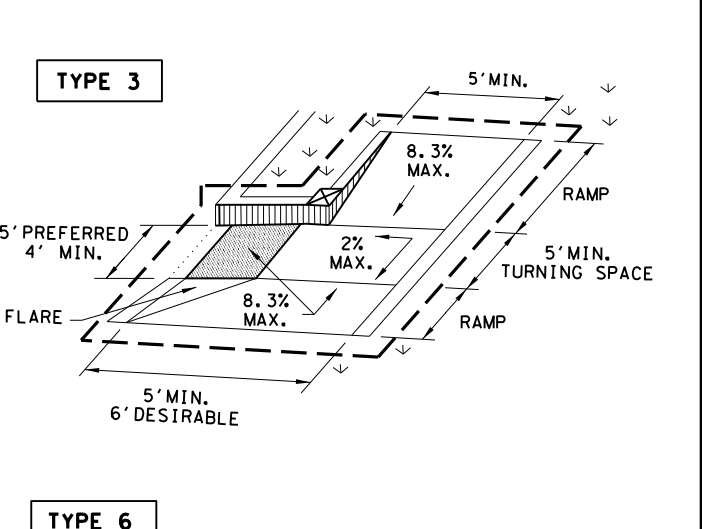
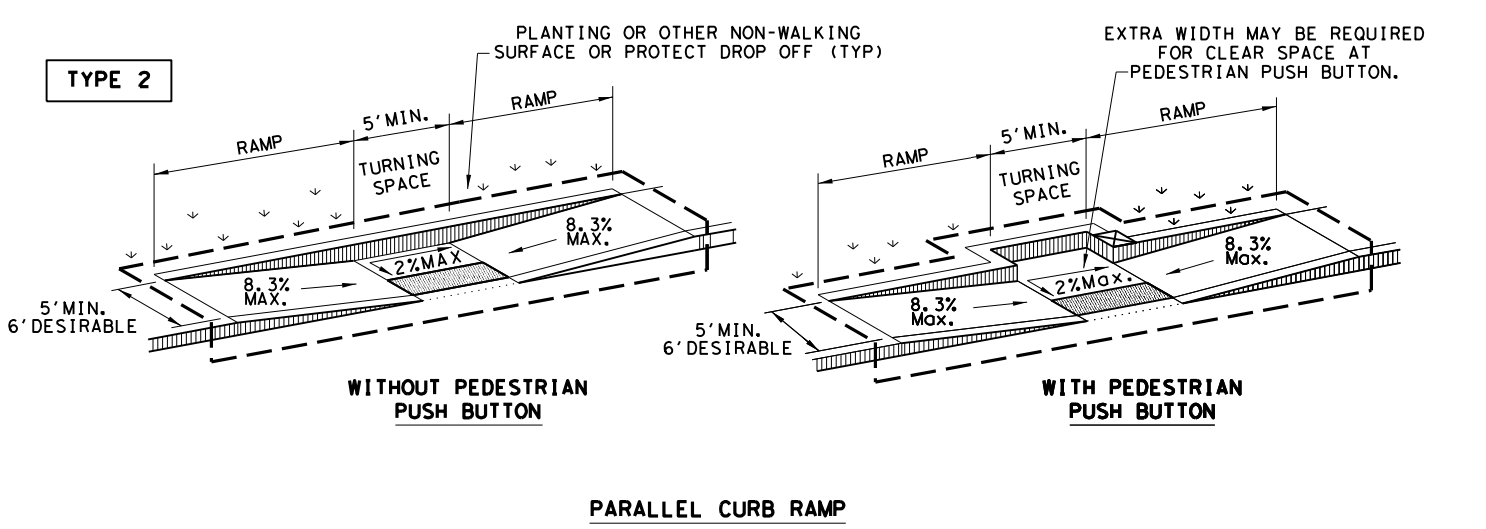
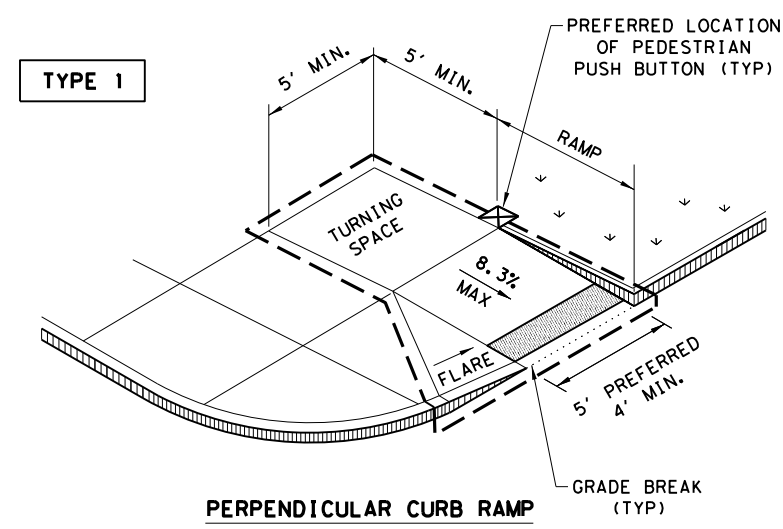


**CURB TRANSITION NOTE:**  
 Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

		<b>Design Division Standard</b>	
<h2>CONCRETE CURB AND GUTTER</h2>			
<h3>CCCG-22</h3>			
FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS
© TXDOT: JUNE 2022	CONT: 0087	SECT: 02	JOB: 059, ETC. SH 359, ETC.
REVISIONS		DIST: CRP	COUNTY: JIM WELLS, ETC.
			SHEET NO. <b>42</b>

DATE: 4/6/2024  
 FILE: \\txdot.projectwiseonline.com:txdot4\Documents\16 - CRP\Design Projects\008702059\4 - Design\Plan Set\3. Roadway\Standards\ped18.dgn

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**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.

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

DETECTABLE WARNING SURFACE

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

Texas Department of Transportation  
 Design Division Standard

**PEDESTRIAN FACILITIES CURB RAMPS**

**PED-18**

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
REVISED 08, 2005	DIST	COUNTY	SHEET NO.	
REVISED 06, 2012	CRP	JIM WELLS, ETC.	43	
REVISED 01, 2018				



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DATE: 4/6/2024  
 FILE: pw://txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/008702059/4 - Design/Plan Set/3. Roadway/Standards/ped18.dgn

**GENERAL NOTES**

**CURB RAMPS**

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. 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.
5. Turning Spaces shall be 5' x 5' minimum. Cross slope shall be maximum 2%.
6. Clear 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.
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 latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
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. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
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. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. 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.
18. Existing features that comply with applicable standards may remain in place unless otherwise shown on the plans.

**DETECTABLE WARNING MATERIAL**

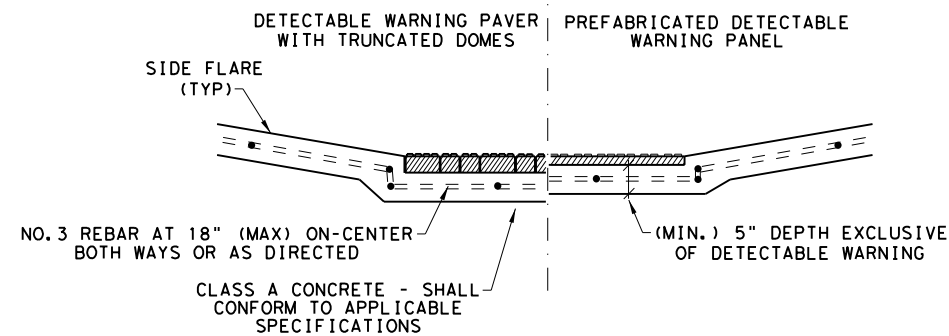
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. 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.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches 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.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

**DETECTABLE WARNING PAVERS (IF USED)**

25. 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.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

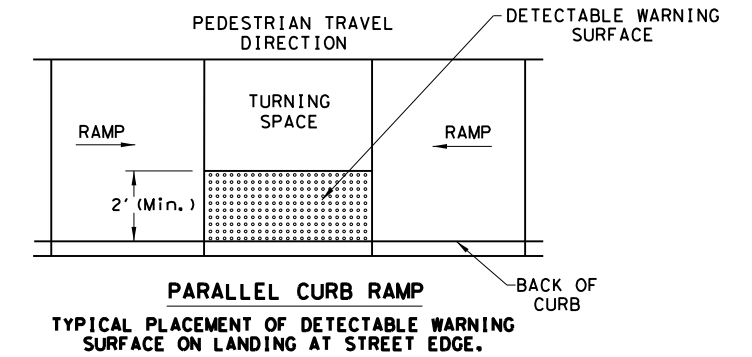
**SIDEWALKS**

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. 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.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. 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 five percent (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 PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. 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".
34. Sidewalk details are shown elsewhere in the plans.

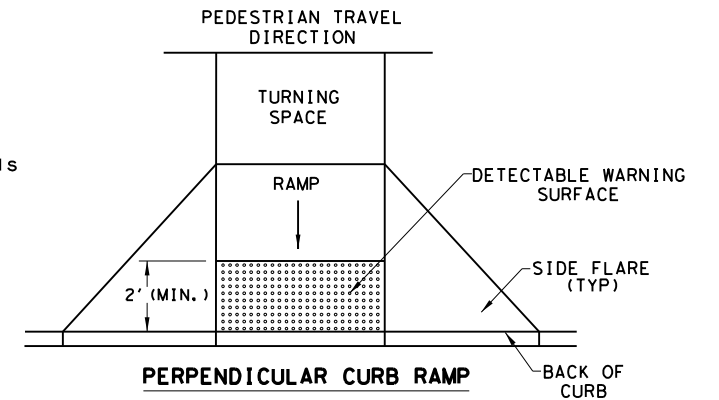


**SECTION VIEW DETAIL  
 CURB RAMP AT DETECTIBLE WARNINGS**

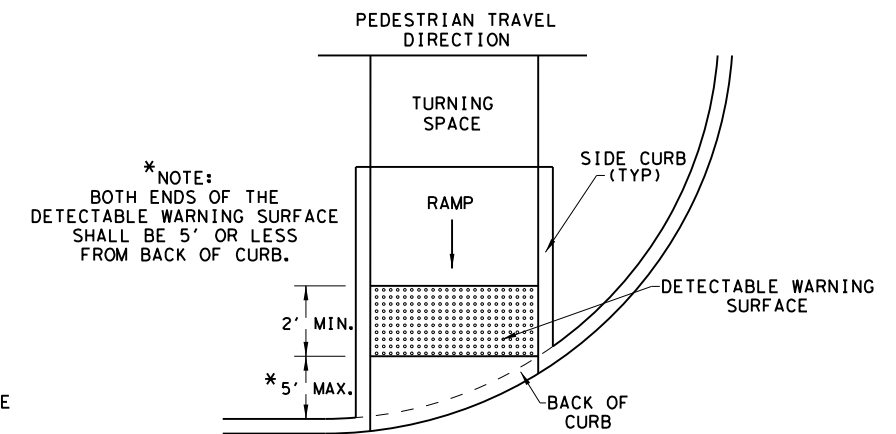
**DETECTABLE WARNING SURFACE DETAILS**



**PARALLEL CURB RAMP  
 TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.**



**PERPENDICULAR CURB RAMP  
 TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.**



\* NOTE:  
 BOTH ENDS OF THE  
 DETECTABLE WARNING SURFACE  
 SHALL BE 5' OR LESS  
 FROM BACK OF CURB.

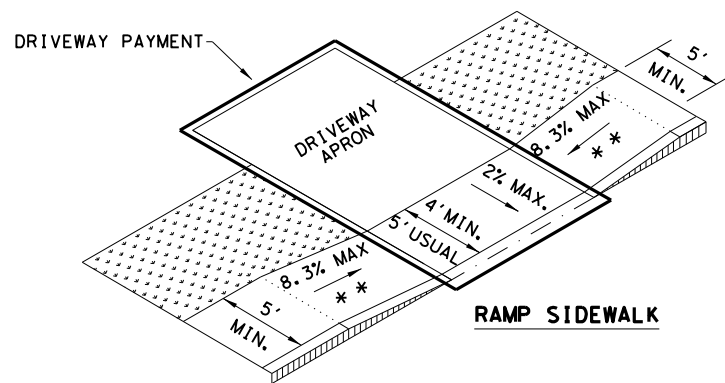
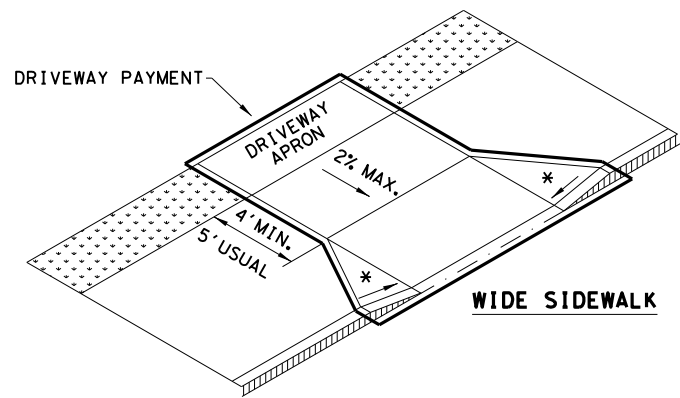
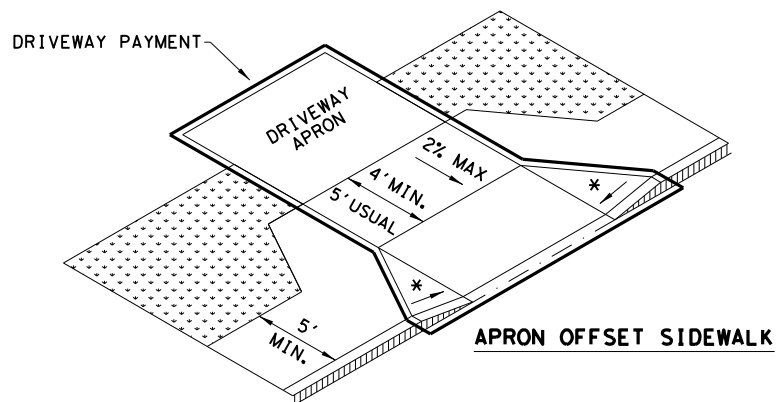
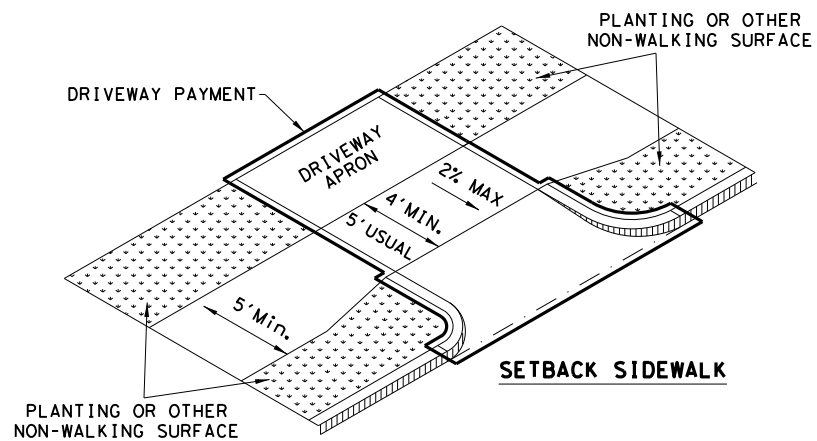
**DIRECTIONAL CURB RAMP  
 TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.**

SHEET 2 OF 4

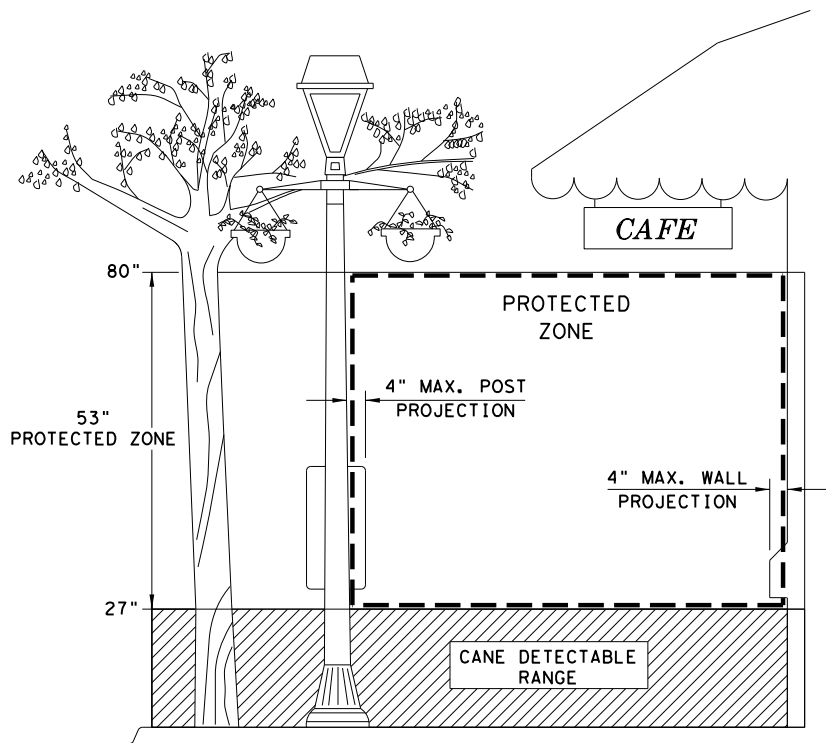
		Design Division Standard	
<h1>PEDESTRIAN FACILITIES          CURB RAMPS</h1> <h2>PED-18</h2>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS	0087	02	059, ETC. SH 359, ETC.
REVISED 08, 2005	DIST	COUNTY	SHEET NO.
REVISED 06, 2012	CRP	JIM WELLS, ETC.	44
REVISED 01, 2018			

DATE: 4/6/2024  
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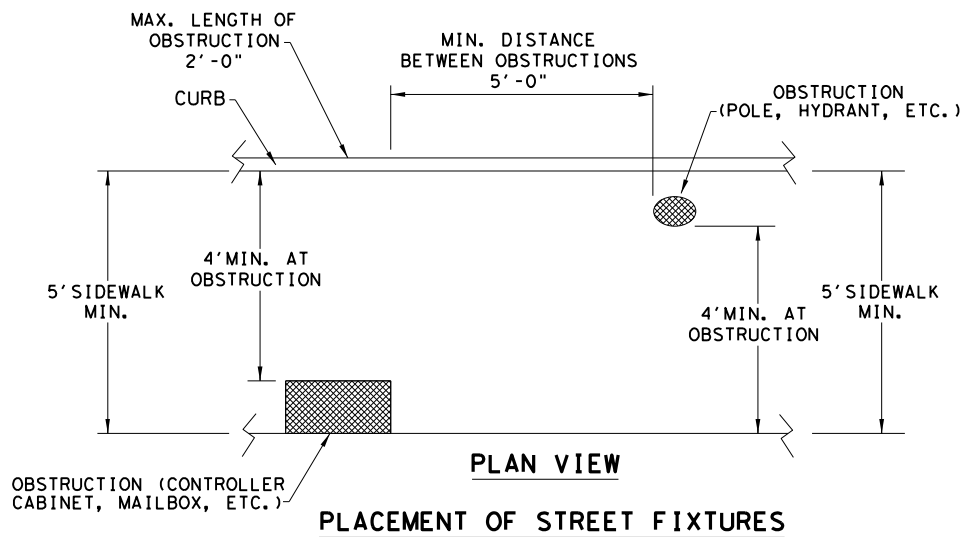
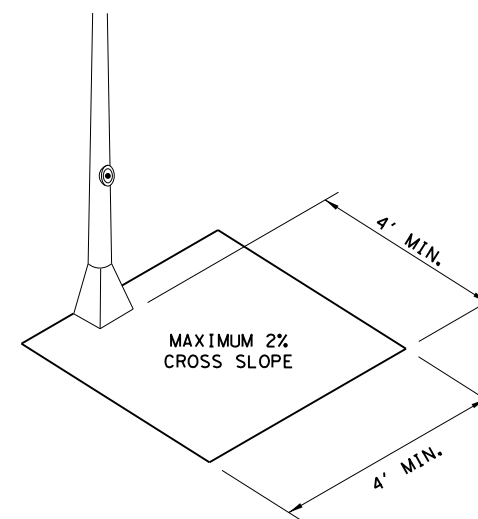
**SIDEWALK TREATMENT AT DRIVEWAYS**



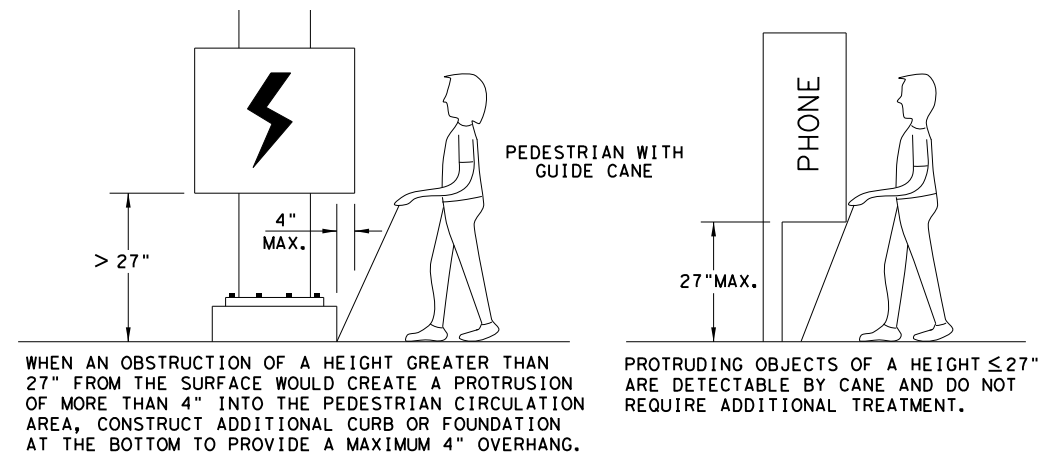
NOTES:  
 \* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.  
 \* \* IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.



NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



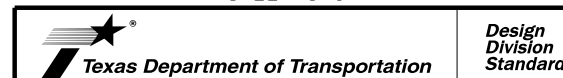
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



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 ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

SHEET 3 OF 4



**PEDESTRIAN FACILITIES**  
**CURB RAMPS**

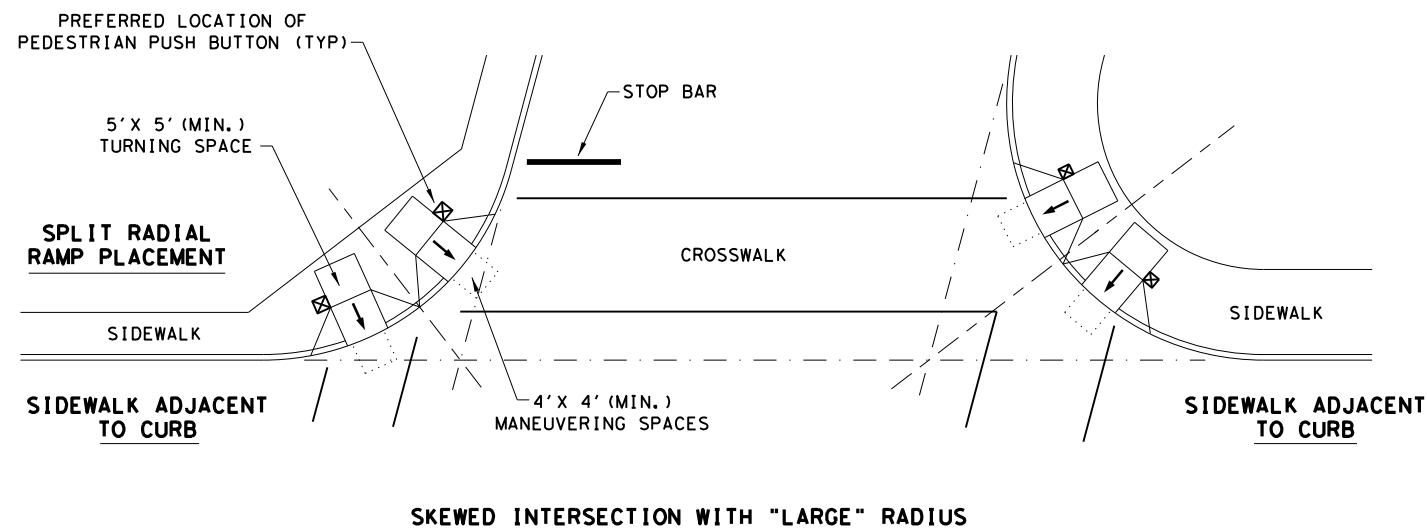
**PED-18**

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
REVISED 08, 2005	DIST	COUNTY	SHEET NO.	
REVISED 06, 2012	CRP	JIM WELLS, ETC.	45	
REVISED 01, 2018				

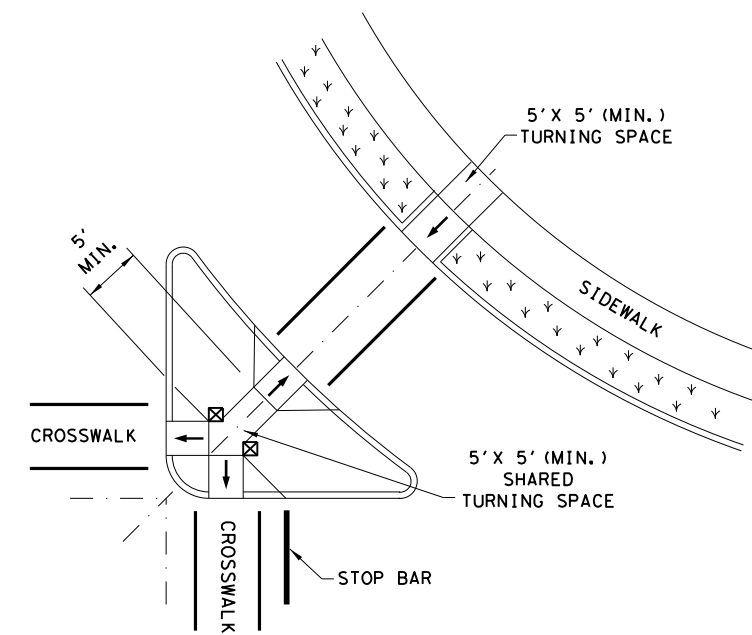
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DATE: 4/6/2024  
 FILE: pw://txdot.projectwiseonline.com:txdot4/Documents/16 - CRP/Design Projects/008702059/4 - Design/Plan Set/3. Roadway/Standards/ped18.dgn

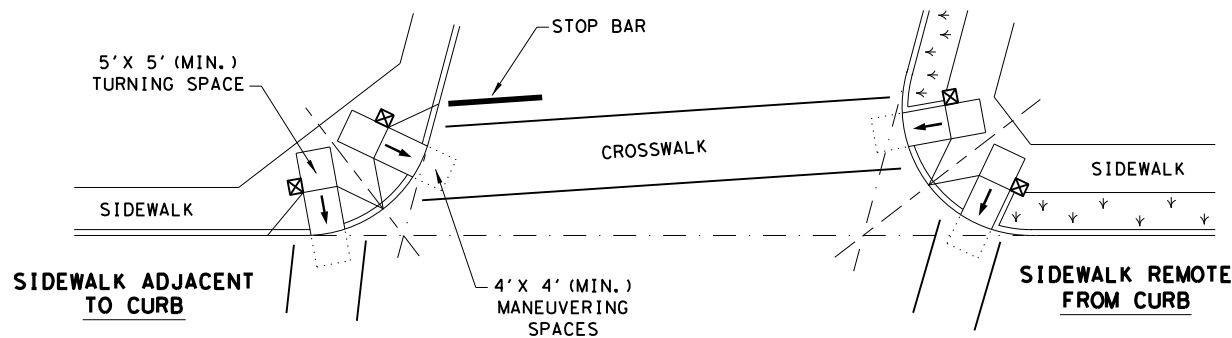
TYPICAL CROSSING LAYOUTS  
 SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



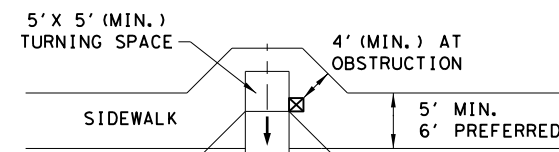
SKewed INTERSECTION WITH "LARGE" RADIUS



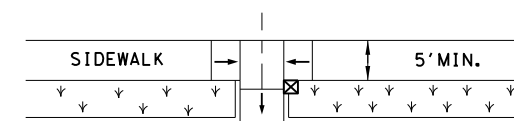
AT INTERSECTION  
 W/FREE RIGHT TURN & ISLAND



SKewed INTERSECTION WITH "SMALL" RADIUS

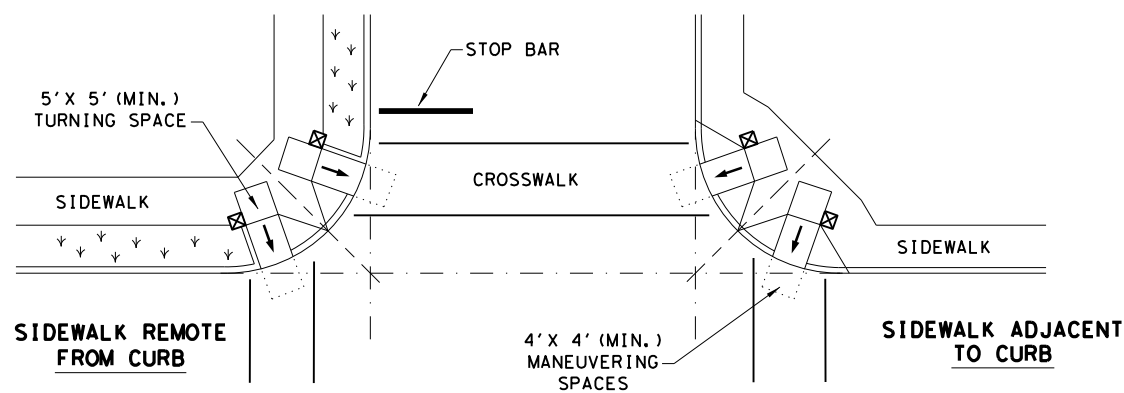


SIDEWALK ADJACENT TO CURB



SIDEWALK REMOTE FROM CURB

MID-BLOCK PLACEMENT  
 PERPENDICULAR RAMPS



NORMAL INTERSECTION WITH "SMALL" RADIUS

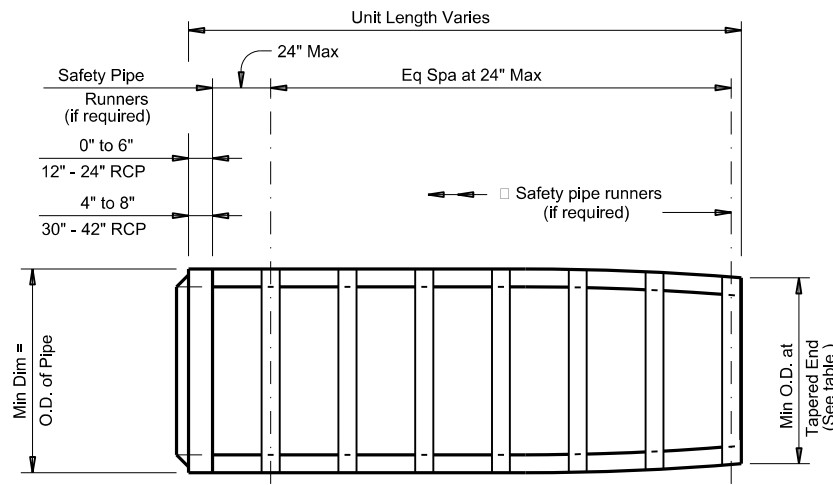
LEGEND:

- SHOWS DOWNWARD SLOPE. →
- DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒
- DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH. ↙ ↘ ↖ ↗

SHEET 4 OF 4

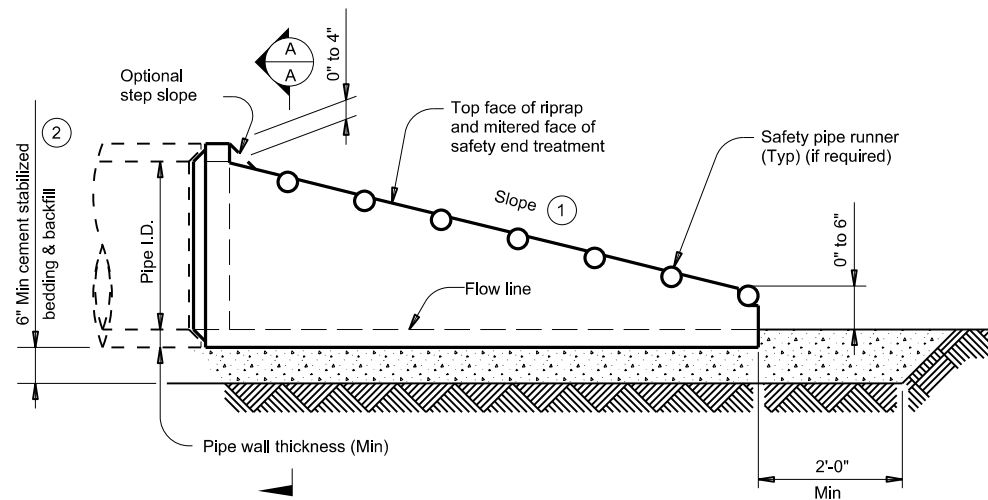
		Design Division Standard	
<h2>PEDESTRIAN FACILITIES</h2> <h3>CURB RAMPS</h3> <h1>PED-18</h1>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS	0087	02	059, ETC. SH 359, ETC.
REVISED 08, 2005	DIST	COUNTY	SHEET NO.
REVISED 06, 2012	CRP	JIM WELLS, ETC.	46
REVISED 01, 2018			

DATE: 4/6/2024 5:54:42 PM  
 FILE: \\txdot\projectwiseonline.com\txdot\4\Documents\16 - CRP\Design Projects\008702059\4 - Design\Plan Set\3. Roadway\Standards\PSET-RP.dgn  
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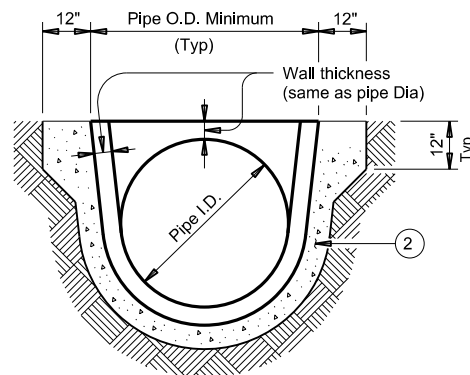
**PLAN VIEW - 12" THRU 24"**

(Showing spigot end connection.)

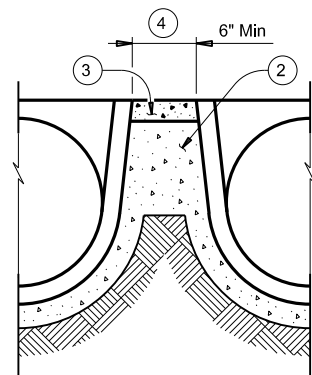


**LONGITUDINAL ELEVATION - 12" THRU 24"**

(Showing spigot end connection.)

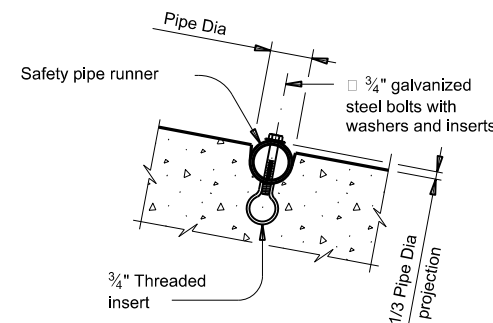


**SECTION A-A**



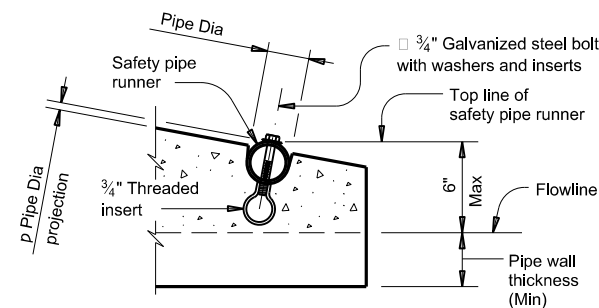
**MULTIPLE PIPE INSTALLATION**

- ① Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
- ② Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- ③ Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment."
- ④ Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
- ⑤ Safety pipe runners are required for multiple pipe culverts with more than two pipes.

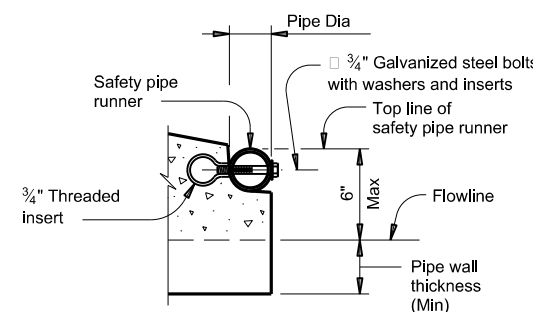


**INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS**

(If required)



**OPTION A**



**OPTION B**

**END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS**

(If required)

**REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS**

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4' - 0"	No	⑤	3" STD	3.500"	3.068"
15"	2 1/4"	19 1/2"	19"	0.07 Circ.	6:1	5' - 8"	No	⑤	3" STD	3.500"	3.068"
18"	2 1/2"	23"	21 1/2"	0.07 Circ.	6:1	7' - 3"	No	⑤	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10' - 6"	No	⑤	3" STD	3.500"	3.068"
30"	3 1/2"	37"	31"	0.18 Circ.	6:1	12' - 1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15' - 4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 1/2"	51"	41 1/2"	0.23 Ellip.	6:1	18' - 7"	Yes	Yes	4" STD	4.500"	4.026"

**MATERIAL NOTES:**

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.  
 Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.  
 Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

**GENERAL NOTES:**

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment."  
 When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.  
 Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.  
 Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.  
 Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.  
 Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Bridge Division Standard

**PRECAST SAFETY END TREATMENT**

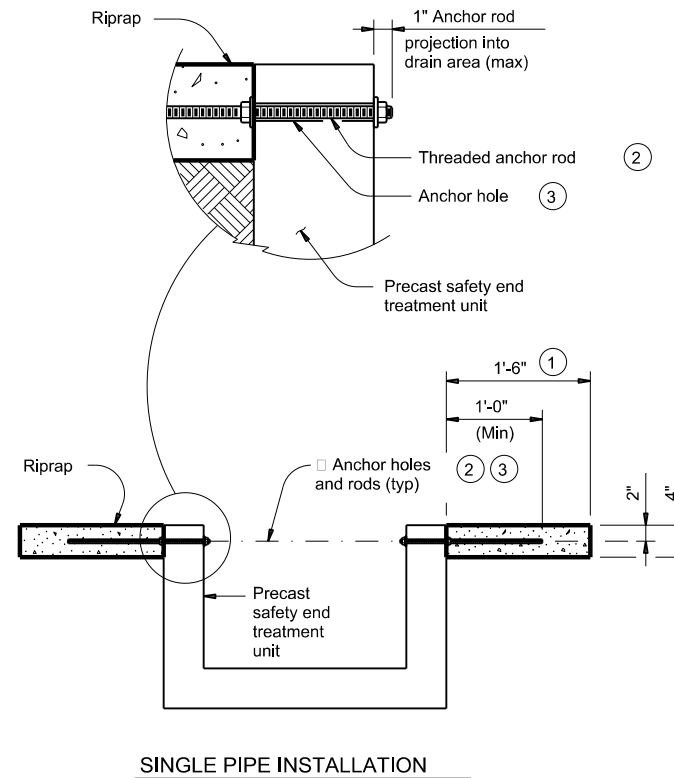
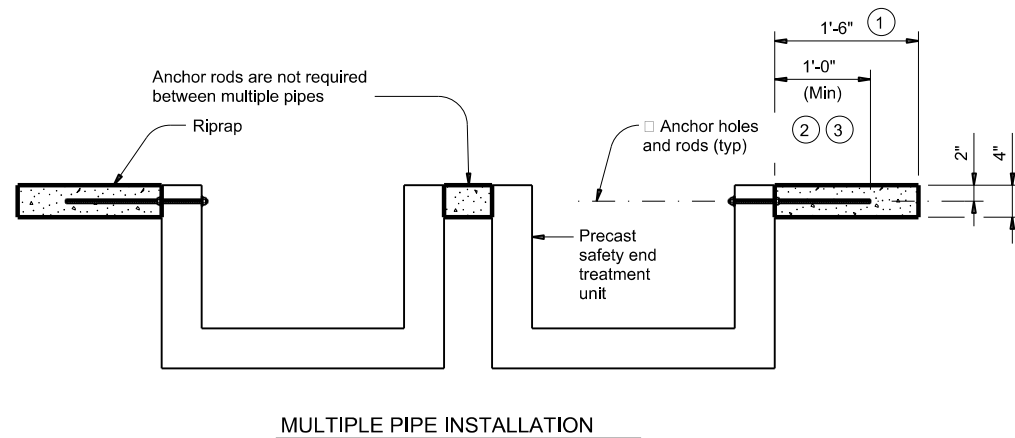
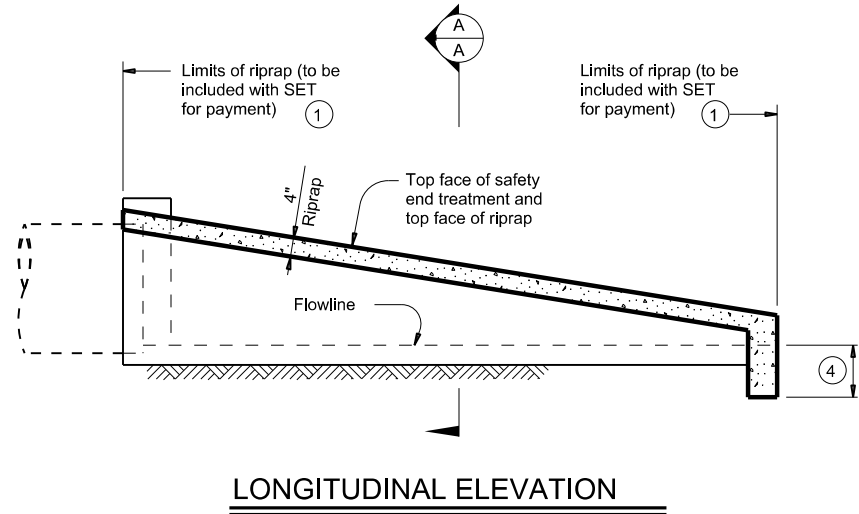
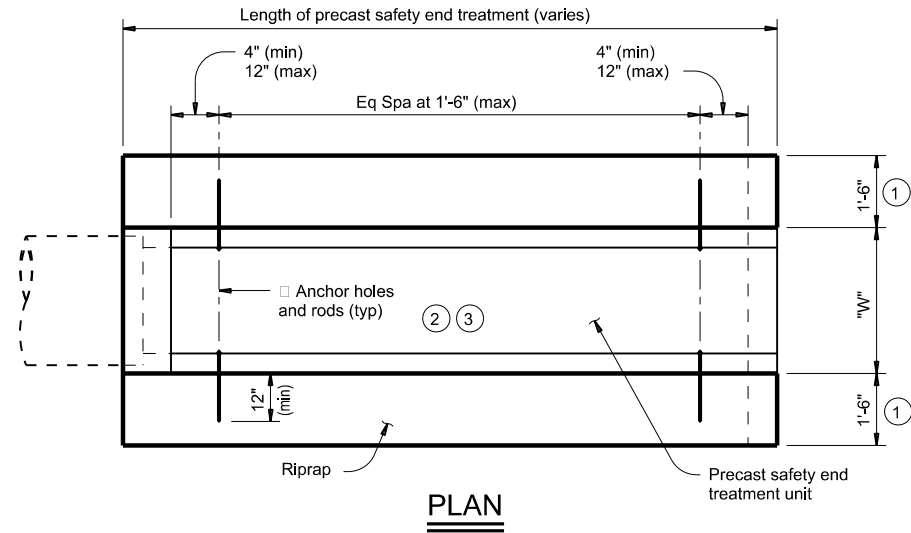
**TYPE II ~ PARALLEL DRAINAGE**

**PSET-RP**

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
	DIST	COUNTY	SHEET NO.	
	CRP	JIM WELLS, ETC.	47	

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SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY)

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards					PSET-RC and PSET-RP Standards		
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

- Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap." When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.
- 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing." Repair galvanizing that is damaged during transport or construction in accordance with the specifications.
- 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.
- Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.
- Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Safety End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap." Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment." Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown. For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrpccast.com. Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.  
 Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

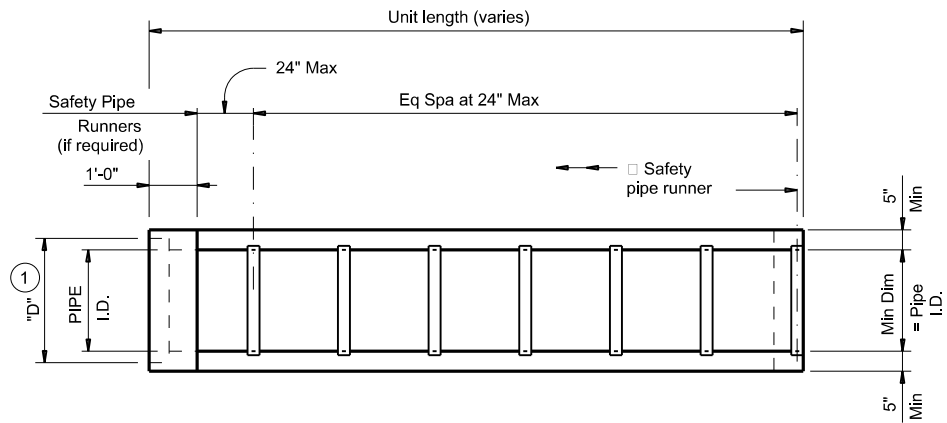
Texas Department of Transportation  
 Bridge Division Standard

**PRECAST SAFETY END TREATMENT TYPE II RIPRAP DETAILS PSET-RR**

FILE:	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY	SHEET NO.		
CRP	JIM WELLS, ETC.	48		

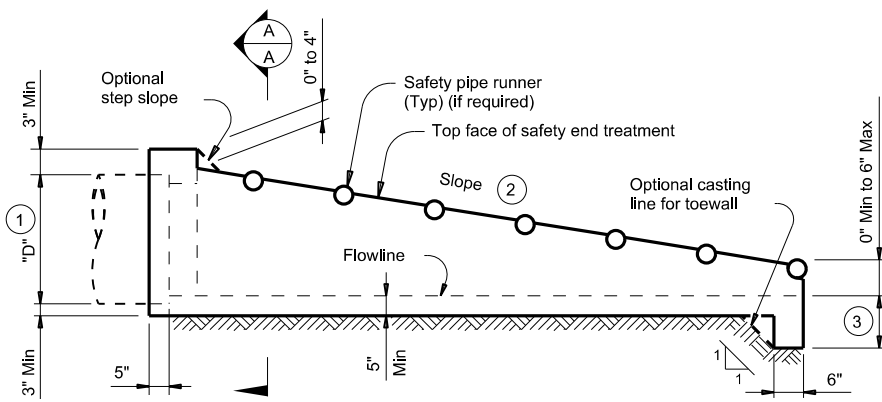
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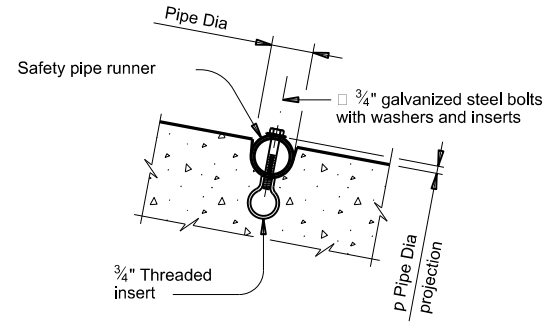
**PLAN**

(Showing bell end connection.)



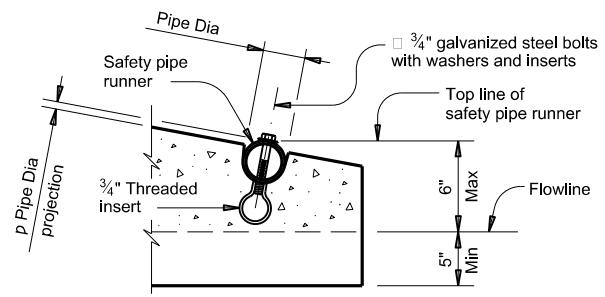
**LONGITUDINAL ELEVATION**

(Showing bell end connection.)

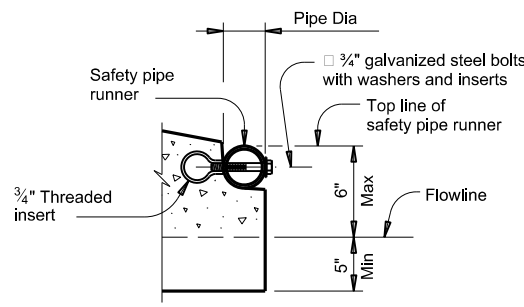


**INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS**

(If required)



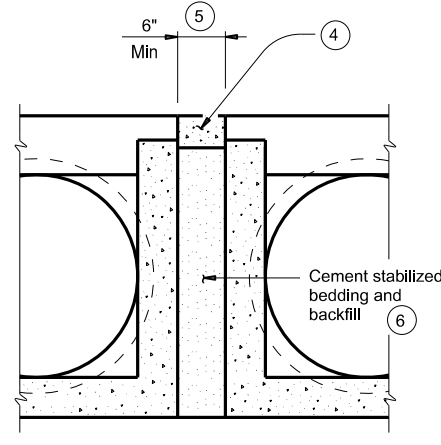
**OPTION A**



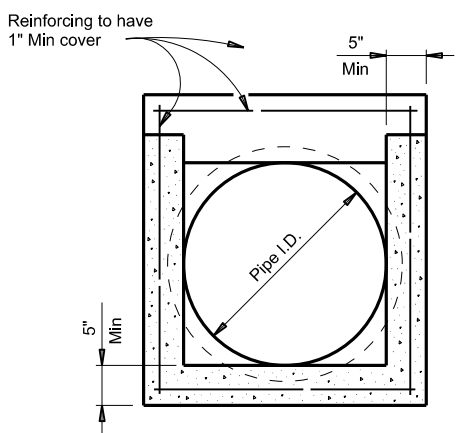
**OPTION B**

**END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS**

(If required)

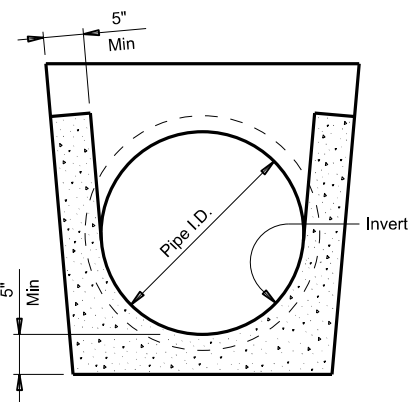


**MULTIPLE PIPE INSTALLATION**

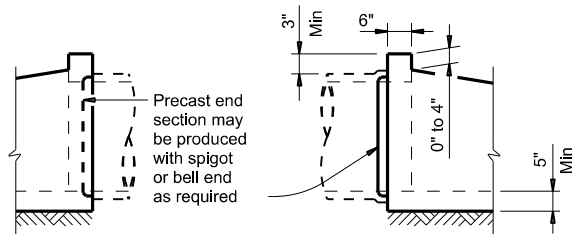


**SECTION A-A**

**OPTION WITH SQUARE BOTTOM**



**OPTION WITH INVERT BOTTOM**



**OPTIONAL JOINT FOR RCP**

(Showing joint between RCP and precast safety end treatment.)

**REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS**

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 1/4"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 1/2"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 1/2"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 1/2"	2.7"	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

- Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.
- Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
- Toewall to be used only when dimension is shown elsewhere in the plans.
- Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment."
- Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
- Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

**GENERAL NOTES:**

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment."  
 When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.  
 Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.  
 Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below:  
 A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).  
 B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).  
 At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.  
 Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.  
 Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.  
 Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.  
 Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

**Texas Department of Transportation** Bridge Division Standard

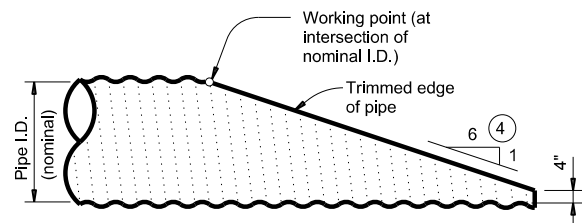
**PRECAST SAFETY END TREATMENT TYPE II ~ PARALLEL DRAINAGE**

**PSET-SP**

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
12-21: Added 42" TP	DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.		49	

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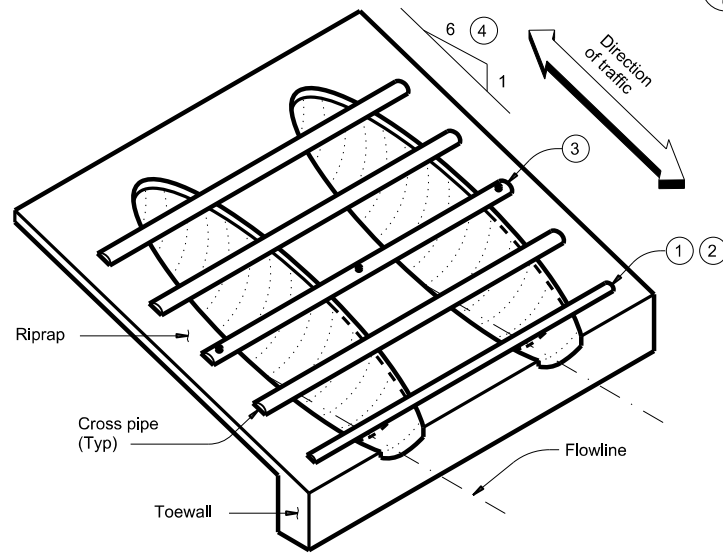
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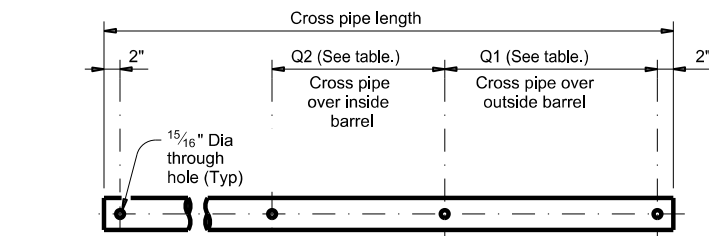
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

**SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER**

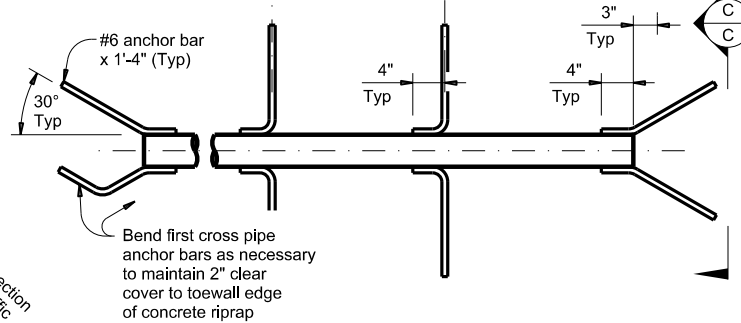
(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)



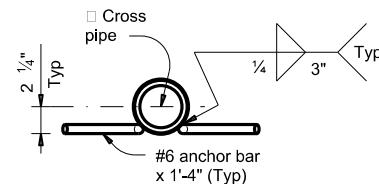
**ISOMETRIC VIEW OF TYPICAL INSTALLATION**



**PIPE WITH BOLTED ANCHOR**

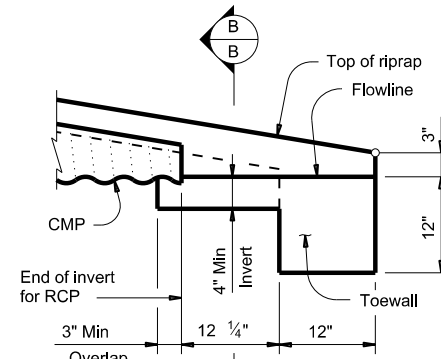


**PIPE WITH ANCHOR BARS**



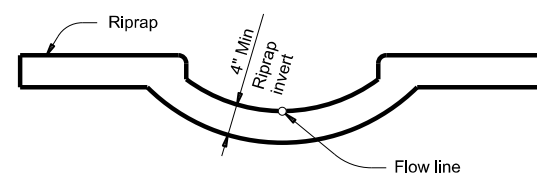
**SECTION C-C**

**CROSS PIPE DETAILS**



**DETAIL "A"**

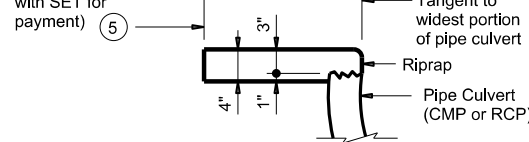
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



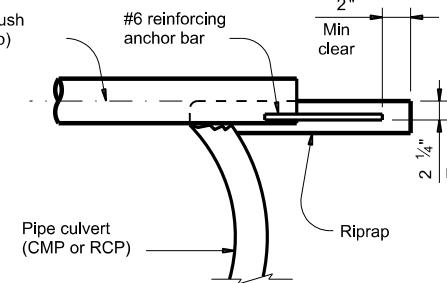
**SECTION B-B**

(Cross pipes not shown for clarity.)

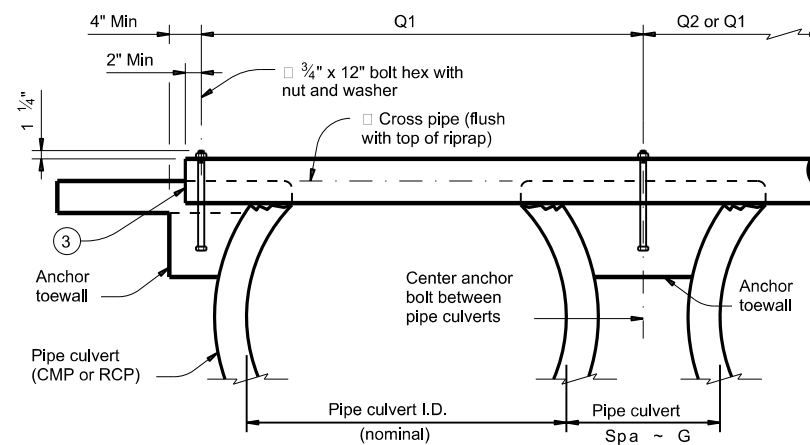
Limits of riprap (to be included with SET for payment)



**SHOWING TYPICAL PIPE CULVERT AND RIPRAP**



**SHOWING CROSS PIPE WITH ANCHOR BAR**



**SHOWING CROSS PIPE WITH BOLTED ANCHOR**

**SECTION A-A**

**CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES**

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"		
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	4" Std (4.500" O.D.)
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"		
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

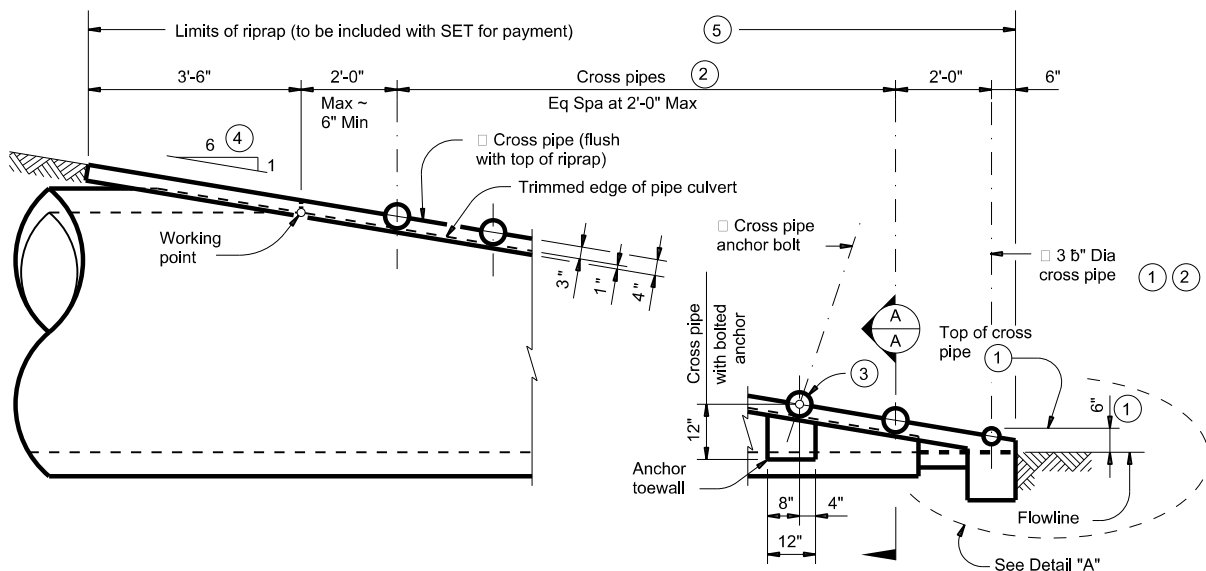
- The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."
- Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

**MATERIAL NOTES:**

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52. Provide ASTM A307 bolts and nuts. Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

**GENERAL NOTES:**

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981. Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes. Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap." Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



**SIDE ELEVATION OF CAST-IN-PLACE CONCRETE**

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)

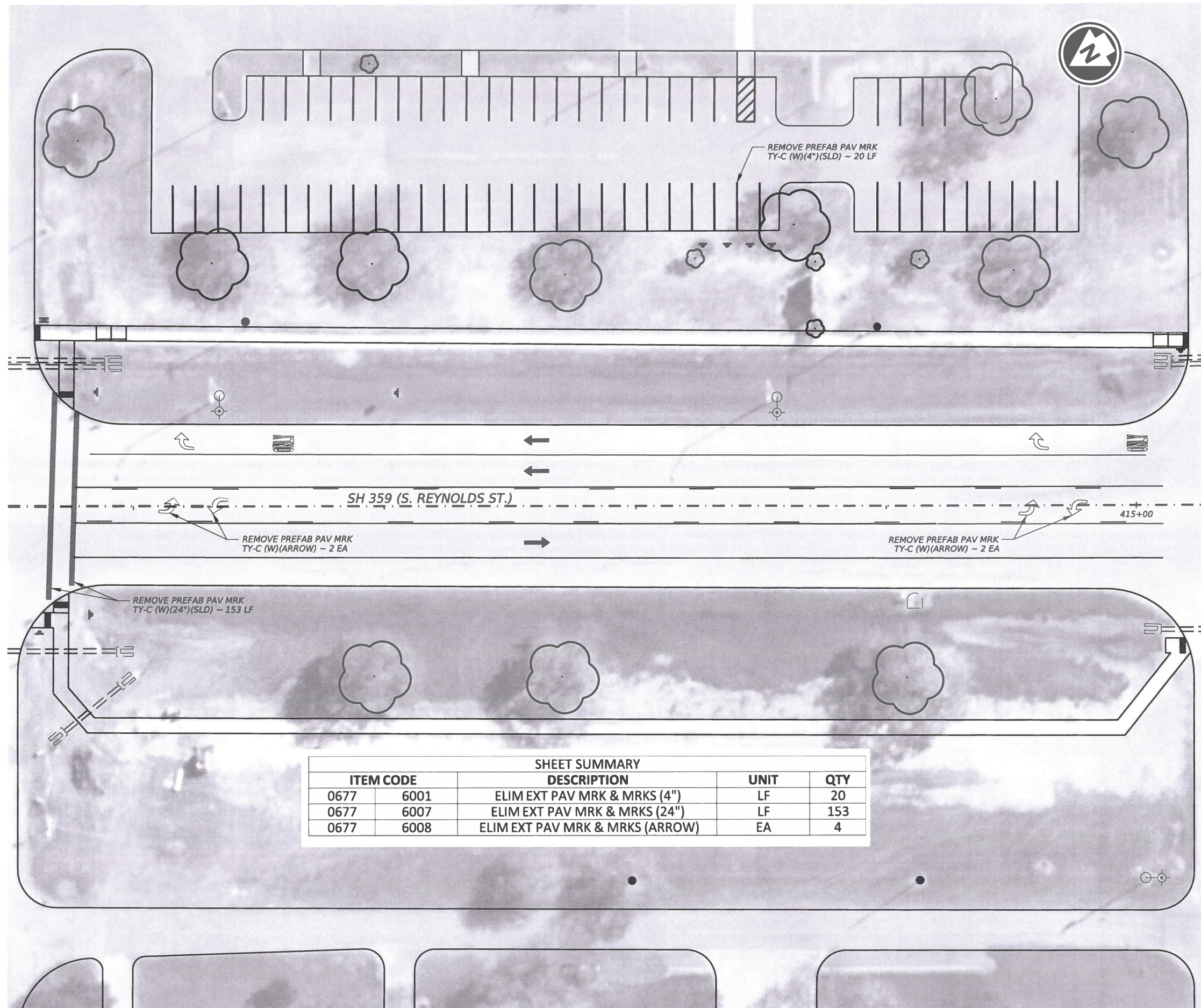
**Texas Department of Transportation** Bridge Division Standard

**SAFETY END TREATMENT FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE SETP-PD**

FILE:	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY	SHEET NO.		
CRP	JIM WELLS, ETC.	50		



DATE: 4/7/2024 6:54:39 PM  
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**LEGEND**

⇄ - DIRECTION OF TRAFFIC

**NOTES:**

1. 4" PARKING LOT STRIPE WILL BE REMOVED FROM THE ORANGE GROVE HIGH SCHOOL PARKING LOT AT THE LOCATION MARKED ON THE LAYOUT ONCE APPROVED BY THE ENGINEER.



*Jorge A. Perez*  
04/07/2024

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	QTY
0677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	20
0677	6007	ELIM EXT PAV MRK & MRKS (24")	LF	153
0677	6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4

SCALE 1" = 40'

**Texas Department of Transportation**

**SH 359**

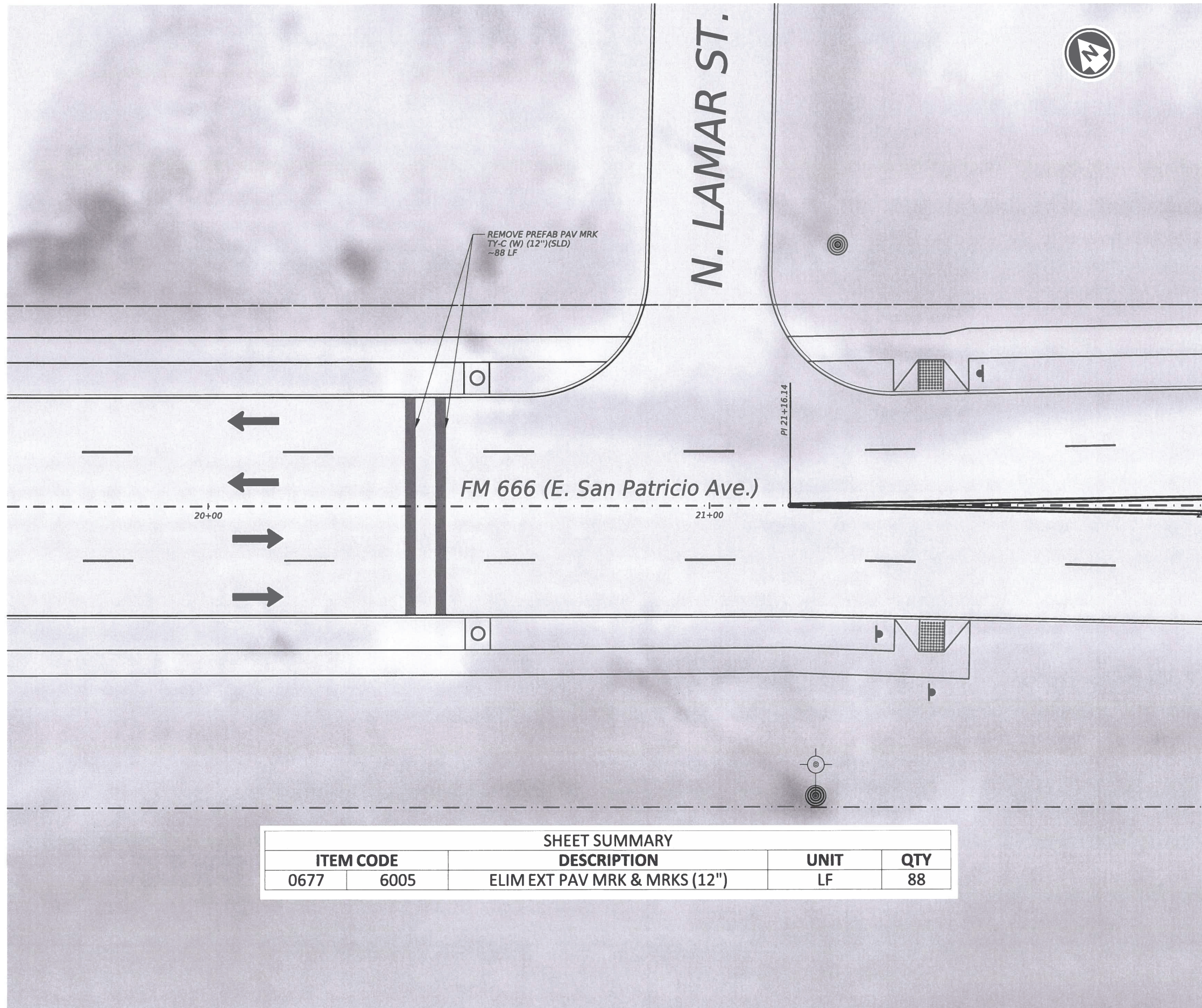
**SURFACE DETAIL REMOVAL LAYOUT SHEET**

© TXDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		51



DATE: 4/7/2024 7:12:03 PM  
 FILE: p:\projects\projectwiseonline.com\TXDOT\4\Documents\16 - CRP\Design\Projects\08702059\A - Design\Plan Set\B - Traffic\Surface Detail Layout Sheets\FM666 SURFACE DETAIL REMOVAL LAYOUT



**LEGEND**

⇄ DIRECTION OF TRAFFIC



*Jorge A. Perez*  
 04/07/2024

SCALE 1" = 20'



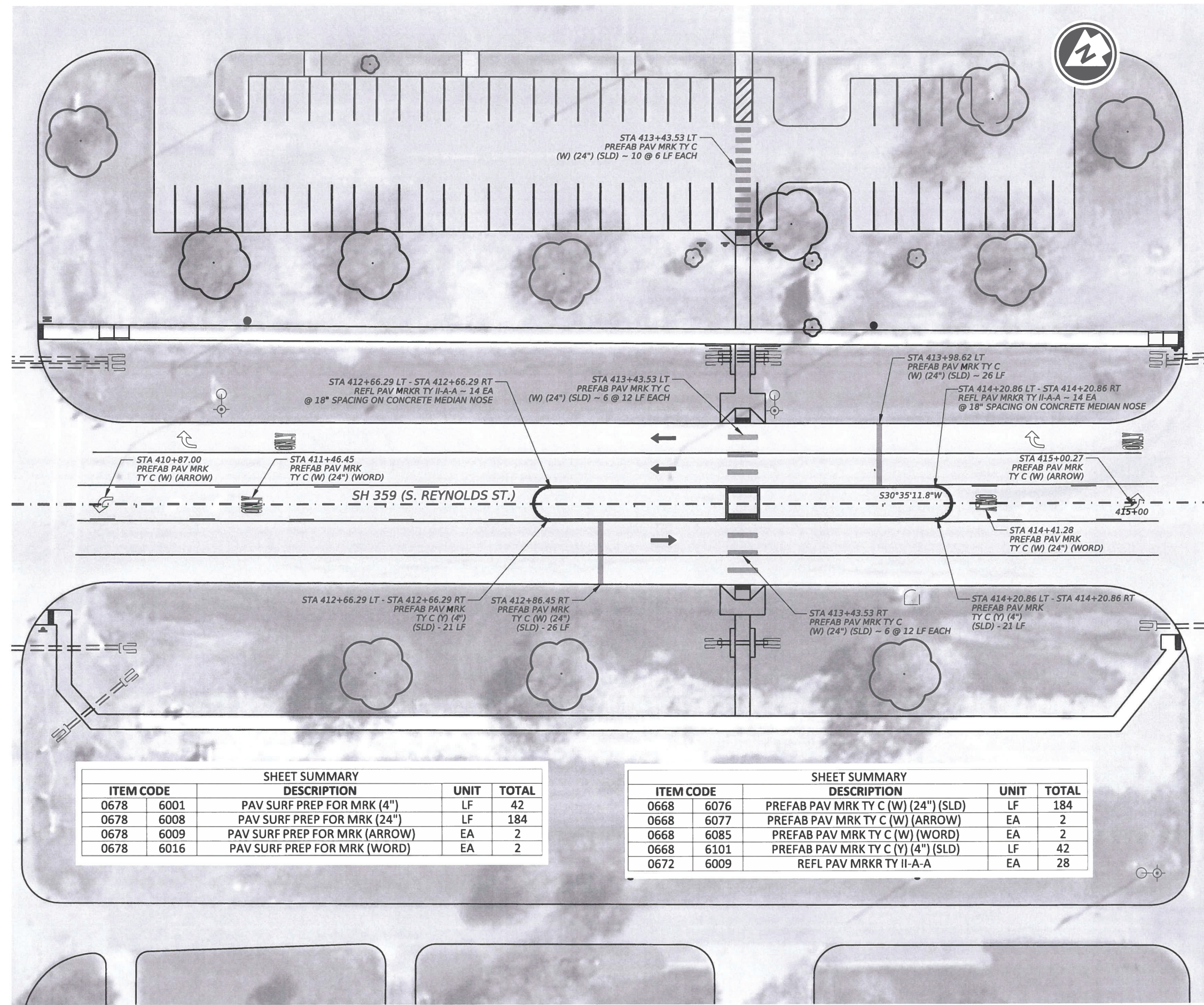
**FM 666**  
**SURFACE DETAIL**  
**REMOVAL LAYOUT**  
**SHEET**

©TXDOT 2024		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		52

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	QTY
0677	6005	ELIM EXT PAV MRK & MRKS (12")	LF	88



DATE: 4/7/2024 7:22:28 PM  
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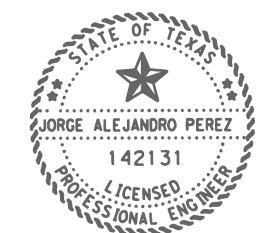


**LEGEND**

← → DIRECTION OF TRAFFIC

**NOTES:**

1. THE CONTRACTOR SHALL APPLY THE PREFABRICATED PAVEMENT MARKING TY C (Y)(4") (SLD) ON THE FACE OF EACH OF THE NOSES OF THE CONCRETE MEDIAN.
2. THE REFLECTIVE PAVEMENT MARKERS TY II-A-A ARE TO BE PLACED ON THE NOSE OF THE CONCRETE MEDIAN TO IMPROVE THE VISIBILITY OF THE CONCRETE MEDIAN.
3. THE CONTRACTOR SHALL MAINTAIN EXISTING LANE WIDTHS WITH THE NEW STRIPING.
4. 24" CROSSWALK STRIPING WILL BE PLACED IN THE ORANGE GROVE HIGH SCHOOL PARKING LOT AT THE LOCATIONS MARKED ON THE LAYOUT. ENGINEER APPROVAL IS REQUIRED BEFORE INSTALLATION.



*Jorge A. Perez*  
 04/07/2024

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0678	6001	PAV SURF PREP FOR MRK (4")	LF	42
0678	6008	PAV SURF PREP FOR MRK (24")	LF	184
0678	6009	PAV SURF PREP FOR MRK (ARROW)	EA	2
0678	6016	PAV SURF PREP FOR MRK (WORD)	EA	2

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0668	6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	184
0668	6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	2
0668	6085	PREFAB PAV MRK TY C (W) (WORD)	EA	2
0668	6101	PREFAB PAV MRK TY C (Y) (4") (SLD)	LF	42
0672	6009	REFL PAV MRKR TY II-A-A	EA	28

SCALE 1" = 40'

Texas Department of Transportation

**SH 359**

**SURFACE DETAIL LAYOUT SHEET**

©TxDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		53



DATE: 4/7/2024 7:29:46 PM  
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# PIRATE STADIUM PARKING LOT

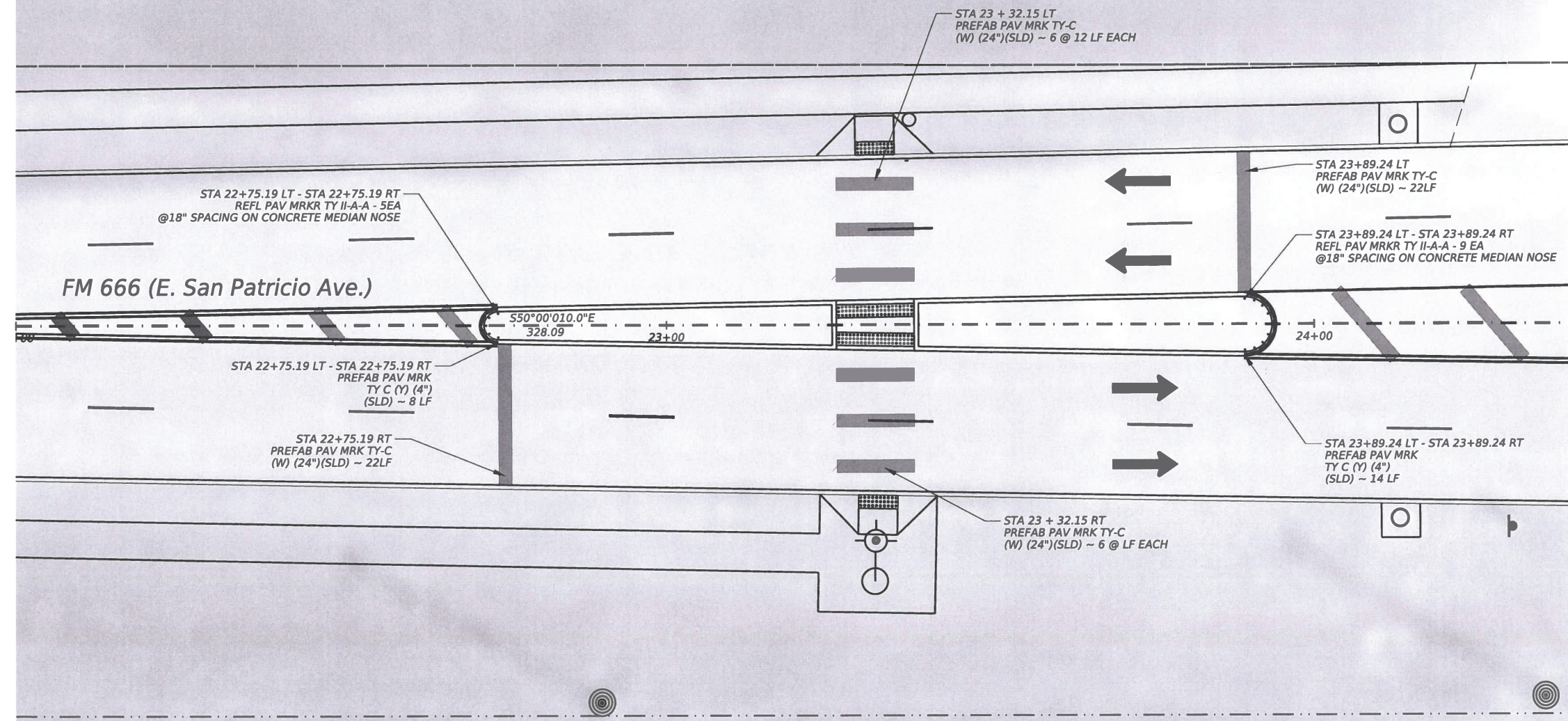


### LEGEND

⇌ DIRECTION OF TRAFFIC

### NOTES:

1. THE CONTRACTOR SHALL APPLY THE PREFABRICATED PAVEMENT MARKING TY C (Y) (4") (SLD) ON THE FACE OF EACH OF THE NOSES OF THE CONCRETE MEDIAN.
2. THE REFLECTIVE PAVEMENT MARKERS TY II-A ARE TO BE PLACED ON THE NOSE OF THE CONCRETE MEDIAN TO IMPROVE THE VISIBILITY OF THE CONCRETE MEDIAN.
3. THE CONTRACTOR SHALL MAINTAIN EXISTING LANE WIDTHS WITH THE NEW STRIPING.



*Jorge A. Perez*  
04/07/2024

SCALE 1" = 20'

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0678	6001	PAV SURF PREP FOR MRK (4")	LF	22
0678	6008	PAV SURF PREP FOR MRK (24")	LF	116

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0668	6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	116
0668	6101	PREFAB PAV MRK TY C (Y) (4") (SLD)	LF	22
0672	6009	REFL PAV MRKR TY II-A-A	EA	14

**Texas Department of Transportation**

**FM 666**

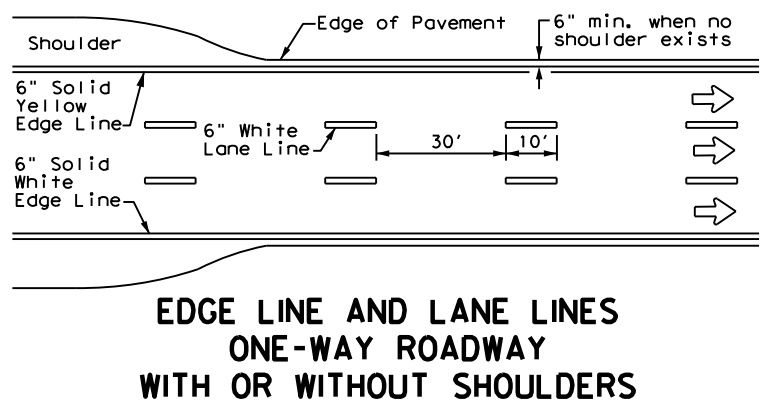
**SURFACE DETAIL LAYOUT SHEET**

© TxDOT 2024 SHEET 1 OF 1

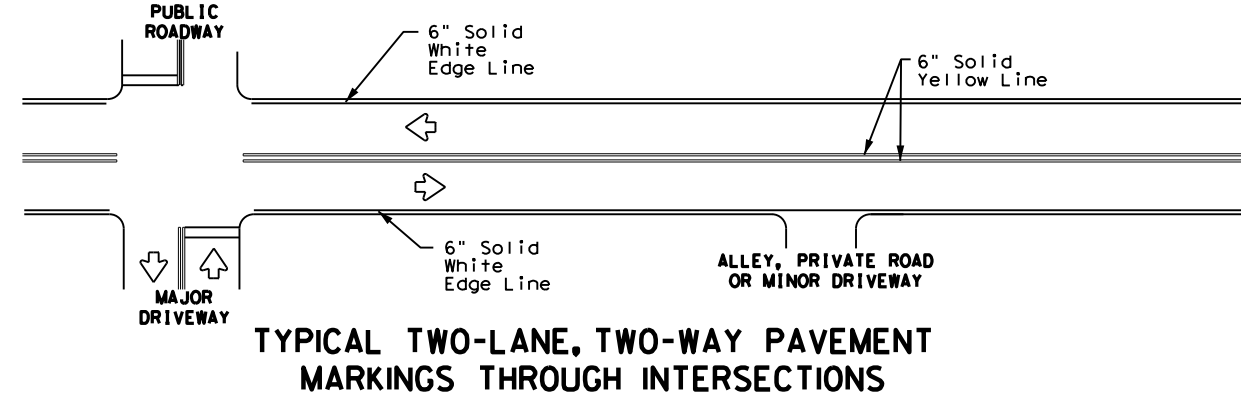
CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		54



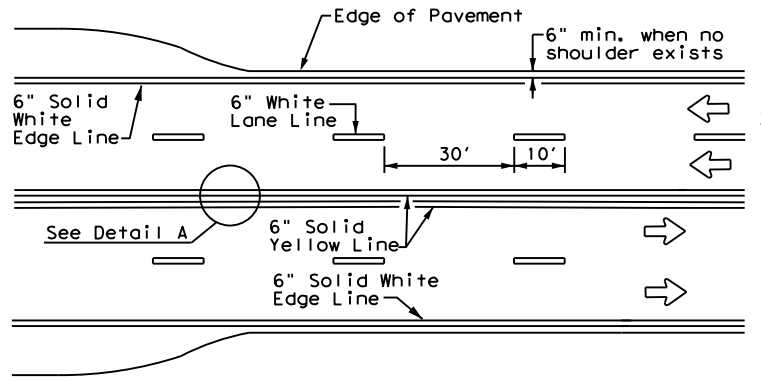
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 The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of any information from any other source to this standard.



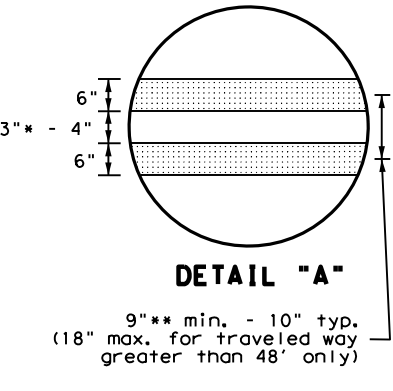
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



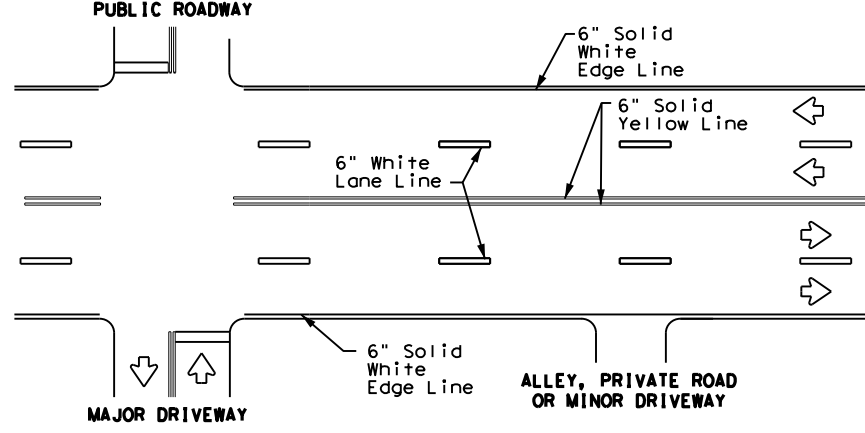
**CENTERLINE AND LANE LINES  
FOUR LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



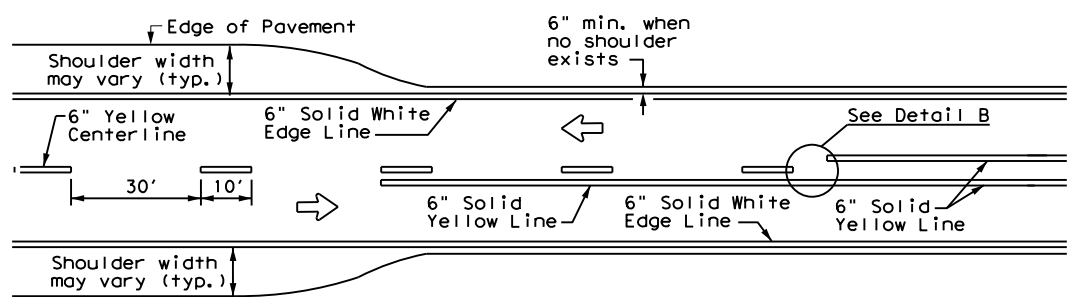
**DETAIL "A"**

9" min. - 10" typ.  
(18" max. for traveled way greater than 48' only)

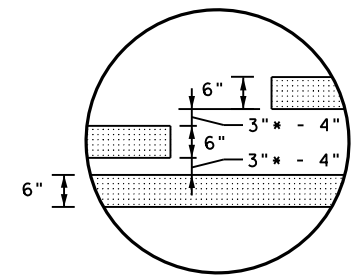
\* 2" minimum for restripe projects when approved by the Engineer.  
\*\* 8" minimum for restripe projects when approved by the Engineer.



**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**

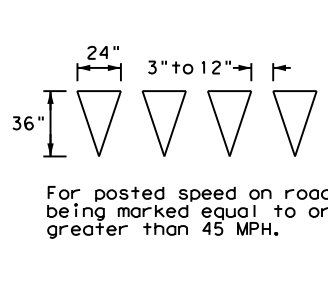


**TWO LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



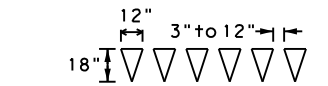
**DETAIL "B"**

\* 2" minimum for restripe projects when approved by the Engineer.



**YIELD LINES**

For posted speed on road being marked equal to or greater than 45 MPH.



For posted speed on road being marked equal to or less than 40 MPH.

**NOTES**

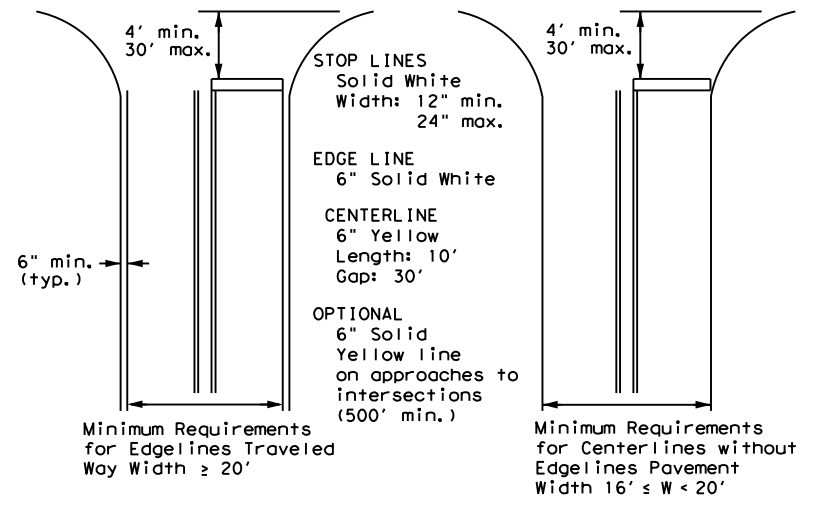
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

**GENERAL NOTES**

- Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

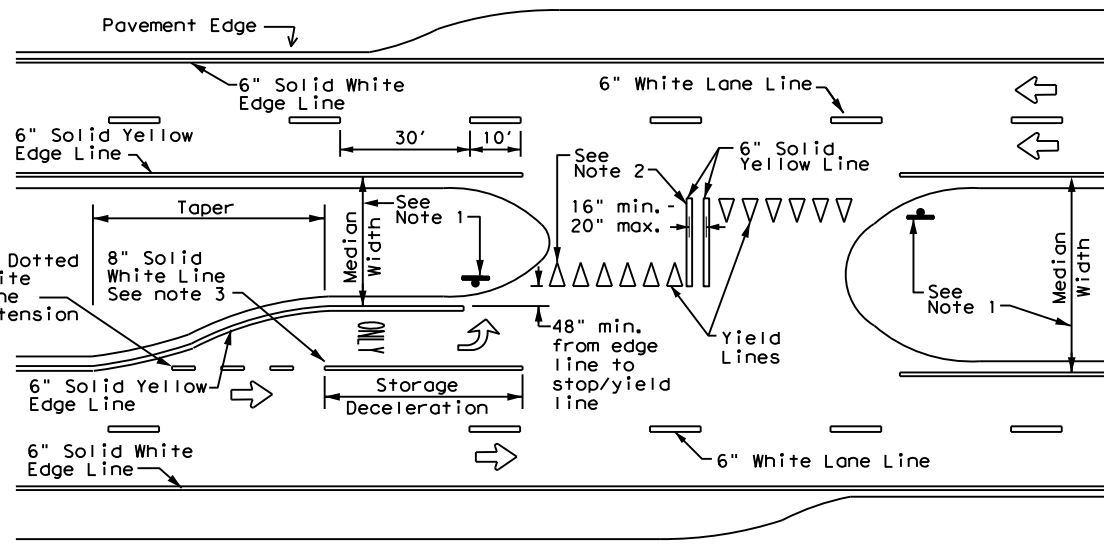
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

**GUIDE FOR PLACEMENT OF STOP LINES,  
EDGE LINE & CENTERLINE**

Based on Traveled Way and Pavement Widths for Undivided Roadways



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**



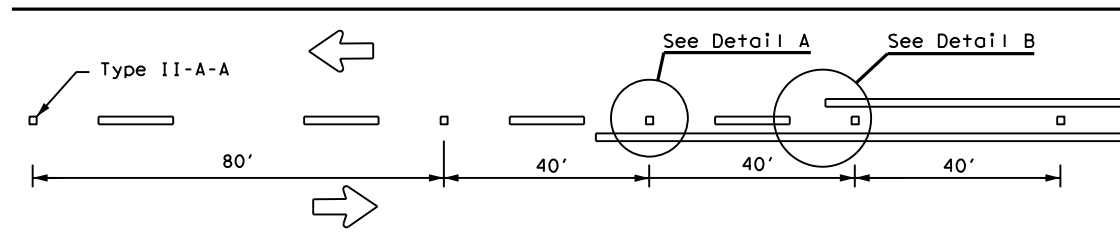
**TYPICAL STANDARD  
PAVEMENT MARKINGS**

**PM(1) - 22**

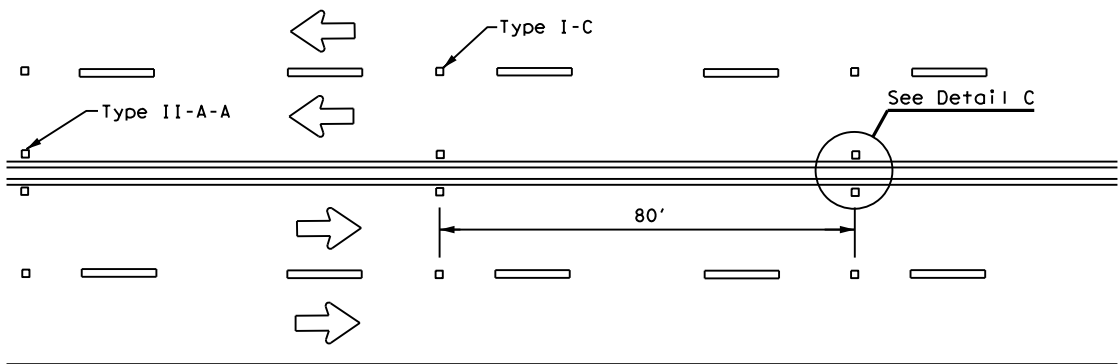
FILE: pml-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
11-78 8-00 6-20	DIST	COUNTY	SHEET NO.	
8-95 3-03 12-22	CRP	JIM WELLS, ETC.	55	
5-00 2-12	22A			

# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

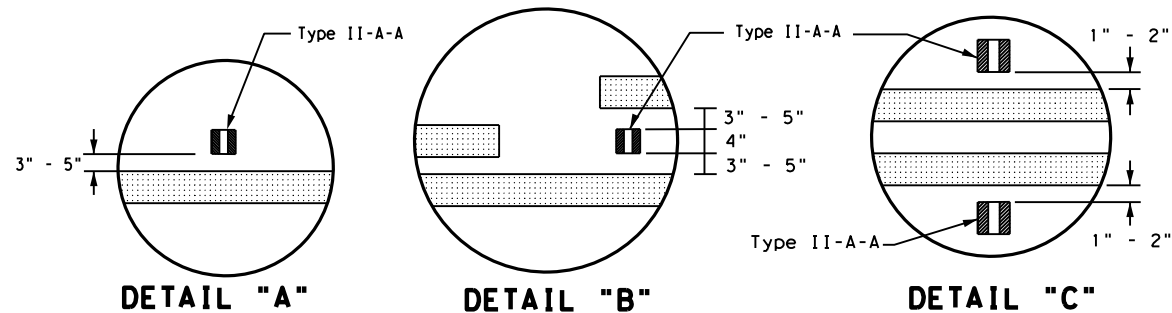
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of units or the accuracy of the information contained herein. The user of this standard shall be responsible for the accuracy of the information contained herein.



**CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS**



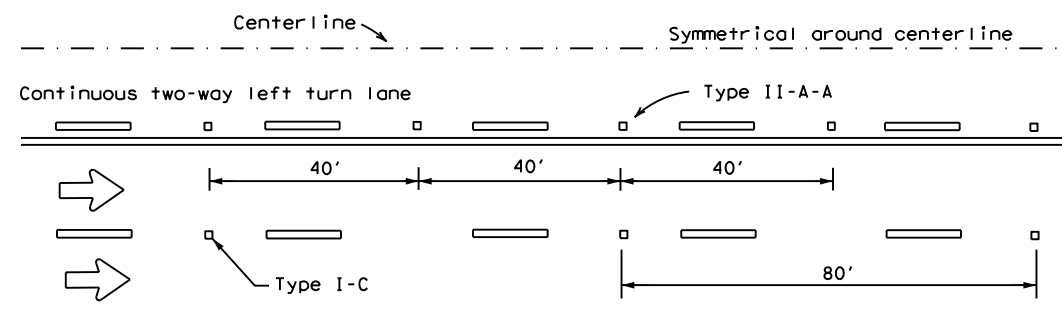
**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY ROADWAYS**



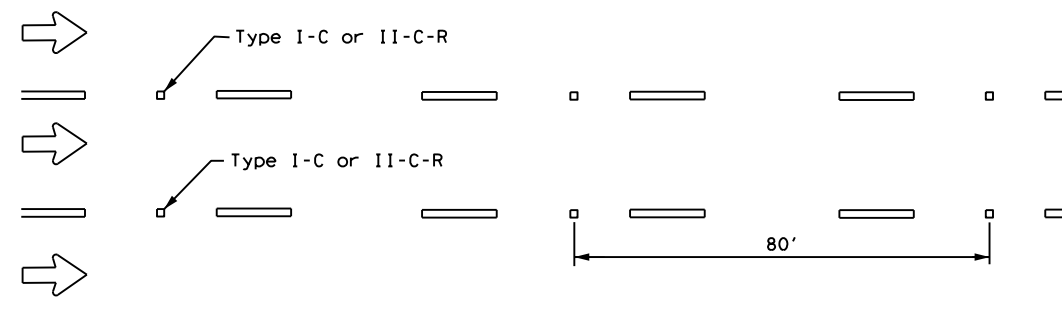
**DETAIL "A"**

**DETAIL "B"**

**DETAIL "C"**

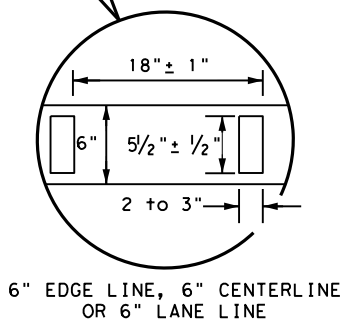
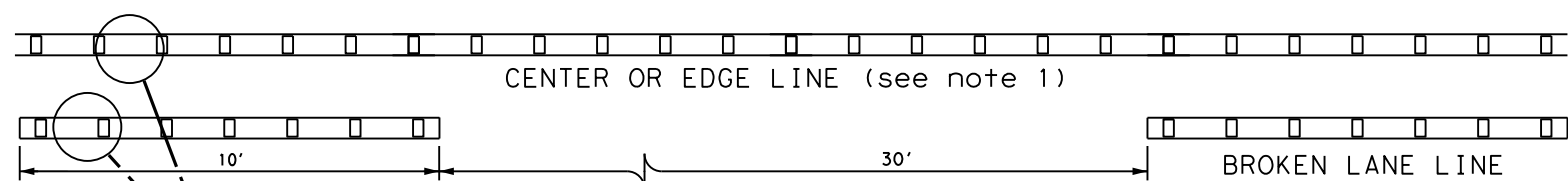


**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**



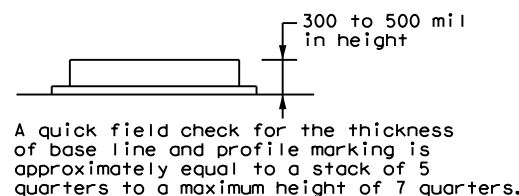
**LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)**

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.  
 See Note 3.



**REFLECTORIZED PROFILE  
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



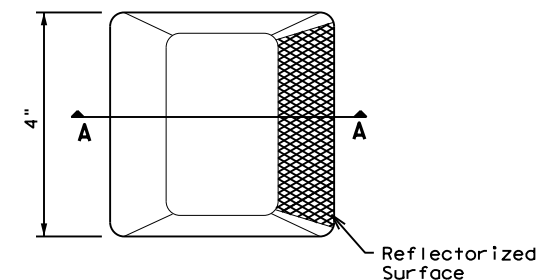
A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

**NOTES**

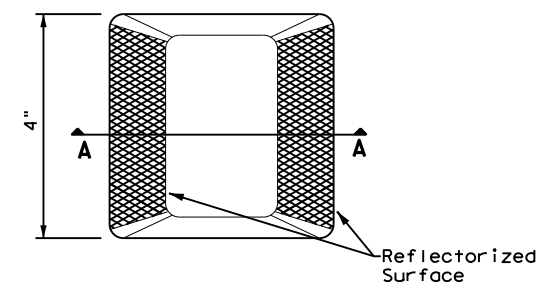
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

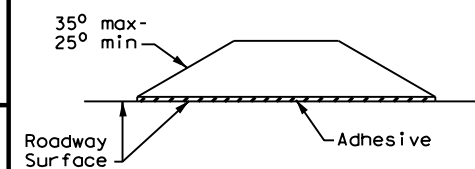
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



**SECTION A**

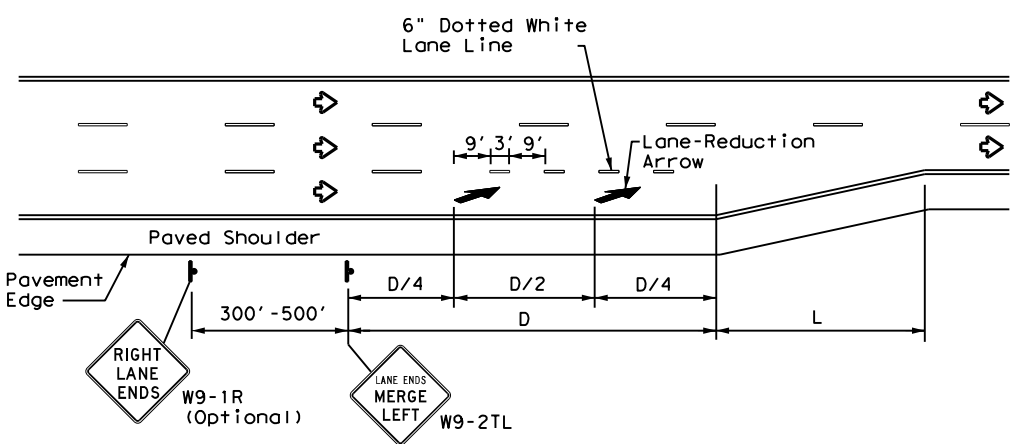
**RAISED PAVEMENT MARKERS**



**POSITION GUIDANCE USING  
RAISED MARKERS  
REFLECTORIZED PROFILE  
MARKINGS  
PM(2) - 22**

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
4-77 8-00 6-20	DIST	COUNTY	SHEET NO.	
4-92 2-10 12-22	CRP	JIM WELLS, ETC.	56	
5-00 2-12				

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**LANE REDUCTION**

**NOTES**

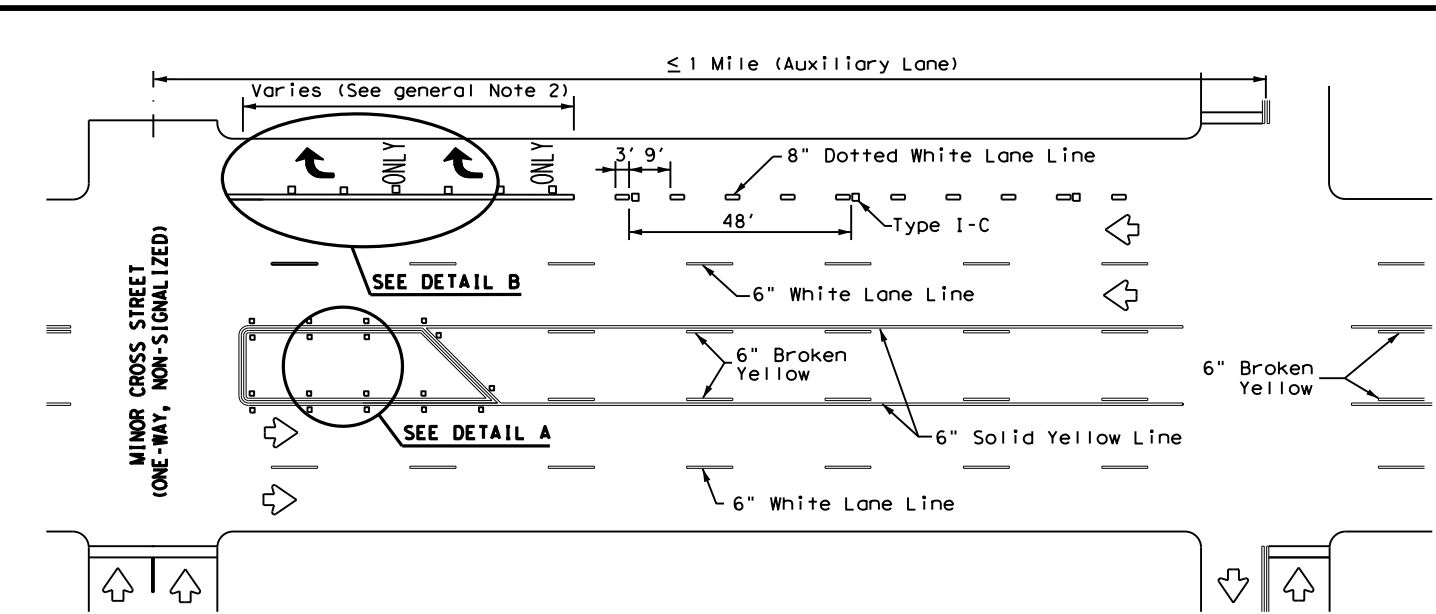
- Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
- On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
- For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

**GENERAL NOTES**

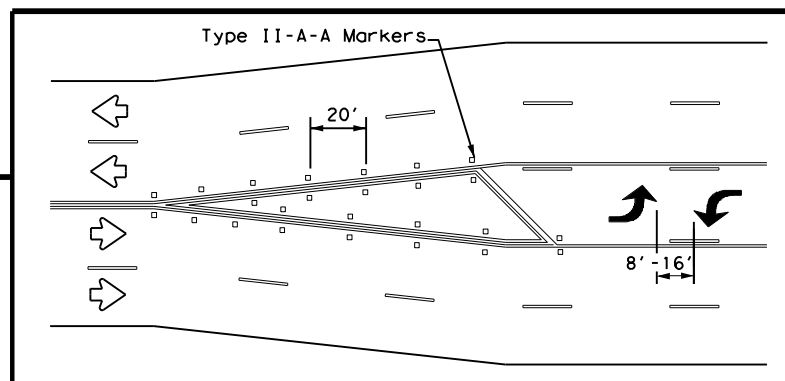
- Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
- When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
- Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

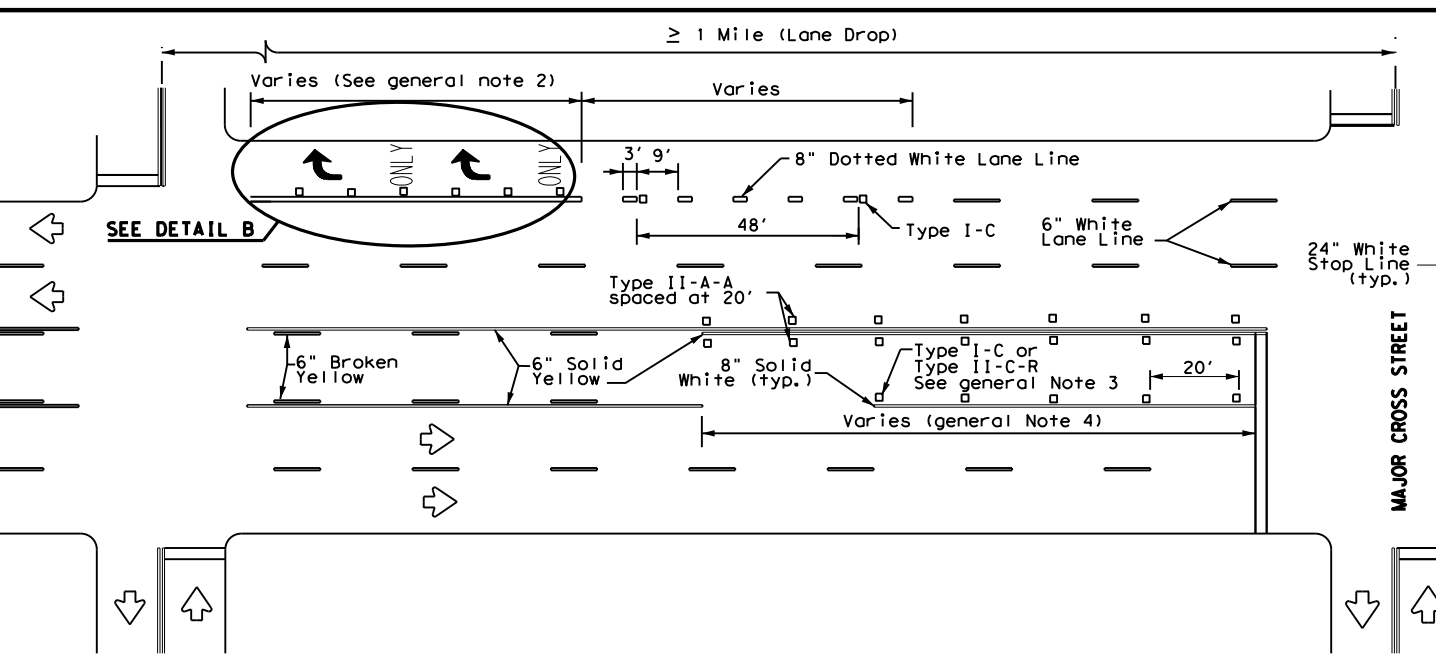


**TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE**

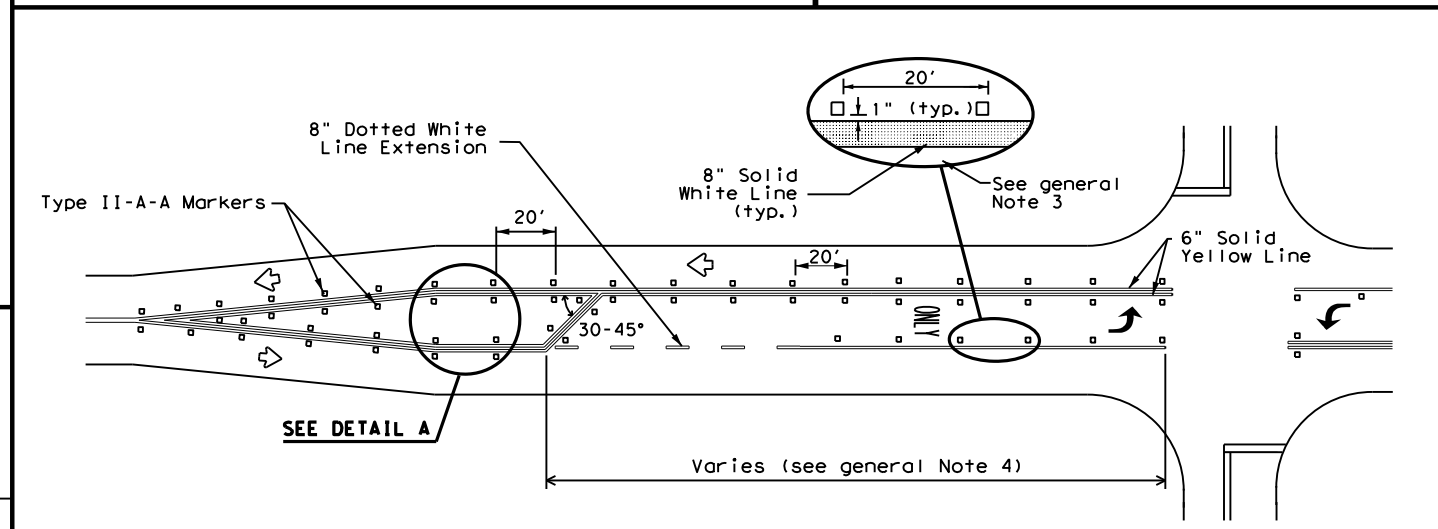


A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

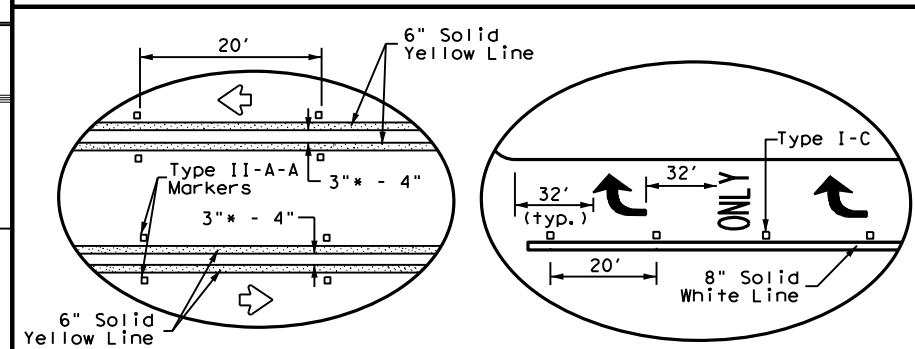
**TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY**



**TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP**



**TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS**



**DETAIL A**

**DETAIL B**

\* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

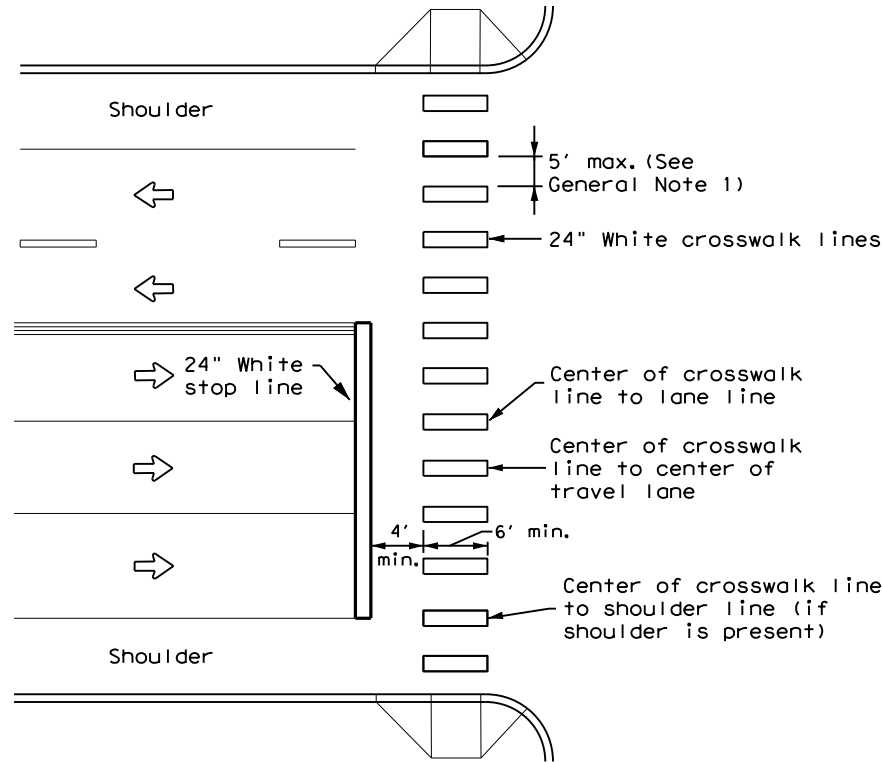
**TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS**  
**PM(3) - 22**

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
4-98 3-03 6-20	DIST	COUNTY	SHEET NO.	
5-00 2-10 12-22	CRP	JIM WELLS, ETC.	57	
8-00 2-12				



DATE: 4/6/2024 5:56:18 PM  
FILE: \\txdot.projectwiseonline.com:TxDOT\4\Documents\16 - CRP\Design Projects\pm4-22a.dgn

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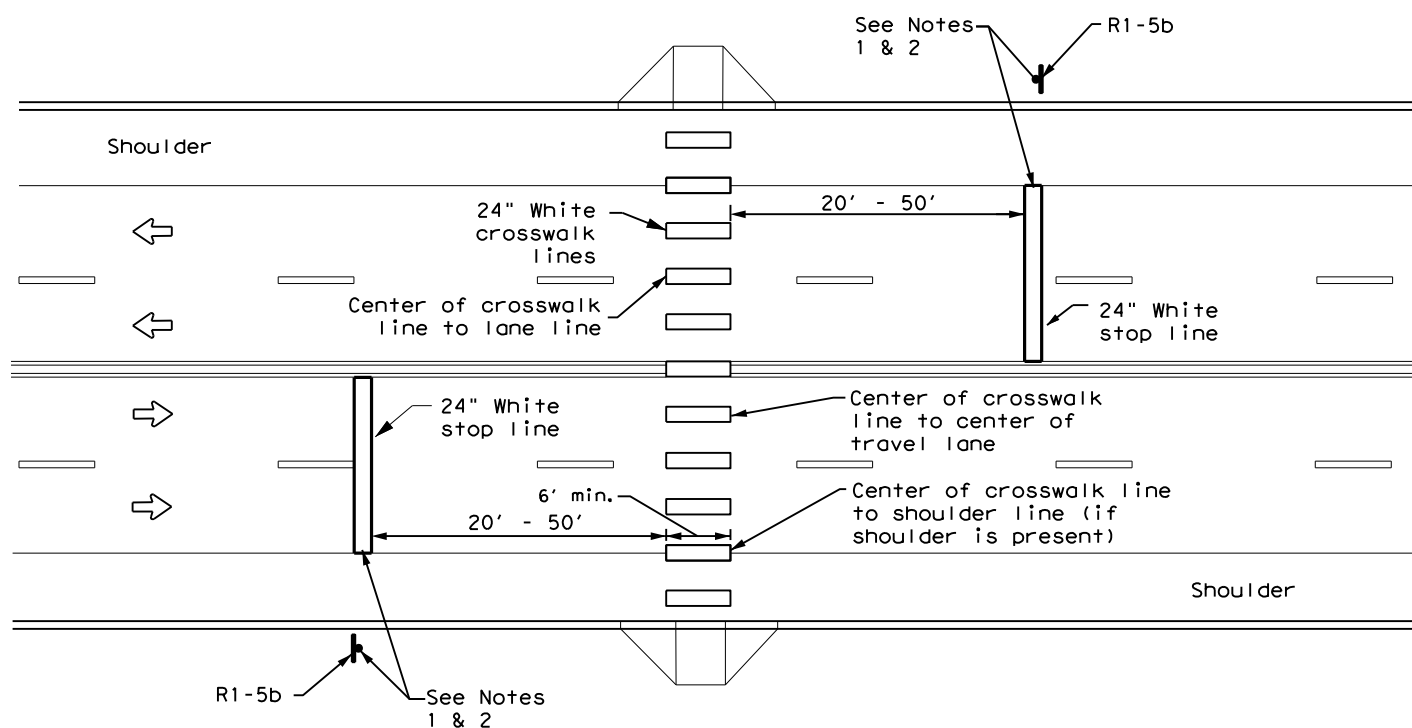
**HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH**

**GENERAL NOTES**

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK**

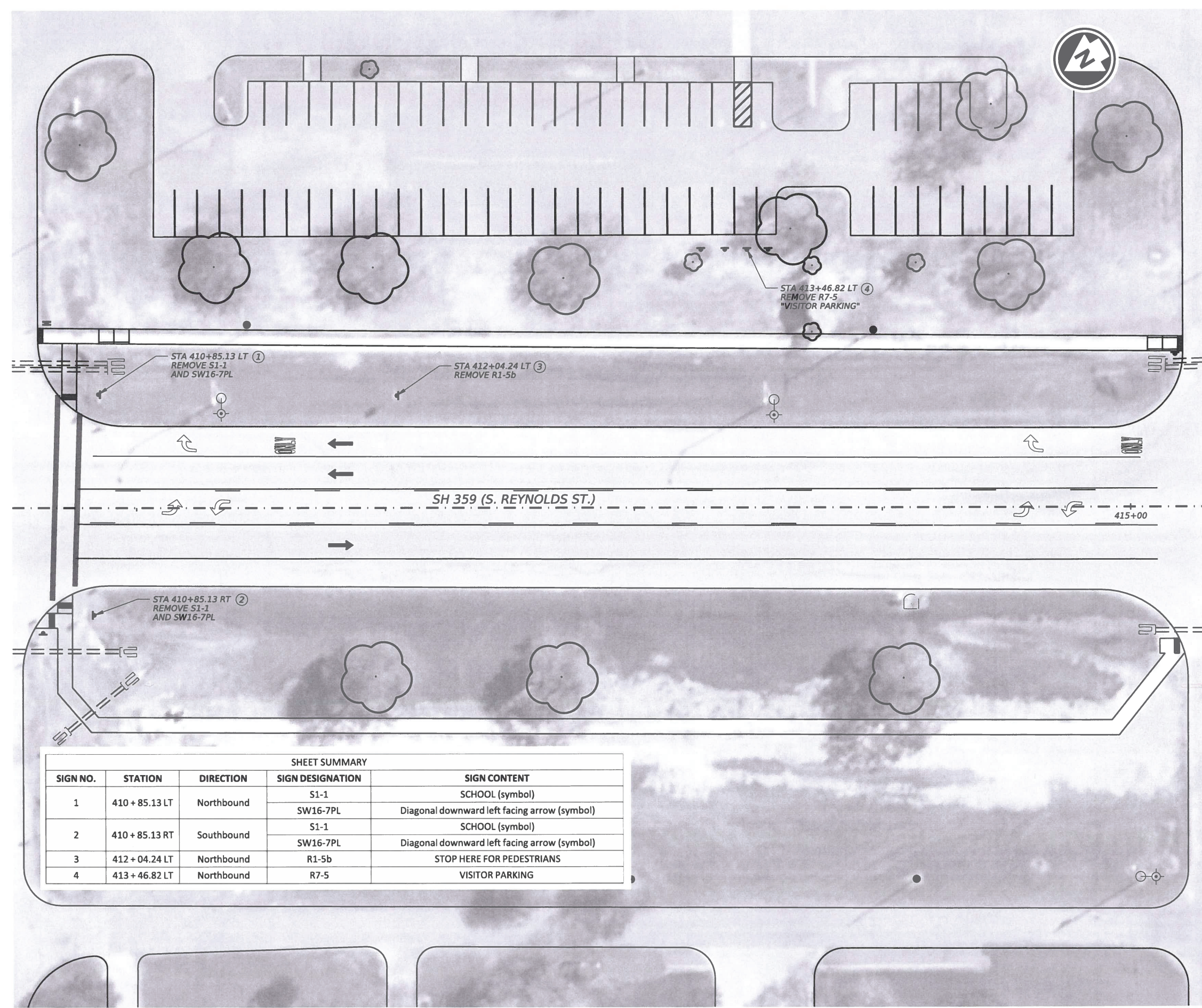
**NOTES:**

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

			Traffic Safety Division Standard		
<b>CROSSWALK PAVEMENT MARKINGS</b>					
<b>PM(4)-22A</b>					
FILE: pm4-22a.dgn	DW:	CK:	DW:	CK:	
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0087	02	059, ETC. SH 359, ETC.		
6-20	DIST	COUNTY	SHEET NO.		
6-22	CRP	JIM WELLS, ETC.	58		
12-22					
22a					



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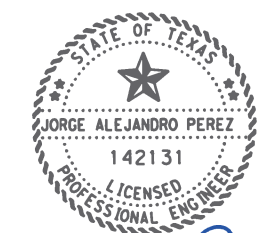
**LEGEND**

- DIRECTION OF TRAFFIC
- SIGN ASSEMBLY

**NOTES:**

1. SIGN ASSEMBLY 4 "VISITOR PARKING" SIGN WILL BE REMOVED FROM THE ORANGE GROVE HIGH SCHOOL PARKING LOT AT THE LOCATION MARKED ON THE LAYOUT. ENGINEER APPROVAL IS REQUIRED BEFORE REMOVAL.

SHEET SUMMARY				
SIGN NO.	STATION	DIRECTION	SIGN DESIGNATION	SIGN CONTENT
1	410 + 85.13 LT	Northbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)
2	410 + 85.13 RT	Southbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)
3	412 + 04.24 LT	Northbound	R1-5b	STOP HERE FOR PEDESTRIANS
4	413 + 46.82 LT	Northbound	R7-5	VISITOR PARKING



*Jorge A. Perez*  
 04/10/2024

SCALE 1" = 40'

**Texas Department of Transportation**

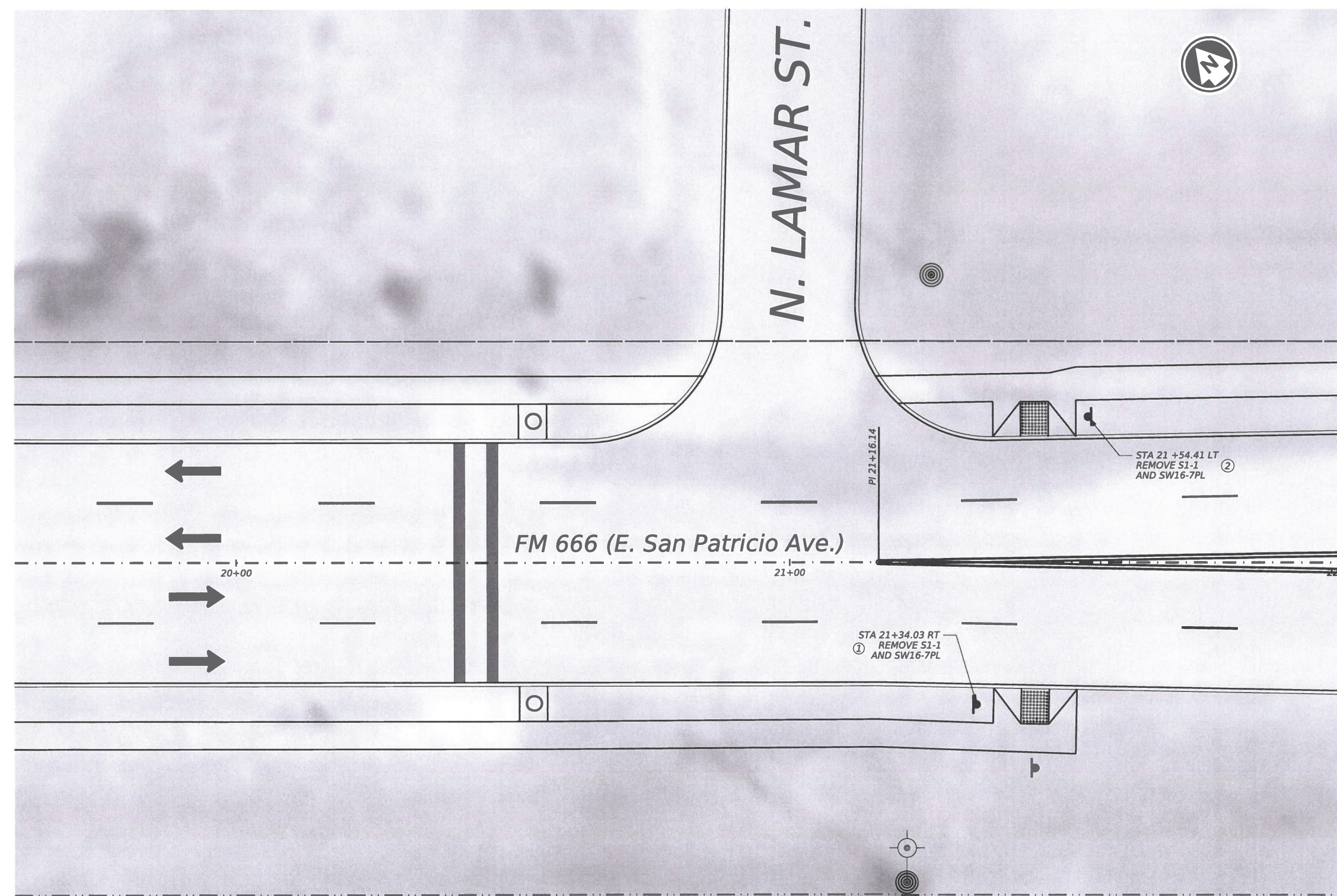
**SH 359**

**SIGN REMOVAL LAYOUT SHEET**

© TXDOT 2024		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		59



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**LEGEND**

- DIRECTION OF TRAFFIC
- SIGN ASSEMBLY



*Jorge A. Perez*  
04/10/2024

SHEET SUMMARY				
SIGN NO.	STATION	DIRECTION	SIGN DESIGNATION	SIGN CONTENT
1	21 + 54.41LT	Northbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)
2	21 + 34.03RT	Southbound	S1-1	SCHOOL (symbol)
			SW16-7PL	Diagonal downward left facing arrow (symbol)

SCALE 1" = 20'

**FM 666**  
**SIGN REMOVAL**  
**LAYOUT SHEET**

© TXDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		60



# SUMMARY OF SMALL SIGNS

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PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)	
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		
										PREFABRICATED		1EXT or 2EXT = # of Ext
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY = TYPE TY N TY S
63	1	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X				SA	P		
63	2	R10-6L	STOP HERE ON RED<STRGHT ARRW DOWN LT>	24 x 36	X				SA	P		
63	3	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X				SA	T		
		*SW16-7PLR (SPECIAL)	ARROW DOWN LEFT-RIGHT 45 DEGREE	36 X 18	X							
63	4	R10-3E	PED TRAFFIC SIGNAL SIGN "e"	9 x 15	X							
63	5	R10-23	CROSSWALK STOP ON RED	24 x 30	X							
63	6	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X							
63	7	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X							
63	8	R10-23	CROSSWALK STOP ON RED	24 x 30	X							
63	9	R10-3E	PED TRAFFIC SIGNAL SIGN "e"	9 x 15	X							
63	10	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X		S80	1	SA	T		
		*SW16-7PLR (SPECIAL)	ARROW DOWN LEFT-RIGHT 45 DEGREE	36 X 18	X							
63	11	R10-6L	STOP HERE ON RED<STRGHT ARRW DOWN LT>	24 x 36	X		S80	1	SA	P		
63	12	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X		S80	1	SA	P		
63	13	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X		S80	1	SA	T		
		SW16-7PL	<ARROW - SLANT DOWN> <YELLOW AUX SIGN>	24 x 12	X							
63	14	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X		S80	1	SA	T		
		SW16-7PR	<ARROW - SLANT DOWN> <YELLOW AUX SIGN>	24 x 12	X							

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.  
<http://www.txdot.gov/>

- NOTE:**
- Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
  - For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
  - For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).



## SH 359 SUMMARY OF SMALL SIGNS

### SOSS

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© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
4-16	DIST	COUNTY	SHEET NO.	
8-16	CRP	JIM WELLS, ETC.	<b>61</b>	

# SUMMARY OF SMALL SIGNS

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PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)	
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		
										PREFABRICATED		1EXT or 2EXT = # of Ext
64	1	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X		S80	1	SA	P		
64	2	R10-6L	STOP HERE ON RED<STRGHT ARR W DOWN LT>	24 x 36	X		S80	1	SA	P		
64	3	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X		S80	1	SA	T		
		*SW16-7PLR (SPECIAL)	ARROW DOWN LEFT-RIGHT 45 DEGREE	36 X 18	X							
64	4	R10-3E	PED TRAFFIC SIGNAL SIGN "e"	9 x 15	X							
64	5	R10-23	CROSSWALK STOP ON RED	24 x 30	X							
64	6	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X							
64	7	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X							
64	8	R10-23	CROSSWALK STOP ON RED	24 x 30	X							
64	9	R10-3E	PED TRAFFIC SIGNAL SIGN "e"	9 x 15	X							
64	10	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36	X		S80	1	SA	T		
		*SW16-7PLR (SPECIAL)	ARROW DOWN LEFT-RIGHT 45 DEGREE	36 X 18	X							
64	11	R10-6L	STOP HERE ON RED<STRGHT ARR W DOWN LT>	24 x 36	X		S80	1	SA	P		
64	12	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X		S80	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.  
<http://www.txdot.gov/>

- NOTE:**
- Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
  - For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
  - For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).



## FM 666 SUMMARY OF SMALL SIGNS

### SOSS

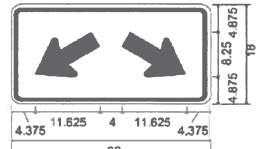
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© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
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4-16	DIST	COUNTY	SHEET NO.	
8-16	CRP	JIM WELLS, ETC.	62	



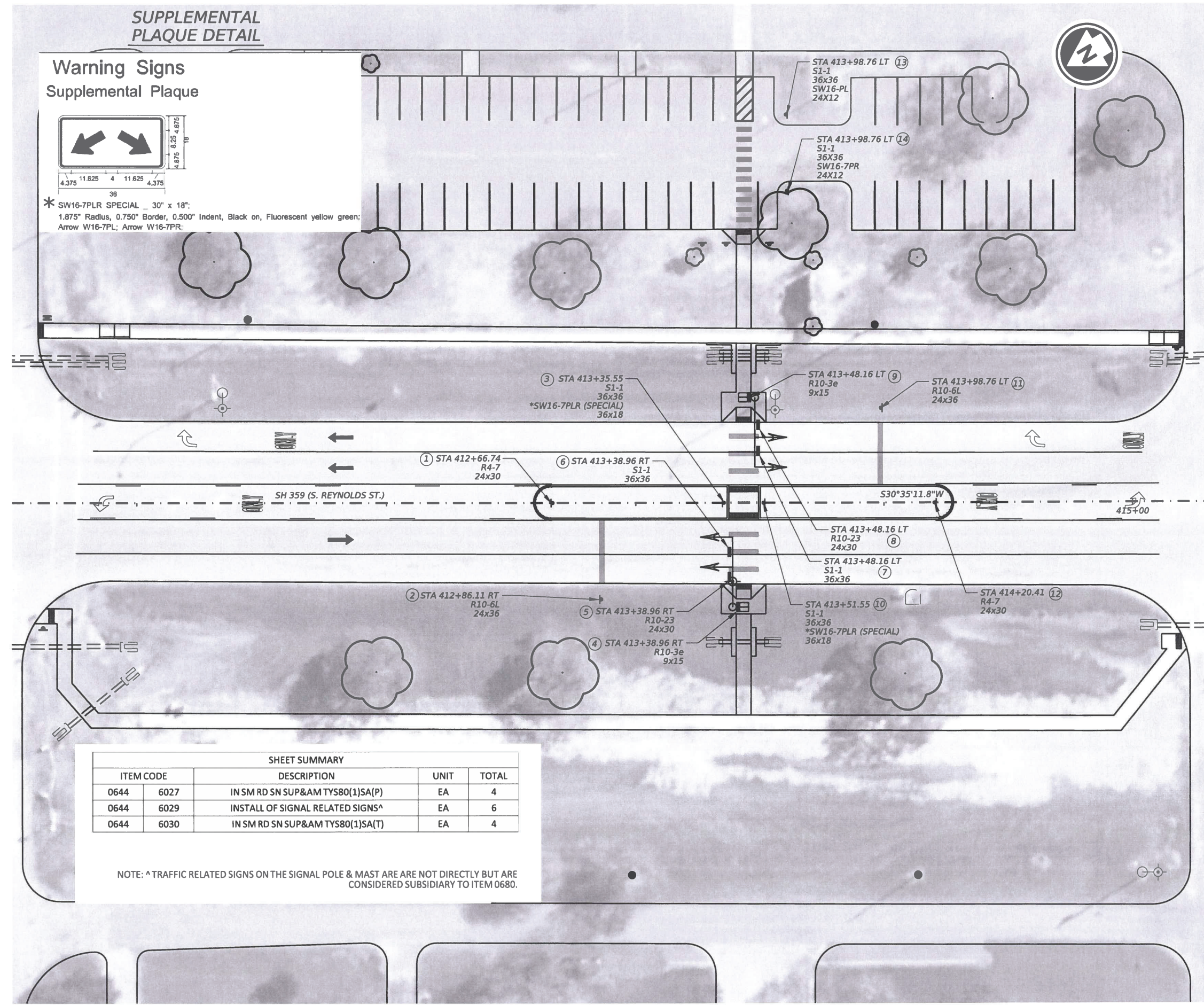
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**SUPPLEMENTAL PLAQUE DETAIL**

**Warning Signs  
Supplemental Plaque**



\* SW16-7PLR SPECIAL 30" x 18":  
 1.875" Radius, 0.750" Border, 0.500" Indent, Black on, Fluorescent yellow green:  
 Arrow W16-7PL; Arrow W16-7PR:



**LEGEND**

- PROP. SIGNAL HEAD
- PROPOSED SIGN TO BE MOUNTED ON MAST ARM OR POLE
- DIRECTION OF TRAFFIC
- PROP. GROUND MOUNTED SIGN

**NOTES:**

1. SIGN ASSEMBLY 9 & 10 ARE TO BE ATTACHED TO THE SIGNAL POLE & ARE SUBSIDIARY TO ITEM 680.
2. SIGN ASSEMBLIES 5 THROUGH 8 ARE TO BE ATTACHED TO THE SIGNAL MAST ARM & ARE SUBSIDIARY TO ITEM 680. REFER TO STANDARDS IN THIS PLAN SET FOR ATTACHMENT DETAILS.
3. REFLECTIVE WRAPS SHALL BE APPLIED TO REGULATORY & WARNING SIGN ASSEMBLIES WHERE APPLICABLE. REFER TO REFLECTIVE WRAP DETAIL SHEET FOR MORE INFORMATION. THIS WILL BE SUBSIDIARY TO ITEM 684.
4. SIGN ASSEMBLIES 13 & 14 WILL BE PLACED IN THE ORANGE GROVE HIGH SCHOOL PARKING LOT AT THE LOCATIONS MARKED ON THE LAYOUT. PLACEMENT OF SIGN ASSEMBLIES MUST BE APPROVED BY THE ENGINEER BEFORE INSTALLATION.
5. ALL SIGNS SHALL BE FABRICATED TO COMPLY WITH TXDOT STANDARDS TO INCLUDE BUT NOT LIMITED TO THE TMUTCD AND THE STANDARD HIGHWAY SIGN DESIGNS.
6. SIGN DESIGNS FOR ALL SIGNS IN THIS LAYOUT SHALL BE SUBMITTED TO TXDOT FOR REVIEW & APPROVAL BY THE TXDOT DISTRICT TRAFFIC OFFICE BEFORE SIGNS CAN BE FABRICATED.

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0644	6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	4
0644	6029	INSTALL OF SIGNAL RELATED SIGNS^	EA	6
0644	6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	4

NOTE: ^ TRAFFIC RELATED SIGNS ON THE SIGNAL POLE & MAST ARE NOT DIRECTLY BUT ARE CONSIDERED SUBSIDIARY TO ITEM 0680.



*Jorge A. Perez*  
 04/07/2024

SCALE 1" = 40'

**Texas Department of Transportation**

**SH 359  
SIGN LAYOUT SHEET**

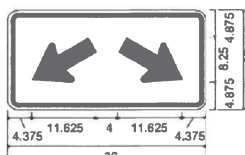
©TXDOT 2024		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST		COUNTY	SHEET NO.
CRP		JIM WELLS, ETC.	63



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**SUPPLEMENTAL PLAQUE DETAIL**

Warning Signs  
Supplemental Plaque



\*SW16-7PLR SPECIAL - 30" x 18";  
1.875" Radius, 0.750" Border, 0.500" Indent, Black on, Fluorescent yellow green;  
Arrow W16-7PL; Arrow W16-7PR;

# PIRATE STADIUM PARKING LOT

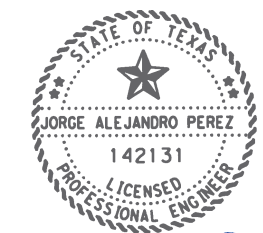
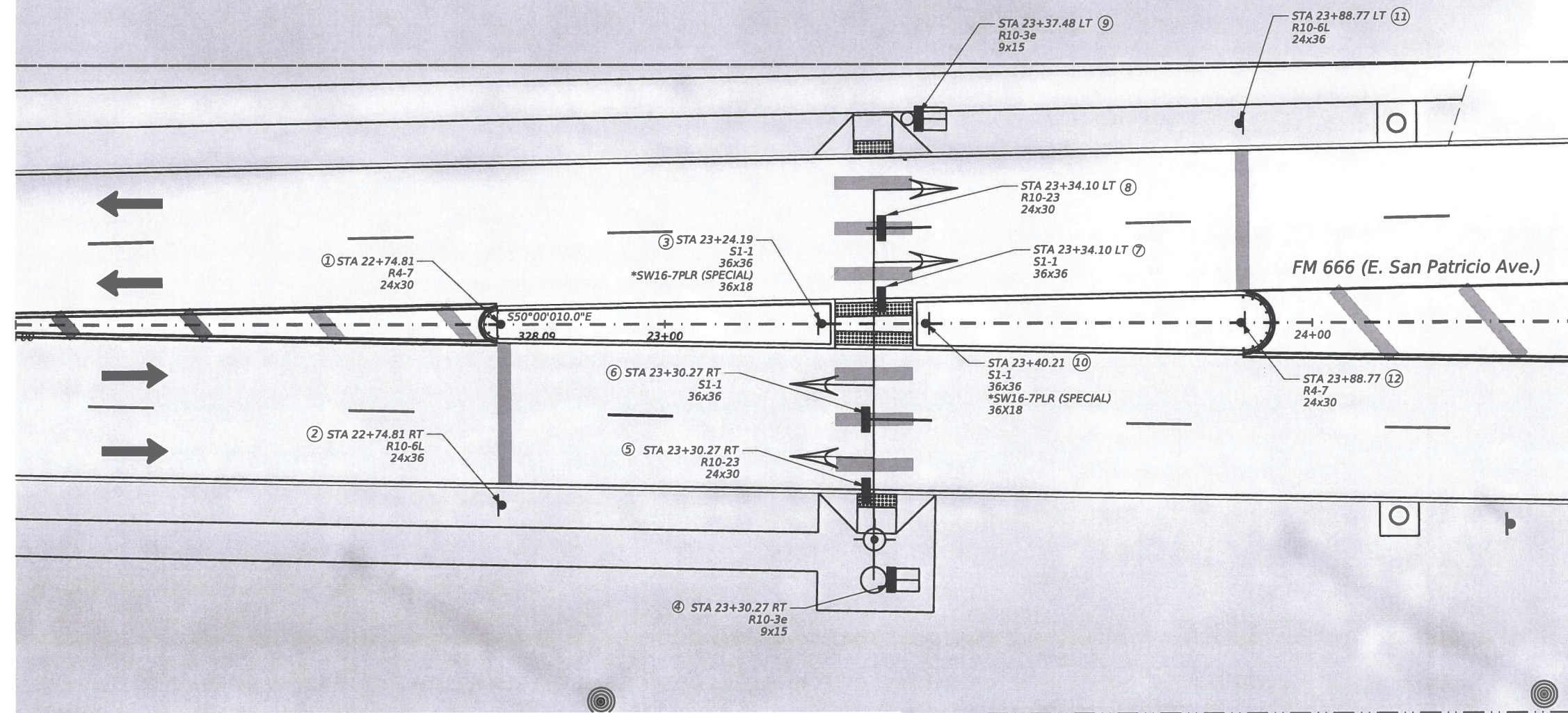


**LEGEND**

- PROP. SIGNAL HEAD
- PROPOSED SIGN TO BE MOUNTED ON MAST ARM OR POLE
- DIRECTION OF TRAFFIC
- PROP. GROUND MOUNTED SIGN

NOTES:

1. SIGN ASSEMBLY 4 & 9 ARE TO BE ATTACHED TO THE SIGNAL POLE & ARE SUBSIDIARY TO ITEM 680.
2. SIGN ASSEMBLIES 5 THROUGH 8 ARE TO BE ATTACHED TO THE SIGNAL MAST ARM & ARE SUBSIDIARY TO ITEM 680. REFER TO STANDARDS IN THIS PLAN SET FOR ATTACHMENT DETAILS.
3. REFLECTIVE WRAPS SHALL BE APPLIED TO REGULATORY & WARNING SIGN ASSEMBLIES WHERE APPLICABLE. REFER TO REFLECTIVE WRAP DETAIL SHEET FOR MORE INFORMATION. THIS WILL BE SUBSIDIARY TO ITEM 684.
4. ALL SIGNS SHALL BE FABRICATED TO COMPLY WITH TXDOT STANDARDS TO INCLUDE BUT NOT LIMITED TO THE TMUTCD AND THE STANDARD HIGHWAY SIGN DESIGNS.
5. SIGN DESIGNS FOR ALL SIGNS IN THIS LAYOUT SHALL BE SUBMITTED TO TXDOT FOR REVIEW & APPROVAL BY THE TXDOT DISTRICT TRAFFIC OFFICE BEFORE SIGNS CAN BE FABRICATED.



*Jorge A. Perez*  
04/07/2024

SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
0644	6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	4
0644	6029	INSTALL OF SIGNAL RELATED SIGNS^	EA	6
0644	6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	2

NOTE: ^TRAFFIC RELATED SIGNS ON THE SIGNAL POLE & MAST ARE NOT DIRECTLY BUT ARE CONSIDERED SUBSIDIARY TO ITEM 0680.

SCALE 1" = 20'

**Texas Department of Transportation**

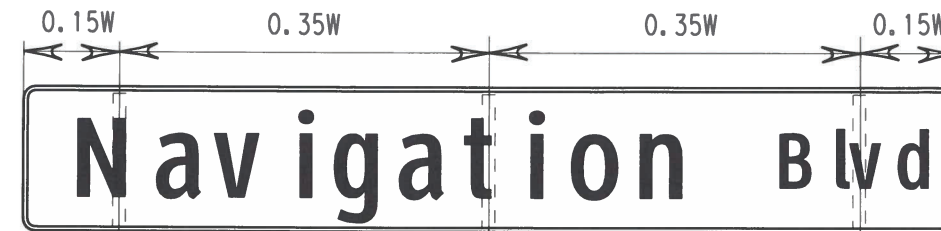
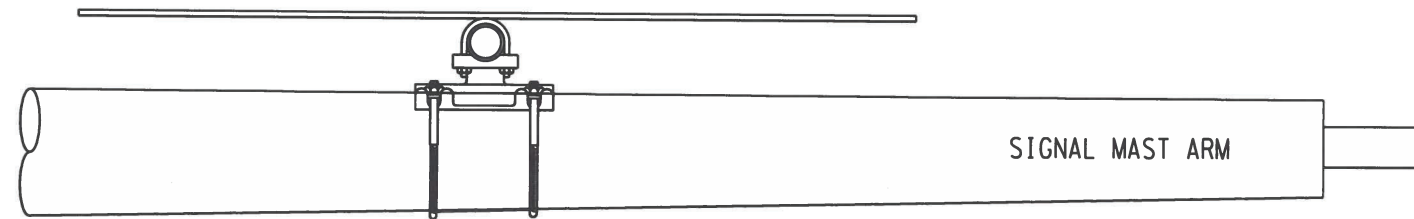
**FM 666**

**SIGN LAYOUT SHEET**

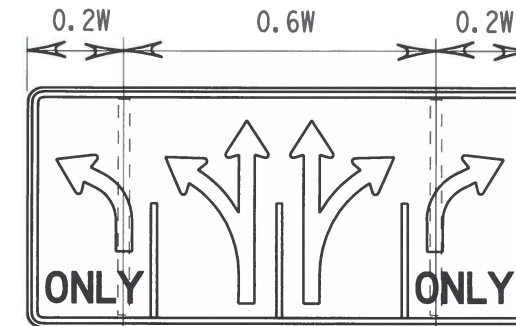
© TXDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		64

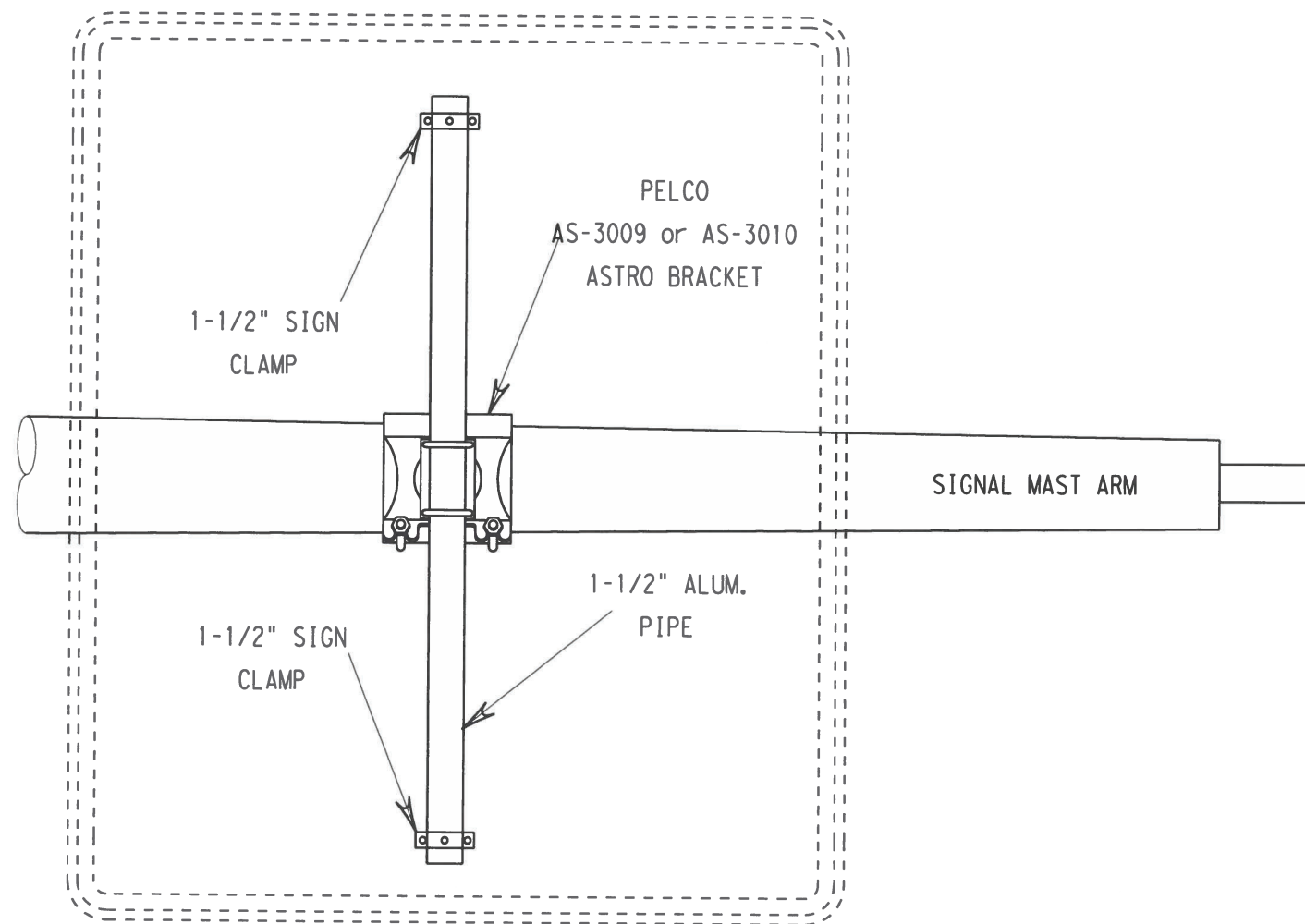




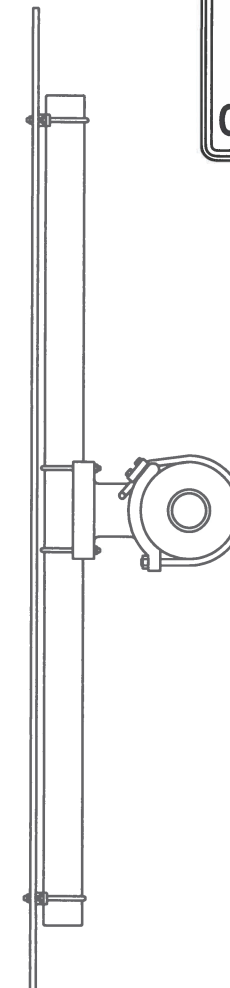
Sign Width greater than 6 ft. use three Astro Brackets



Sign Width is 3 ft. to 6 ft. use two Astro Brackets



Sign Width is less than 3 ft. use one Astro Bracket



*Jorge A. Perez*  
 01/11/2024

Texas Department of Transportation

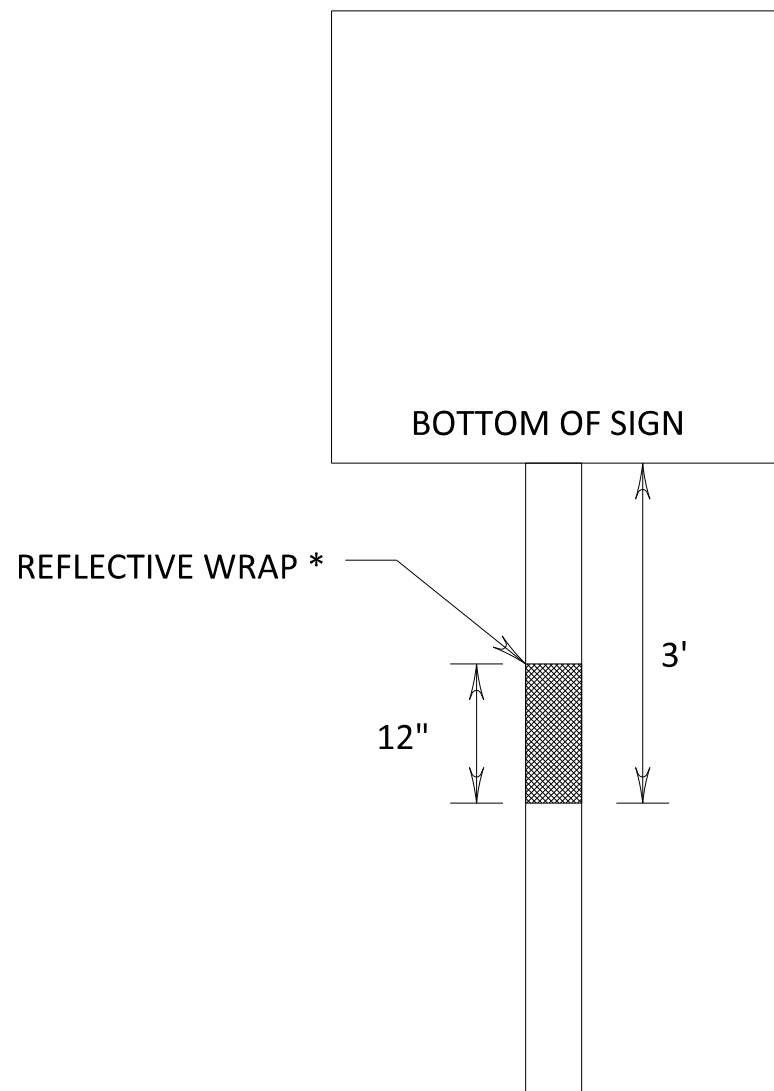
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**SIGN MOUNT FOR TRAFFIC SIGNAL MAST ARMS**

SCALE: NONE  
 SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NUMBER
		65
STATE	DISTRICT	COUNTY
TEXAS	CRP	JIM WELLS, ETC.
CONTROL	SECTION	JOB HIGHWAY NUMBER
0087	02	059, ETC. SH 359, ETC.

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 DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of any information or drawings to digital format.



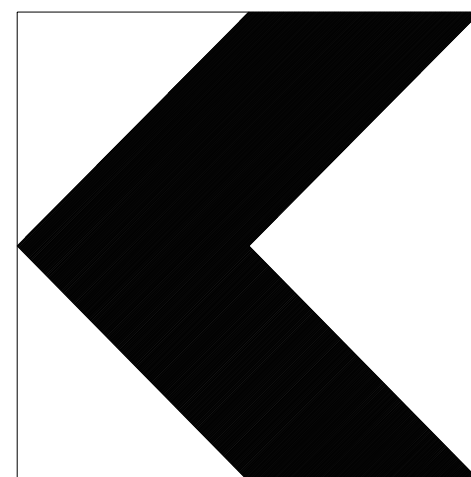
REFLECTIVE WRAP COLOR SHALL MATCH THE BACKGROUND OF THE SIGN, EXCEPT FOR STOP AND YIELD SIGNS, WHICH WILL BE RED.

APPLY WRAP TO ALL WARNING SIGNS, STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS. ADDITIONALLY, APPLY WRAP TO THE W9-1R AND W9-2TL SIGNS IN THE PASSING LANE SECTIONS. PLEASE DIRECT ANY QUESTIONS REGARDING THE WRAPS TO THE ENGINEER.

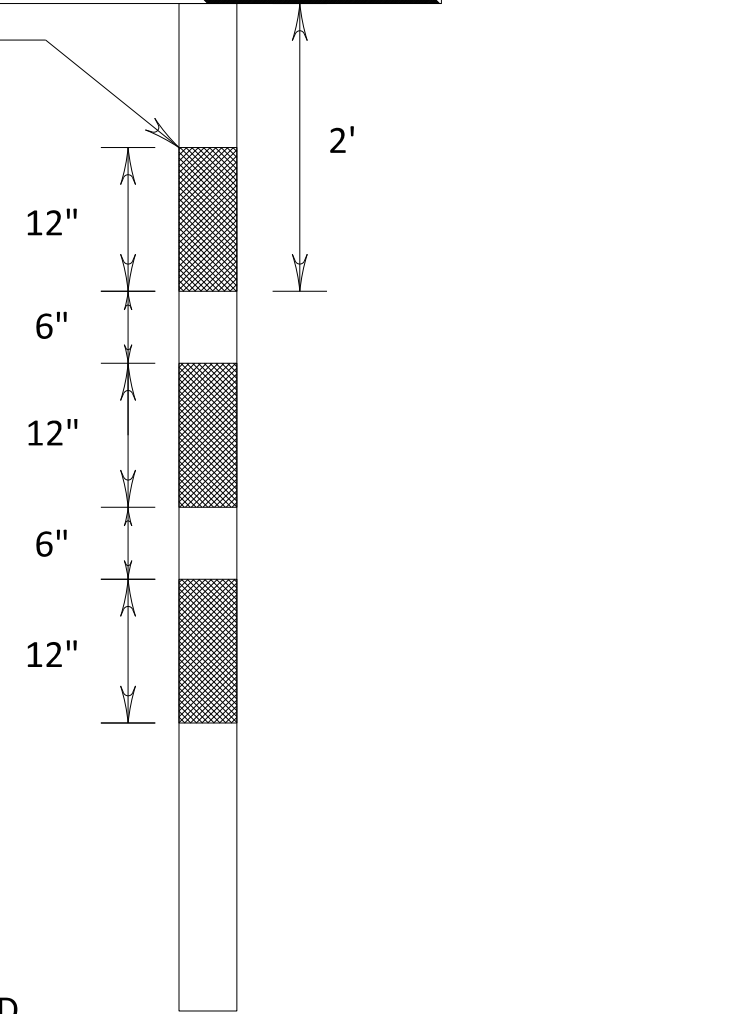
WRAP WILL CONSIST OF A 12" STRIP OF REFLECTIVE MATERIAL OF THE APPROPRIATE COLOR WRAPPED AROUND THE SIGN POST SO THAT THE BOTTOM OF THE STRIP IS POSITIONED 3 FEET FROM THE BOTTOM OF THE SIGN. THE BOTTOM OF THE STRIP WILL BE POSITION 2 FEET FROM THE BOTTOM OF THE SIGN FOR CHEVRON SIGNS (W1-8 SIGNS)

WRAPS WILL BE FURNISHED BY THE CONTRACTOR AND SHALL BE SUBSIDIARY TO ITEM 644.

W1-8



REFLECTIVE WRAP \*



The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.  
<http://www.txdot.gov/>

SHEET 1 OF 1



**CORPUS CHRISTI DISTRICT  
REFLECTIVE WRAP DETAIL**

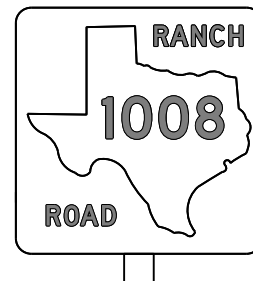
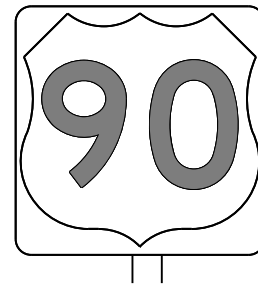
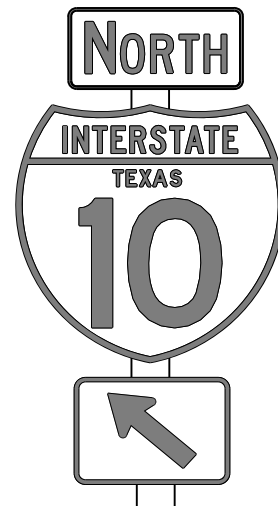
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© TxDOT July 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC. SH 359, ETC.	
	DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.		66	

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DATE: 4/6/2024 5:57:55 PM  
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## REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

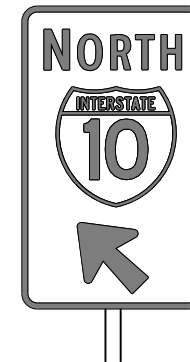
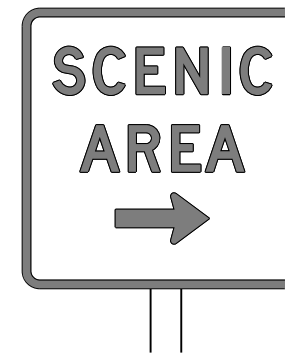
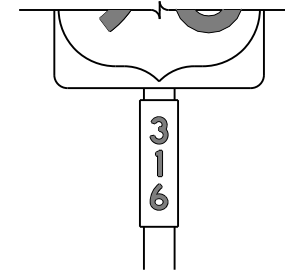
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

## REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

## GENERAL NOTES

- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

- Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.
- Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

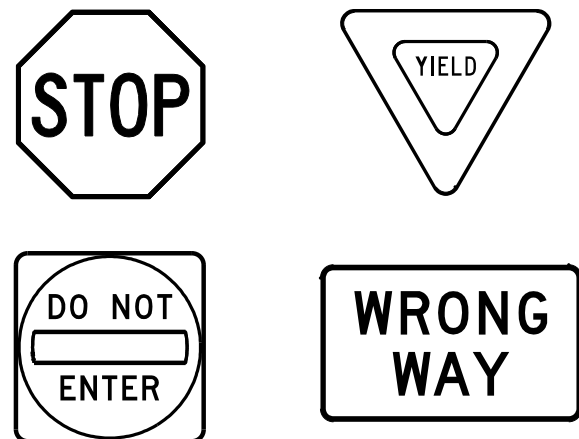
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website:  
<http://www.txdot.gov/>

<b>Texas Department of Transportation</b>	<i>Traffic Operations Division Standard</i>
<h2 style="margin: 0;">TYPICAL SIGN REQUIREMENTS</h2> <h3 style="margin: 0;">TSR(3) - 13</h3>	
FILE: tsr3-13.dgn    DN: TxDOT    CK: TxDOT    DW: TxDOT    CR: TxDOT © TxDOT October 2003    CONT SECT JOB HIGHWAY REVISIONS    0087 02 059, ETC. SH 359, ETC. 12-03 7-13    DIST COUNTY SHEET NO. 9-08    CRP JIM WELLS, ETC.    67	

DATE: 4/6/2024 5:57:59 PM  
 FILE: \\txdot.projectwiseonline.com:txdot\4\Documents\16 - CRP\Design Projects\16-0599\9-08\16-0599.dgn  
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### REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

### REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

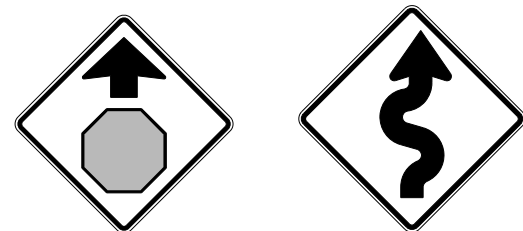
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

### REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

### REQUIREMENTS FOR SCHOOL SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

### GENERAL NOTES

- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
- White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

#### ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

#### DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

<http://www.txdot.gov/>



## TYPICAL SIGN REQUIREMENTS

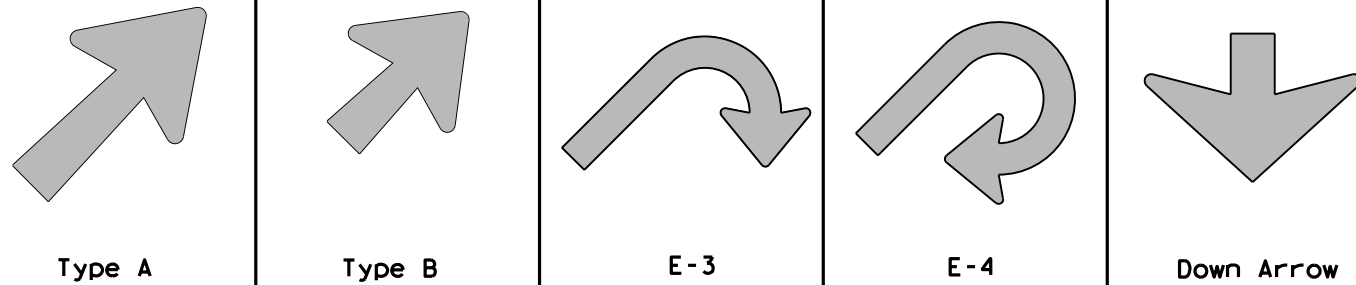
### TSR(4) - 13

FILE:	tsr4-13.dgn	DN:	TxDOT	CR:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY				
	REVISIONS	0087	02	059, ETC.	SH 359, ETC.				
12-03	7-13	DIST	COUNTY	SHEET NO.					
9-08		CRP	JIM WELLS, ETC.						68

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### ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

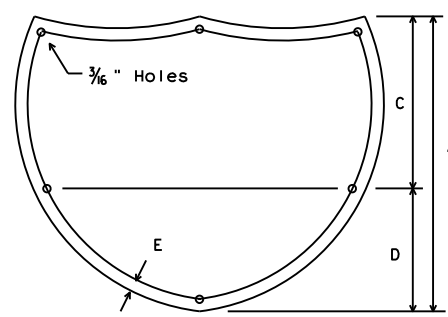
#### NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

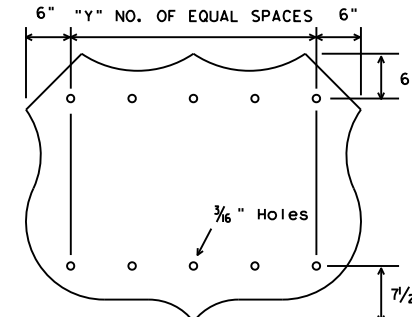
<http://www.txdot.gov/>

### SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



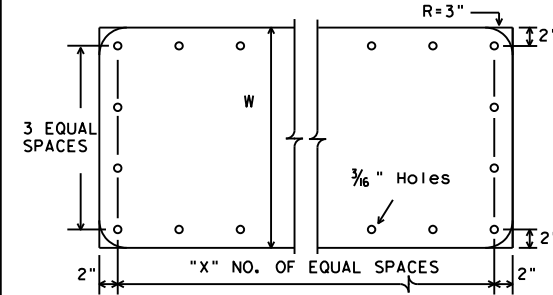
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



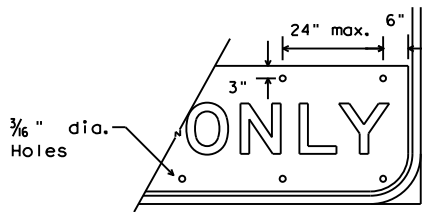
U.S. ROUTE MARKERS

Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



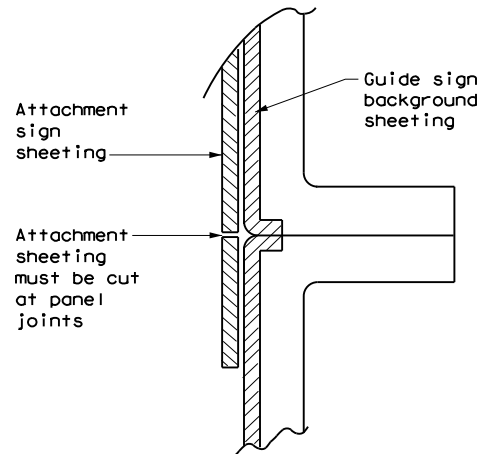
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5



EXIT ONLY PANEL

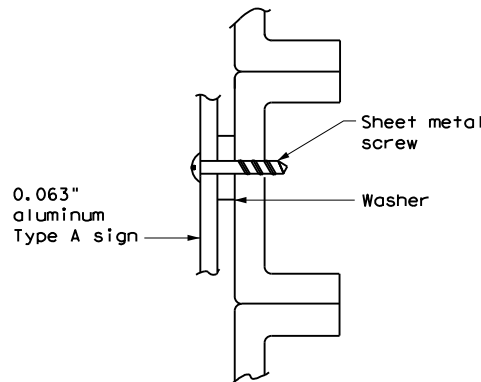
### MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



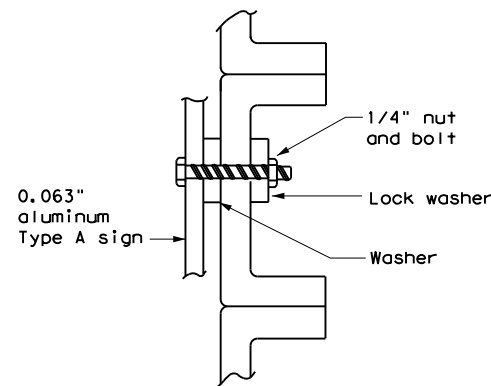
DIRECT APPLIED ATTACHMENT

#### NOTE:

- Sheeting for legend, symbols, and borders must be cut at panel joints.
- Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT

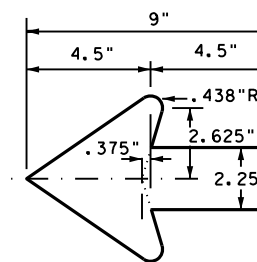


NUT/BOLT ATTACHMENT

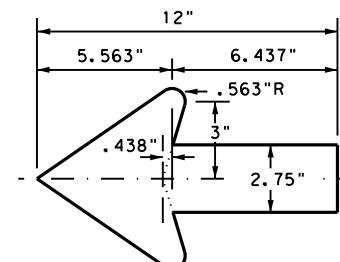
#### NOTE:

Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

### ARROW DETAILS for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

### TYPICAL SIGN REQUIREMENTS

#### TSR (5) - 13

FILE: tsr5-13.dgn	DW: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	CRP	JIM WELLS, ETC.	69	

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## SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

### Post Type

- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

### Number of Posts (1 or 2)

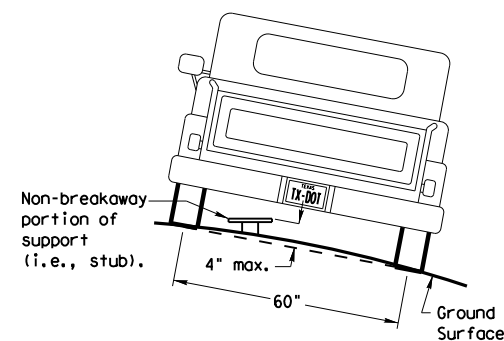
### Anchor Type

- UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS = Wedge Anchor Steel - (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))
- SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

### Sign Mounting Designation

- P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
- IF REQUIRED
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

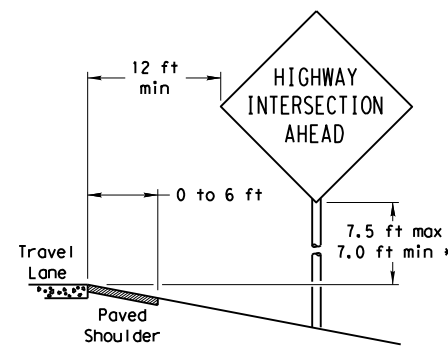
## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

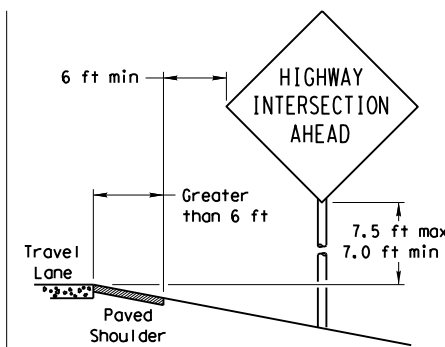
## SIGN LOCATION

### PAVED SHOULDERS



#### LESS THAN 6 FT. WIDE

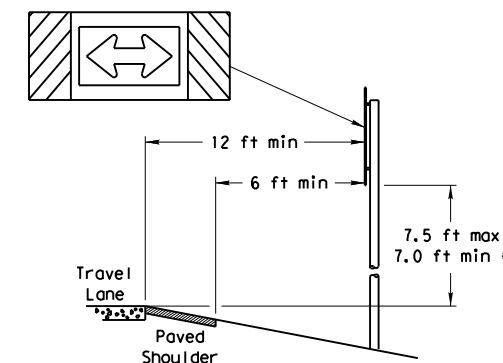
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



#### GREATER THAN 6 FT. WIDE

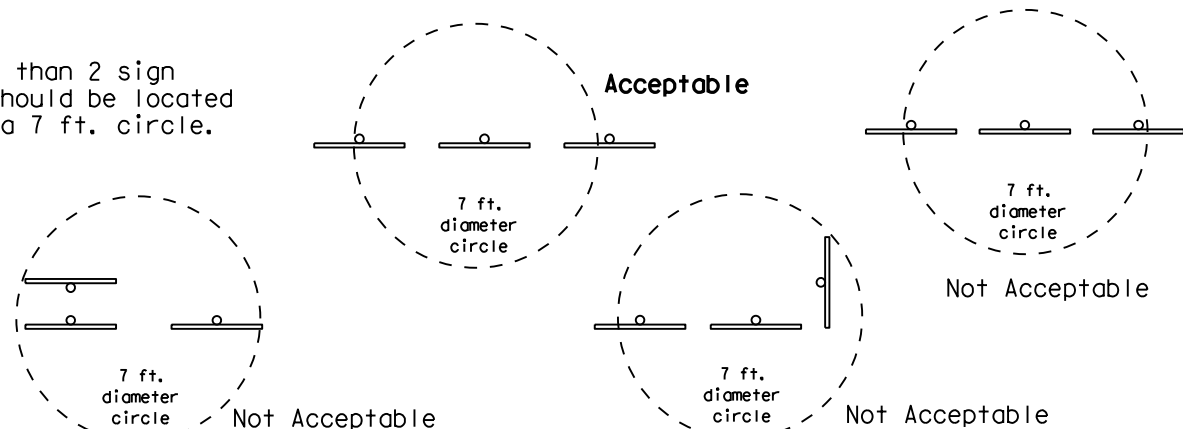
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

### T-INTERSECTION

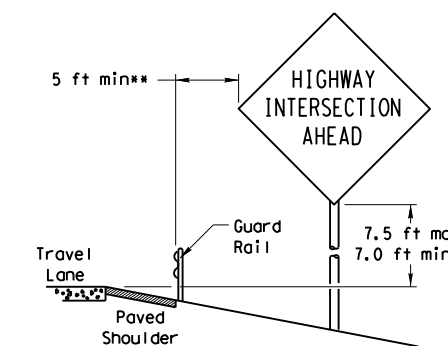


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

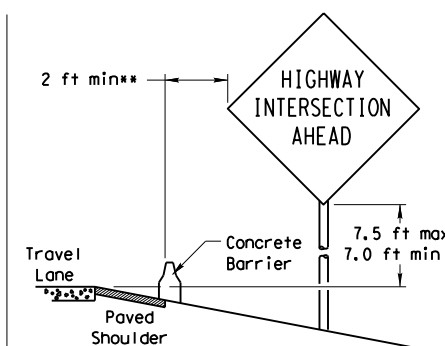
No more than 2 sign posts should be located within a 7 ft. circle.



### BEHIND BARRIER



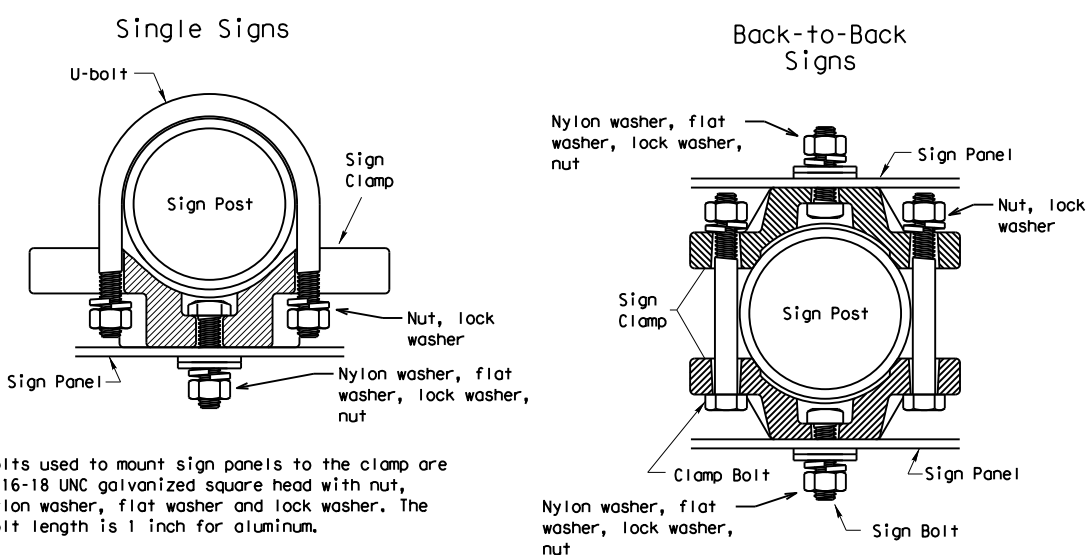
#### BEHIND GUARDRAIL



#### BEHIND CONCRETE BARRIER

\*\*Sign clearance based on distance required for proper guard rail or concrete barrier performance.

## TYPICAL SIGN ATTACHMENT DETAIL



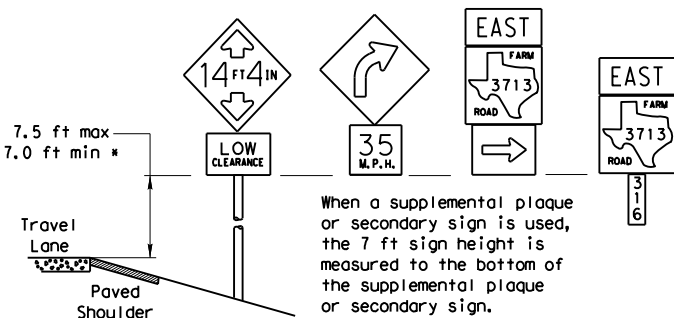
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

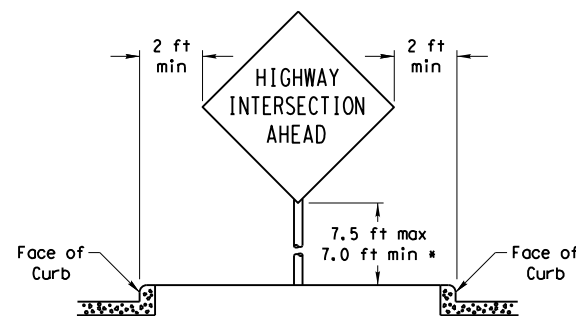
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

### SIGNS WITH PLAQUES

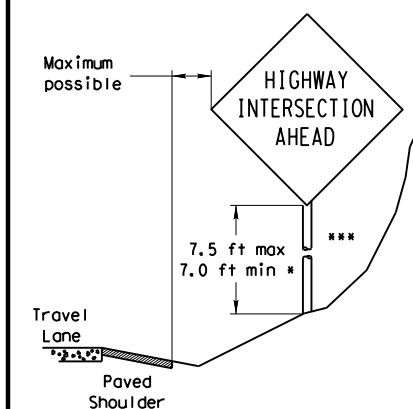


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

### CURB & GUTTER OR RAISED ISLAND



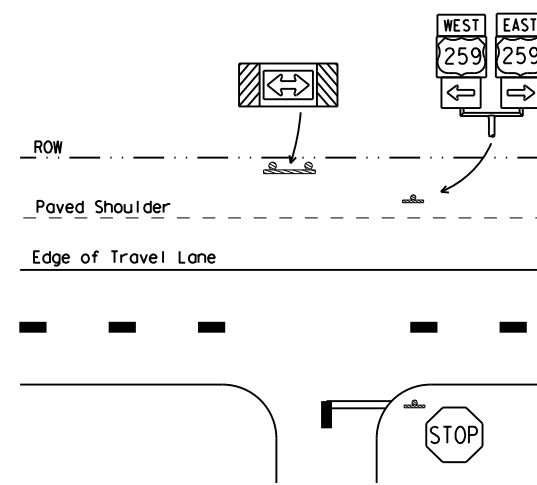
### RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

\*\*\* Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.



\* Signs shall be mounted using the following condition that results in the greatest sign elevation:

- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:  
<http://www.txdot.gov/publications/traffic.htm>

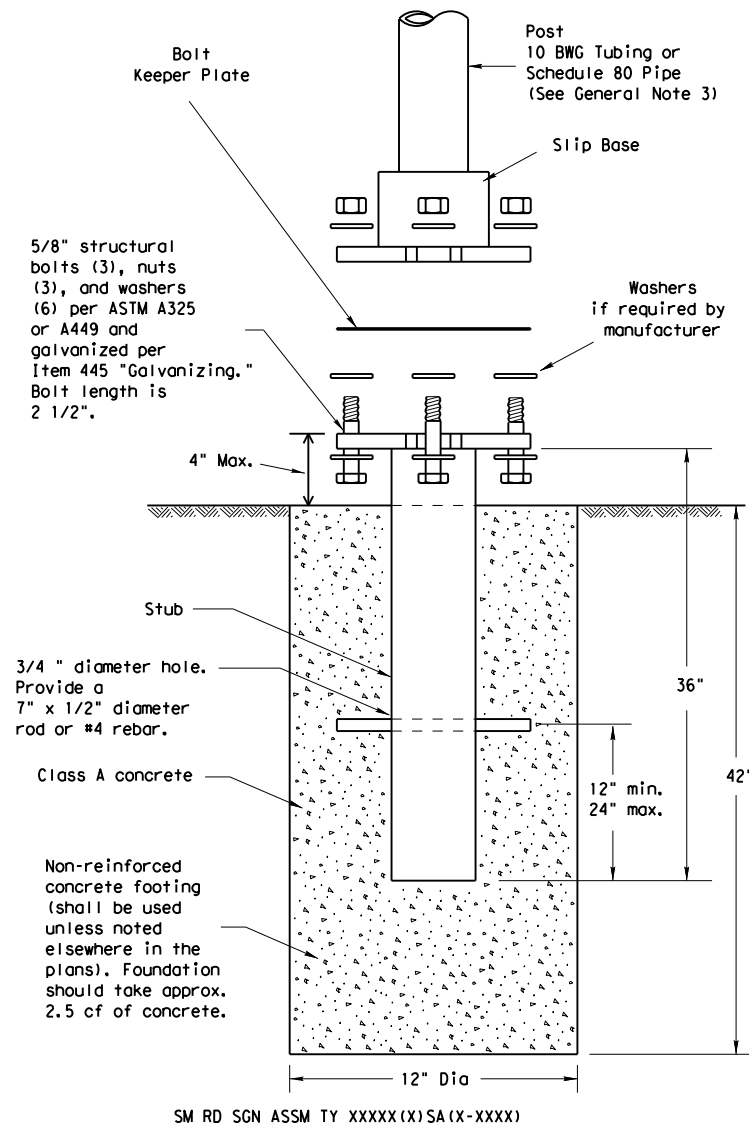
Texas Department of Transportation  
Traffic Operations Division

## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0087	02	059, ETC.	SH 359, ETC.
		DIST	COUNTY		SHEET NO.
		CRP	JIM WELLS, ETC.		70

# TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



## NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. [http://www.txdot.gov/business/producer\\_list.htm](http://www.txdot.gov/business/producer_list.htm) The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

## GENERAL NOTES:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
  - 10 BWG Tubing (2.875" outside diameter)
    - 0.134" nominal wall thickness
    - Seamless or electric-resistance welded steel tubing or pipe
    - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
    - Other steels may be used if they meet the following:
      - 55,000 PSI minimum yield strength
      - 70,000 PSI minimum tensile strength
      - 20% minimum elongation in 2"
    - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
    - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
    - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
  - Schedule 80 Pipe (2.875" outside diameter)
    - 0.276" nominal wall thickness
    - Steel tubing per ASTM A500 Gr C
    - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
      - 46,000 PSI minimum yield strength
      - 62,000 PSI minimum tensile strength
      - 21% minimum elongation in 2"
    - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
    - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
    - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

## ASSEMBLY PROCEDURE

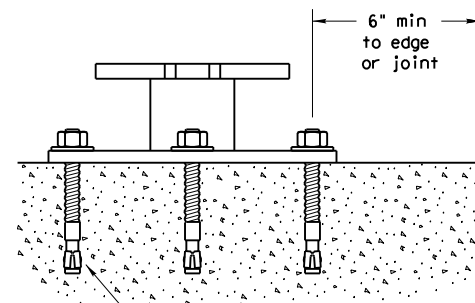
### Foundation

- Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

### Support

- Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
- Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

## CONCRETE ANCHOR



5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

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Texas Department of Transportation  
Traffic Operations Division

## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

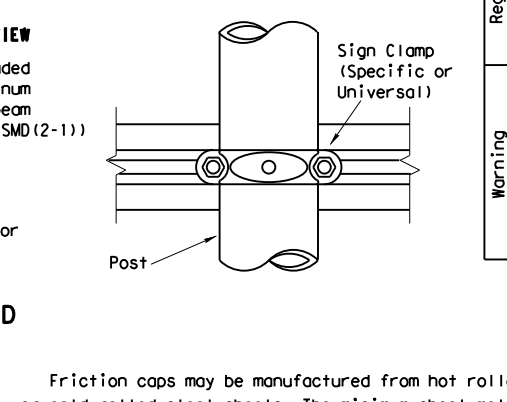
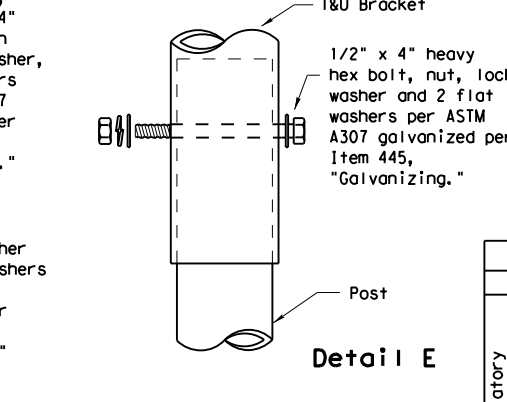
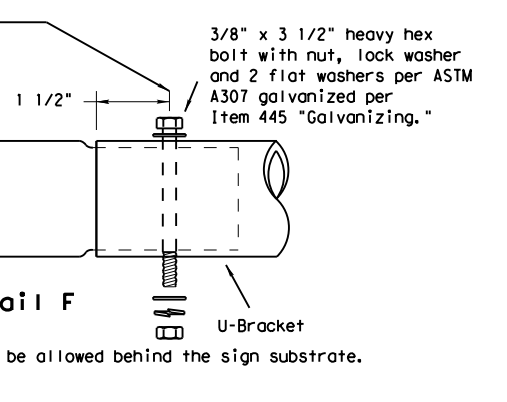
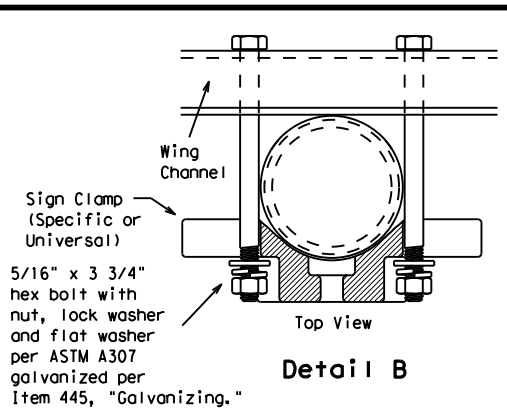
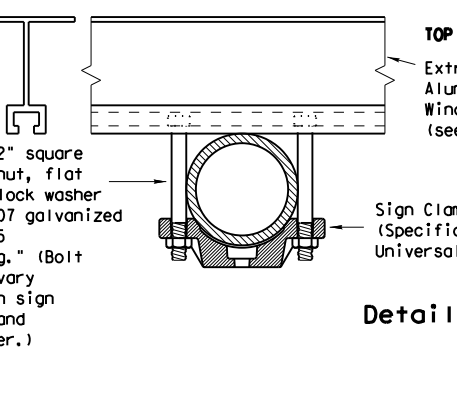
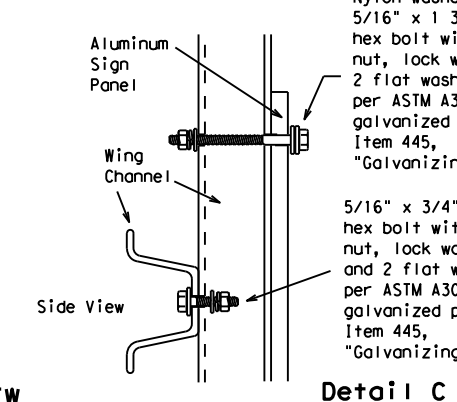
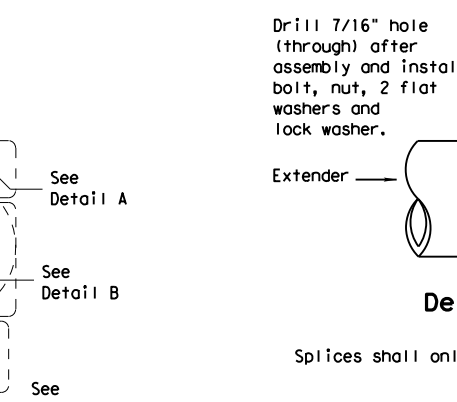
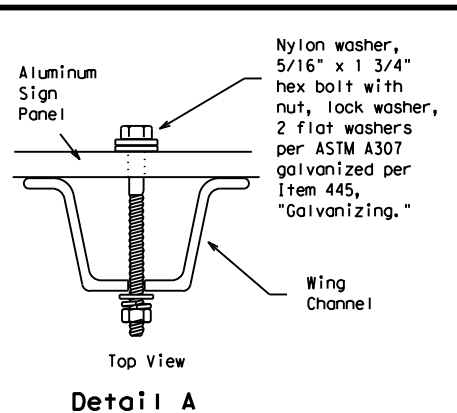
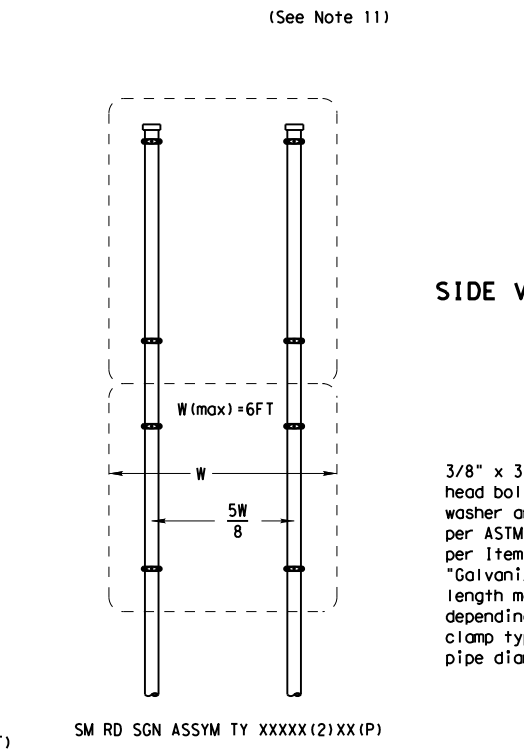
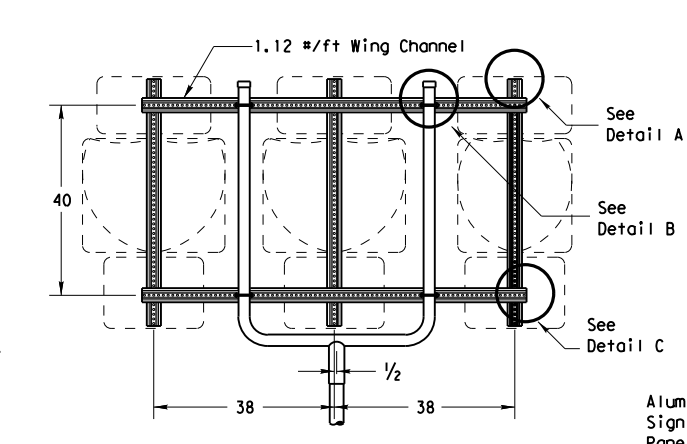
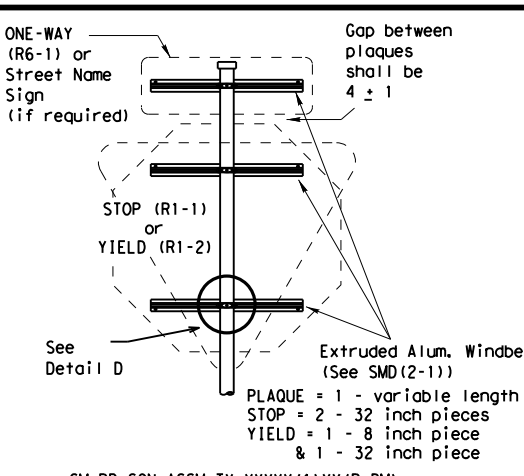
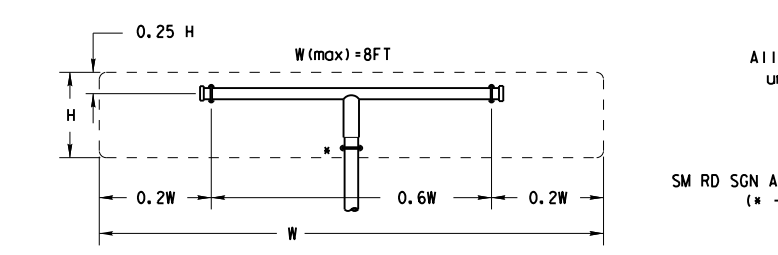
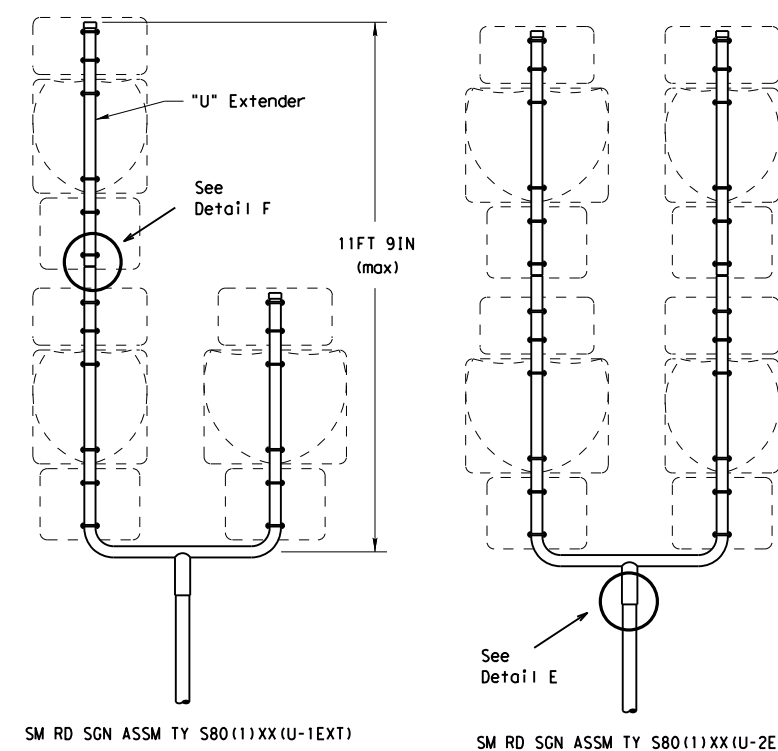
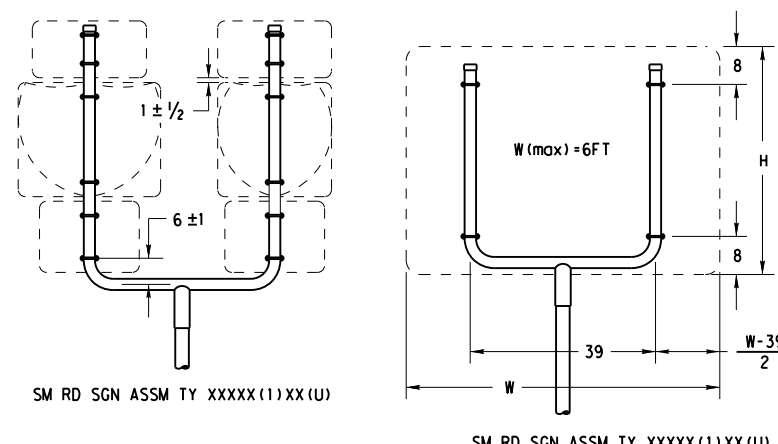
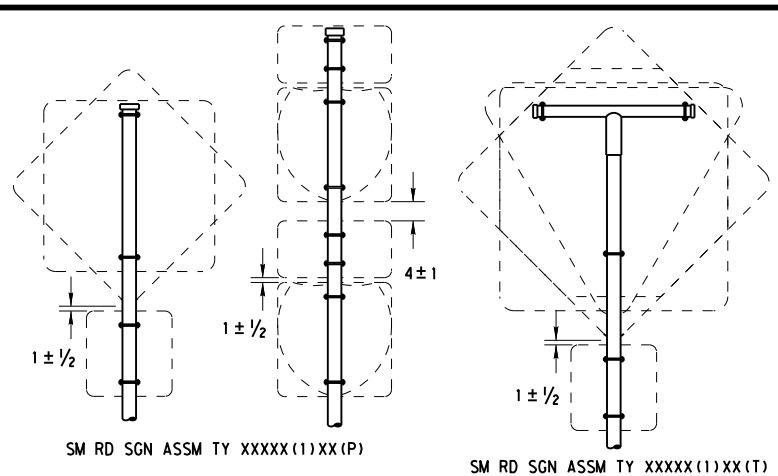
SMD(SLIP-1)-08

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		DIST	COUNTY		SHEET NO.
	CRP	JIM WELLS, ETC.		71	



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All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXX(1)XX(T) (\* - See Note 12)

GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG       | 1          | 16 SF          |
| 10 BWG       | 2          | 32 SF          |
| Sch 80       | 1          | 32 SF          |
| Sch 80       | 2          | 64 SF          |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
- Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.
- Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
SIGN DESCRIPTION	SUPPORT	
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
Warning	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)	
Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)	

Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes. The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture. Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

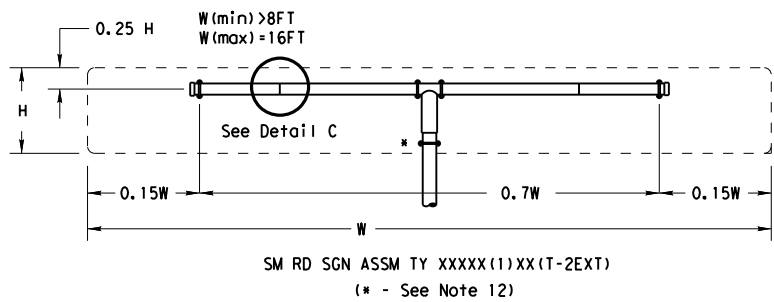
**Texas Department of Transportation**  
 Traffic Operations Division

**SIGN MOUNTING DETAILS**  
**SMALL ROADSIDE SIGNS**  
**TRIANGULAR SLIPBASE SYSTEM**  
**SMD(SLIP-2)-08**

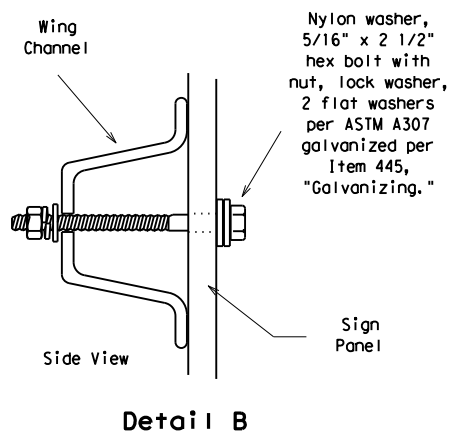
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		DIST:	COUNTY:	SHEET NO.	
		CRP:	JIM WELLS, ETC.		72

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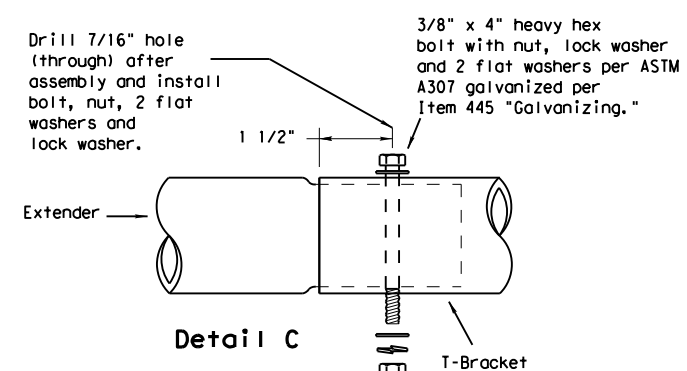
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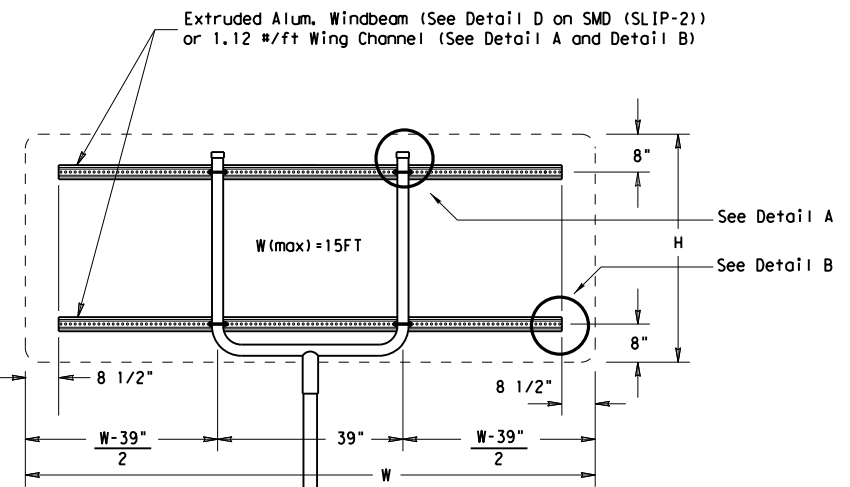
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 (\* - See Note 12)



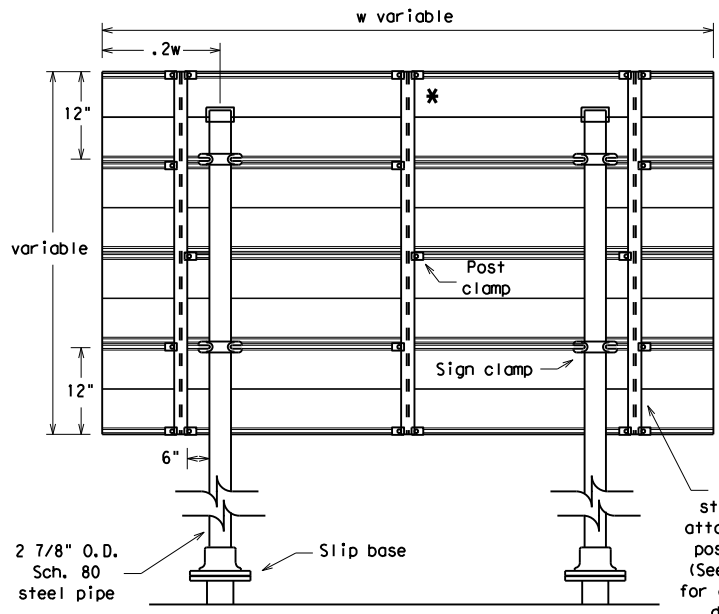
Detail B



Detail C  
 Splices shall only be allowed behind the sign substrate.

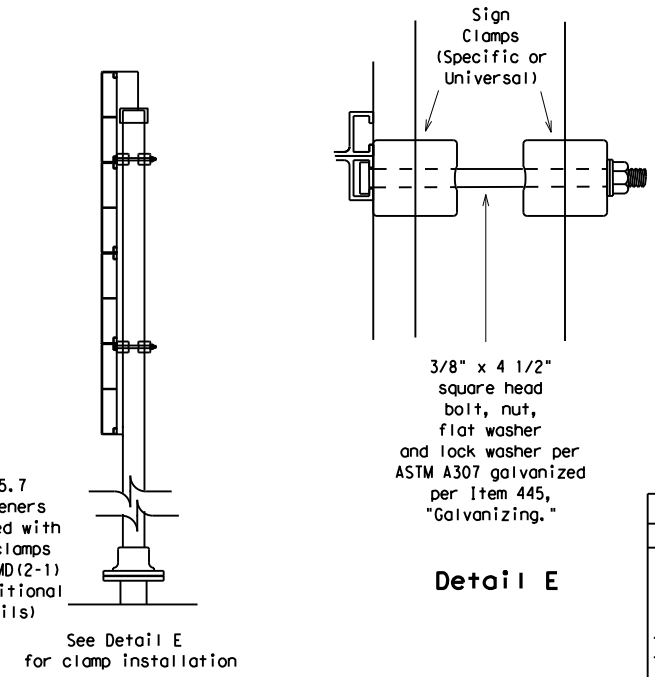


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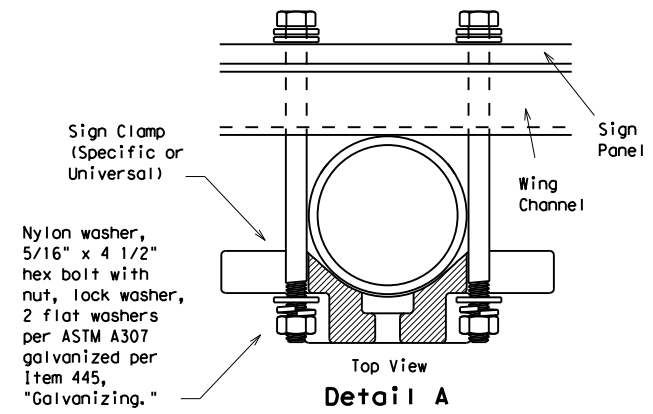


Typical Sign Mount

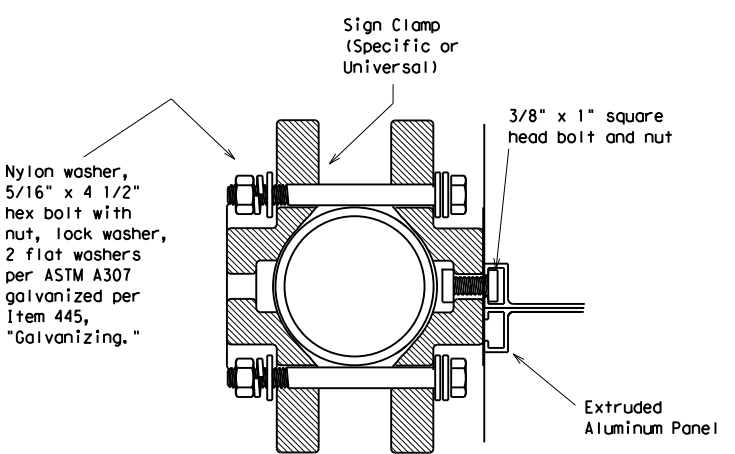
SM RD SGN ASSM TY S80(2)XX(IP-EXAL)  
 \* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Detail E

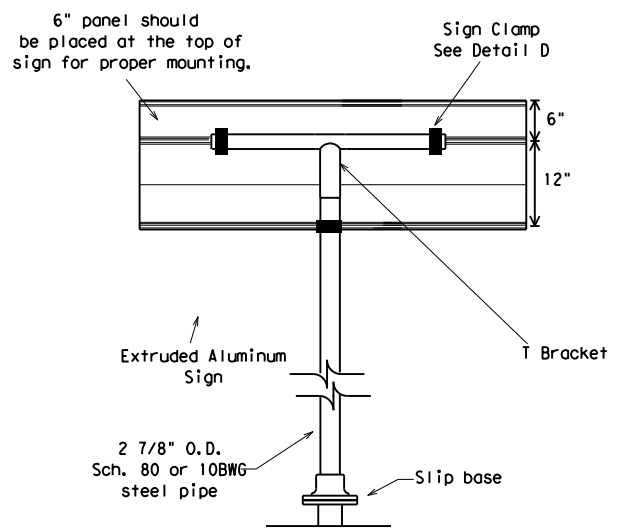


Detail A

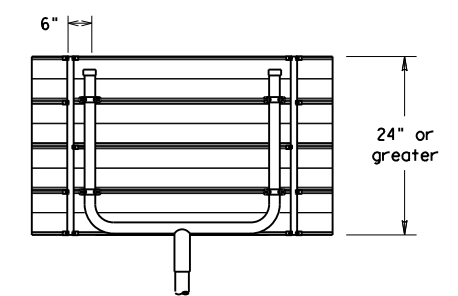


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign With T Bracket



Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details  
 See Detail E for clamp installation

GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG       | 1          | 16 SF          |
| 10 BWG       | 2          | 32 SF          |
| Sch 80       | 1          | 32 SF          |
| Sch 80       | 2          | 64 SF          |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



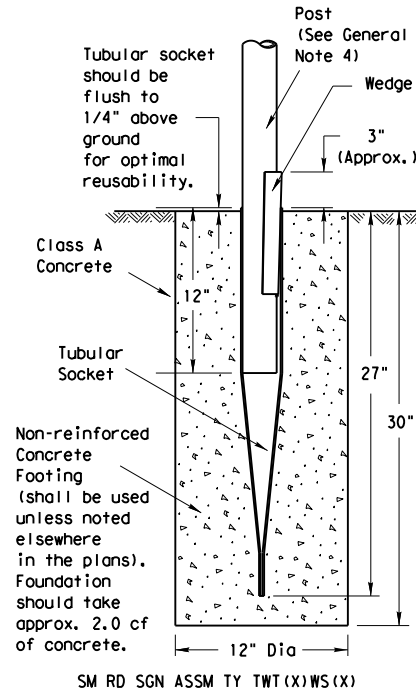
**SIGN MOUNTING DETAILS  
 SMALL ROADSIDE SIGNS  
 TRIANGULAR SLIPBASE SYSTEM  
 SMD(SLIP-3)-08**

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		CRP	JIM WELLS, ETC.		73

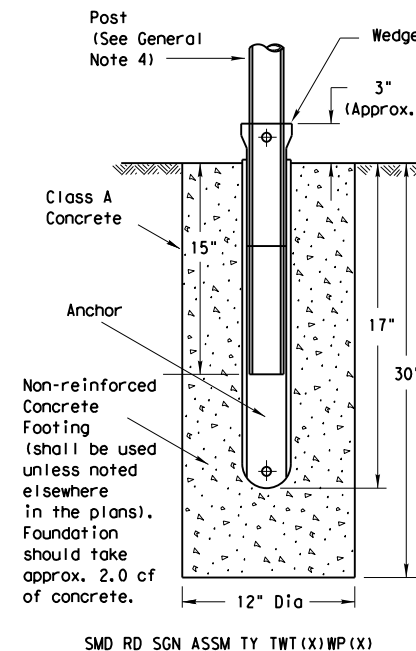
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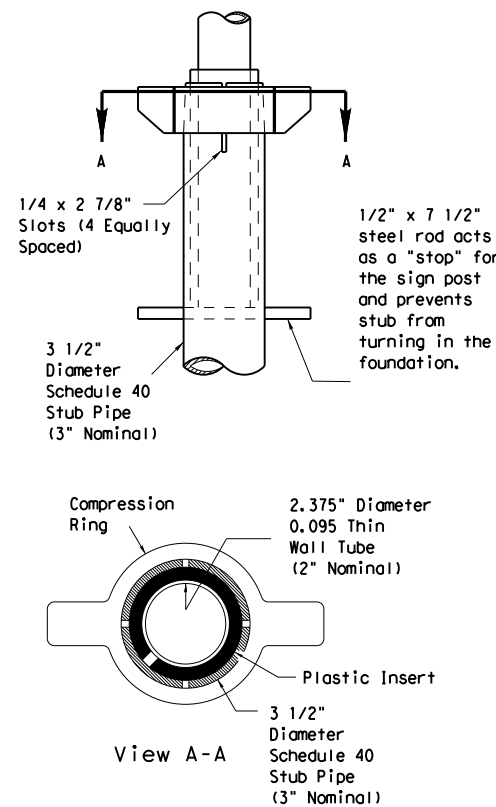
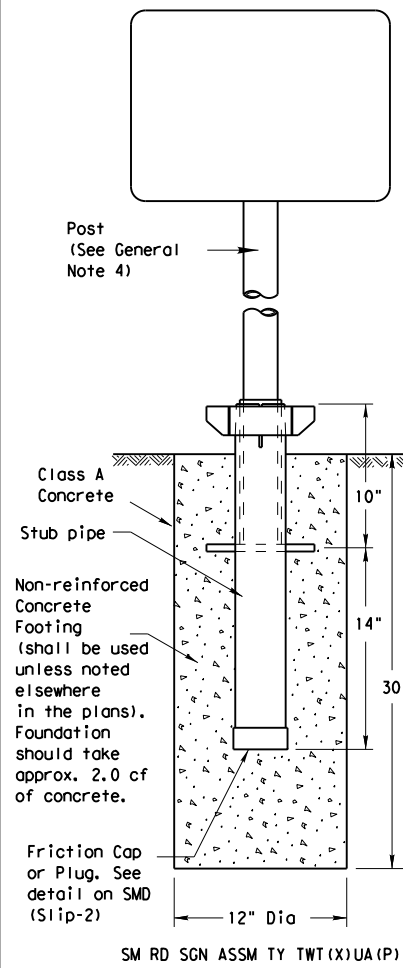
### Wedge Anchor Steel System



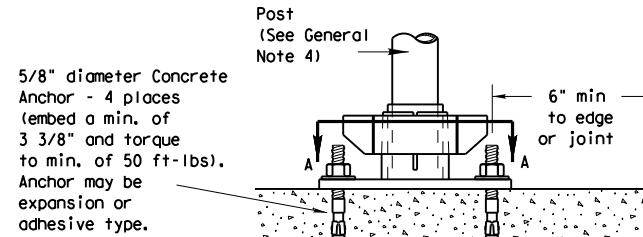
### Wedge Anchor High Density Polyethylene (HDPE) System



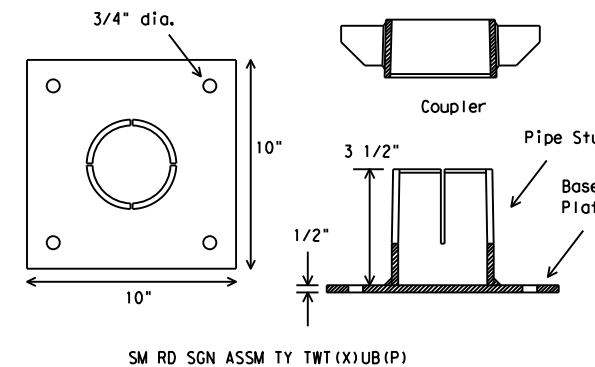
### Universal Anchor System with Thin-Walled Tubing Post



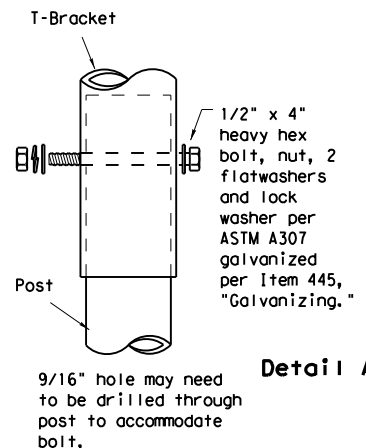
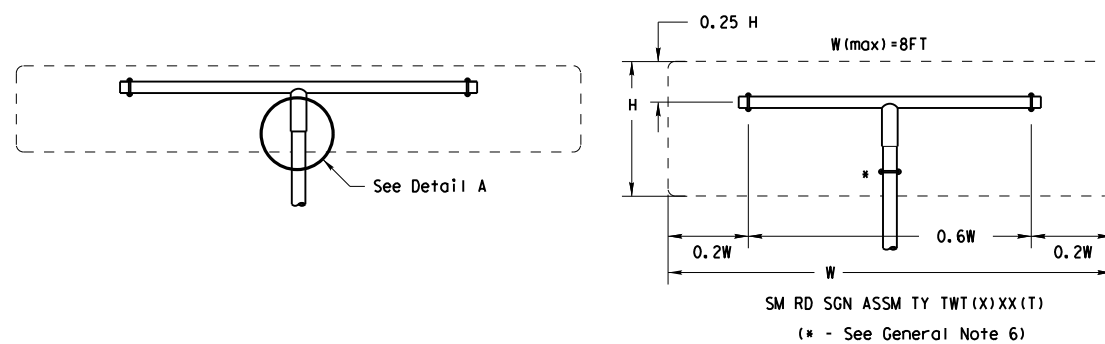
Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.



Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



### Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post



#### NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

#### GENERAL NOTES:

- The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
- The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
- Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: [http://www.txdot.gov/business/producer\\_list.htm](http://www.txdot.gov/business/producer_list.htm)
- Material used as post with this system shall conform to the following specifications:  
 13 BWG Tubing (2.375" outside diameter) (TWT)  
 0.095" nominal wall thickness  
 Seamless or electric-resistance welded steel tubing  
 Steel shall be HSLA Gr 55 per ASTM A1011 or ASTM A1008  
 Other steels may be used if they meet the following:  
 55,000 PSI minimum yield strength  
 70,000 PSI minimum tensile strength  
 18% minimum elongation in 2"  
 Wall thickness (uncoated) shall be within the range of .083" to .099"  
 Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"  
 Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>

#### WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

- Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
- Insert tubular socket into concrete until top of socket is approximately 1/4" above the concrete footing.
- Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer.
- Attach the sign to the sign post.
- Insert the sign post into socket and align sign face with roadway.
- Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

#### UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

- Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- Insert base post in hole to depths shown and backfill hole with concrete.
- Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
- Attach the sign to the sign post.
- Install plastic insert around bottom of post.
- Insert sign post into base post. Lower until the post comes to rest on steel rod.
- Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
- Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

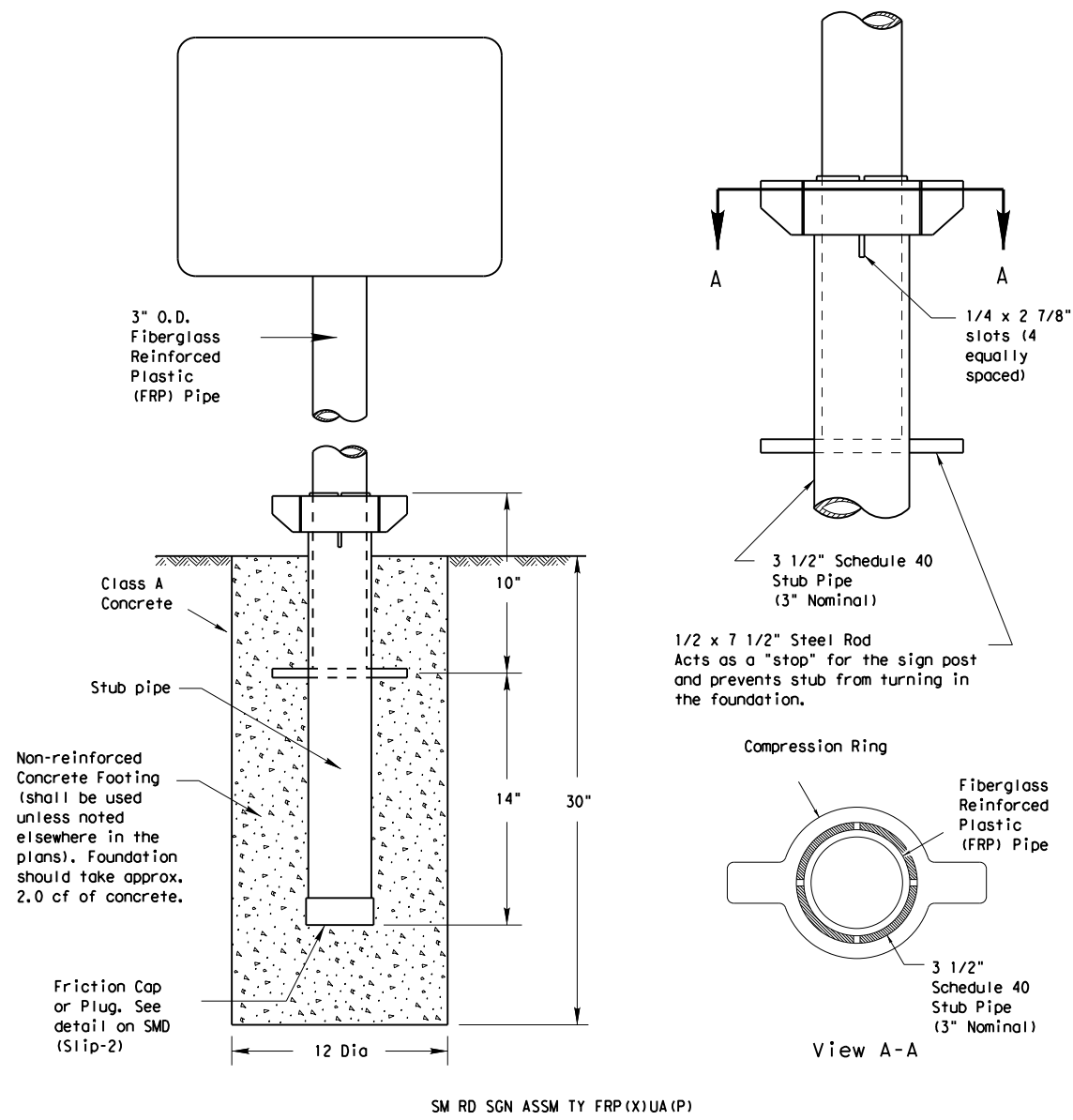


## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST SMD(TWT) - 08

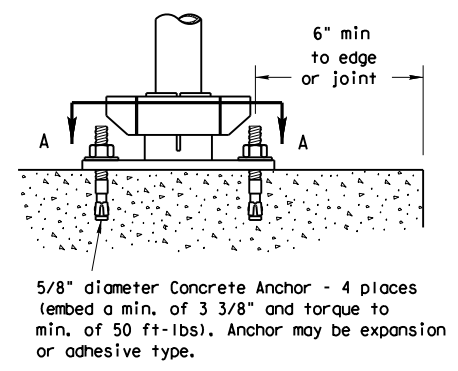
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		CRP	JIM WELLS, ETC.	74	



## Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post

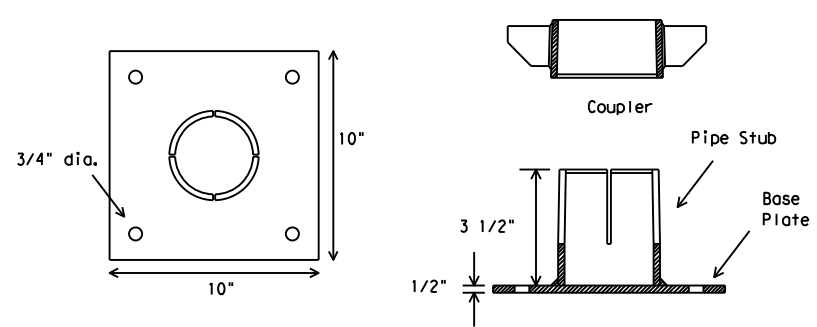


SM RD SGN ASSM TY FRP(X)UA(P)



Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxy and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

### BOLT-DOWN DETAILS



SM RD SGN ASSM TY FRP(X)UB(P)

#### GENERAL NOTES:

- FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
- All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
- See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: <http://www.txdot.gov/publications/traffic.htm>

#### FRP POST REQUIREMENTS

- Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
- Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
- FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:  
Texas Department of Transportation  
Traffic Operations Division  
125 East 11th Street  
Austin, Texas 78701-2483

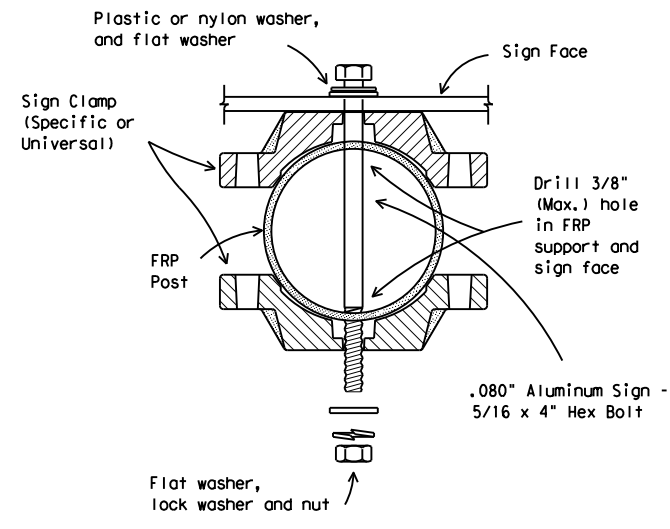
#### UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

- Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
- Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
- Attach sign to FRP post.
- Insert sign post into base post. Lower until the post comes to rest on the steel rod.
- Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
- Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

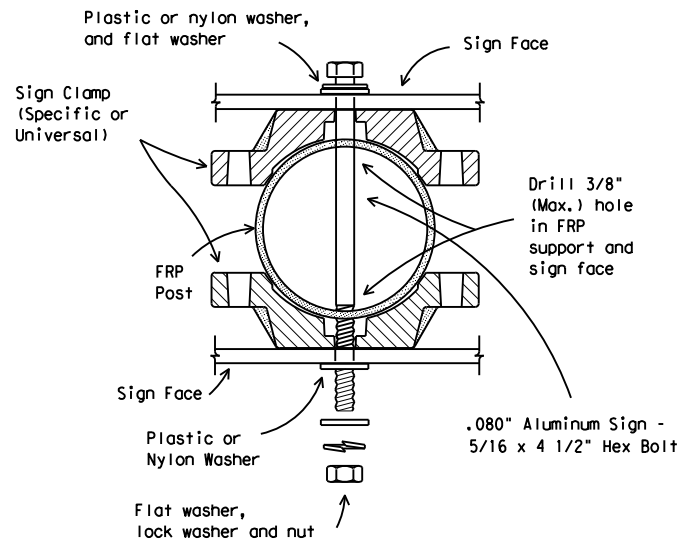
#### BOLT DOWN SIGN SUPPORT

- Position base plate with coupler on existing concrete.
- Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
- Attach sign to FRP post.
- Insert bottom of sign post into pipe stub.
- Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
- Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

### Typical Sign Mounting Detail for FRP Support with Single Sign



### Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

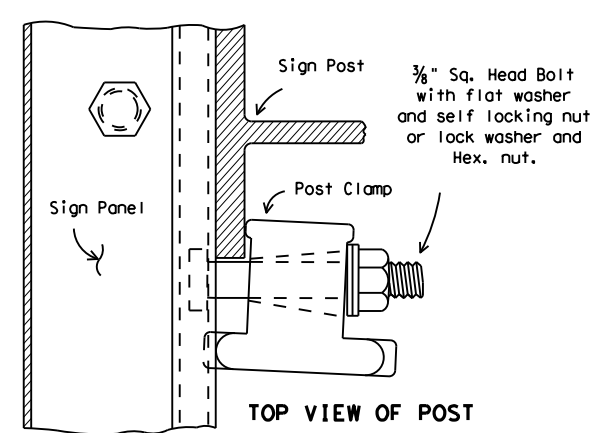
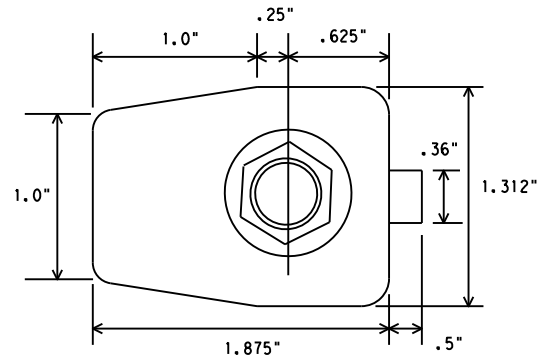
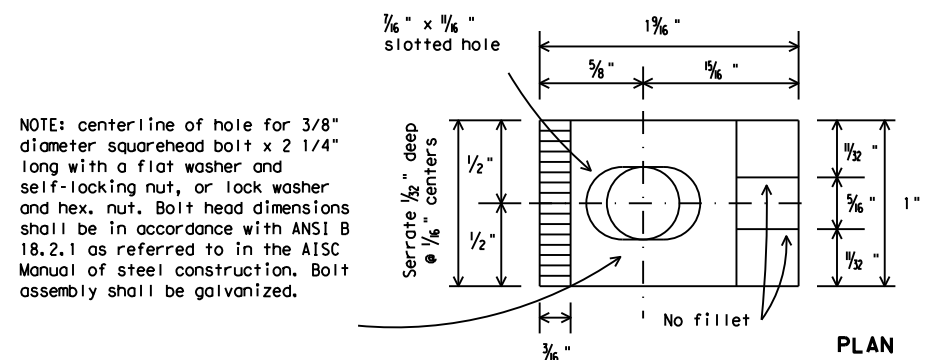
### SMD (FRP) -08

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		DIST	COUNTY		SHEET NO.
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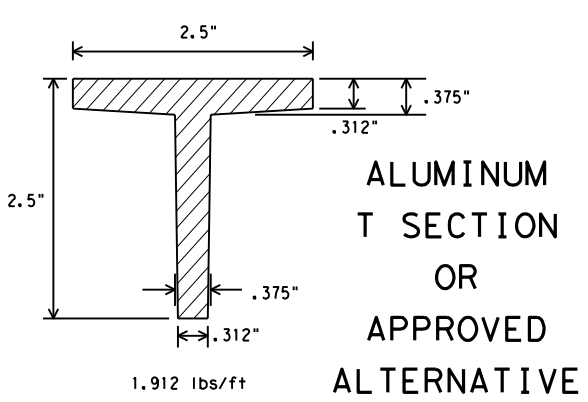
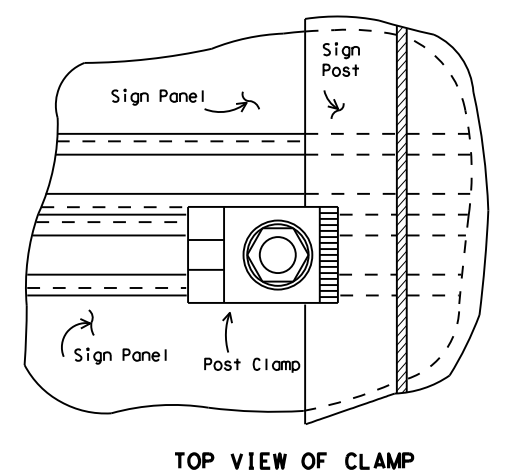
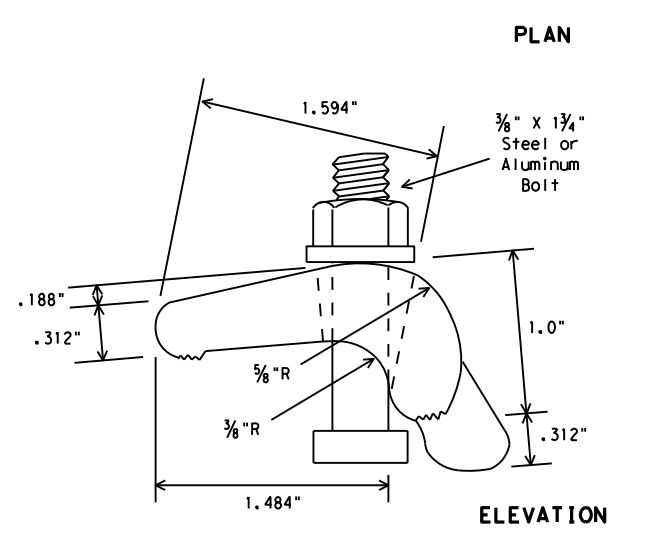
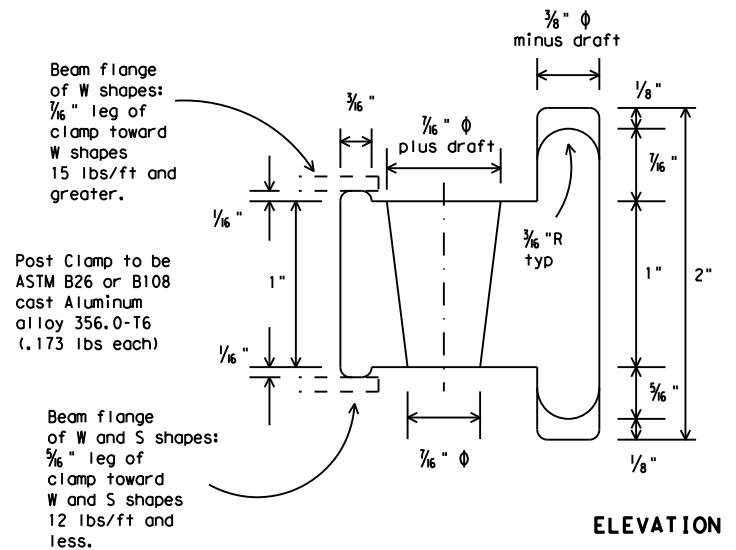
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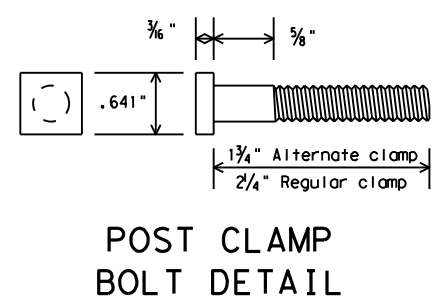
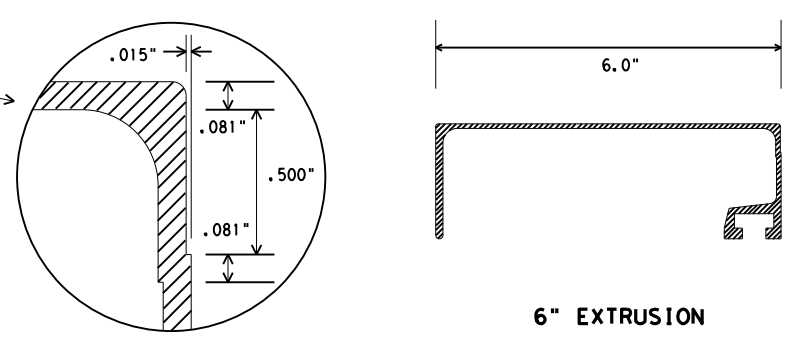
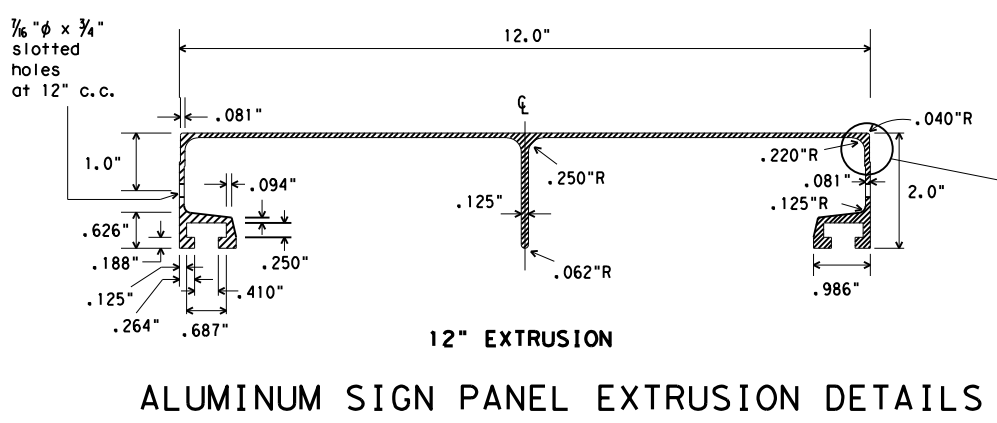
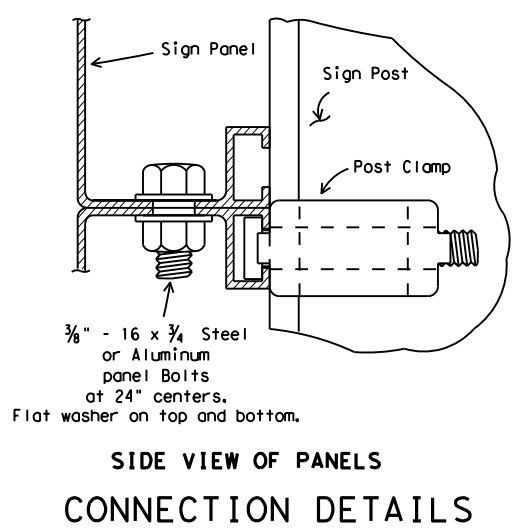
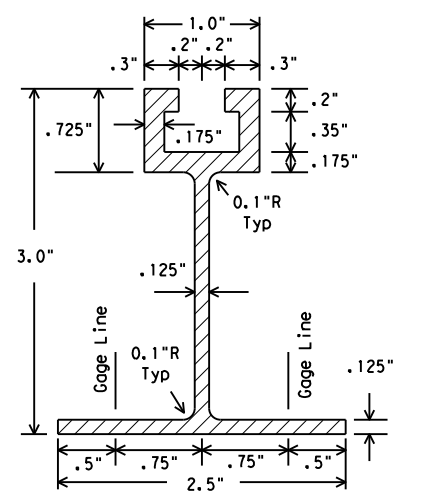


DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

- GENERAL NOTES:
- Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
  - Materials and fabrication shall conform to the requirements of the Department material specifications.
  - Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
  - For fiberglass substrate connection details, see manufacturer's recommendations.



WINDBEAM CROSS SECTION  
 Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



Texas Department of Transportation  
 Traffic Operations Division

**SIGN MOUNTING DETAILS-  
 EXTRUDED ALUMINUM  
 SIGN PANELS & HARDWARE**

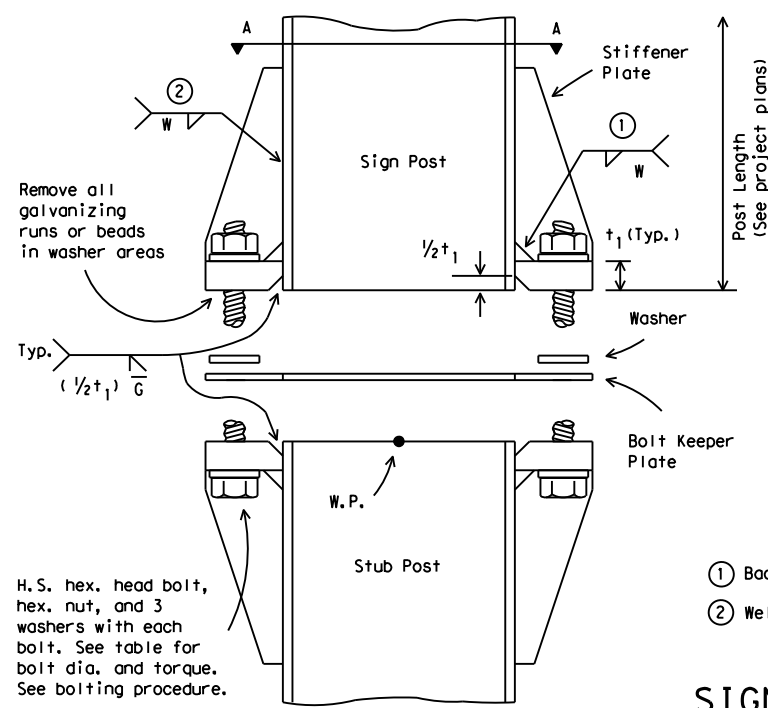
**SMD(2-1)-08**

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		DIST	COUNTY	SHEET NO.	
		CRP	JIM WELLS, ETC.	76	

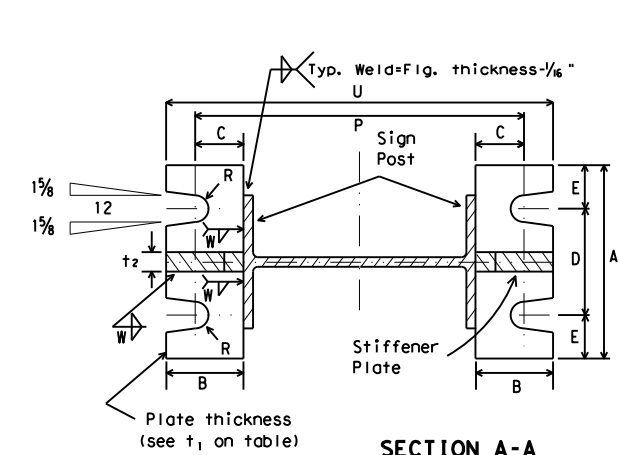
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TRAFFIC SIGN STANDARDS SMD22-08.dgn

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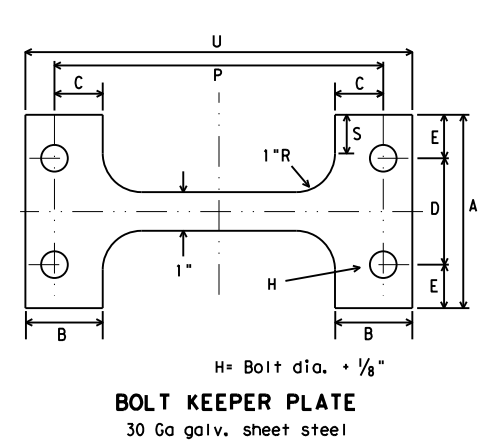
ELEVATION



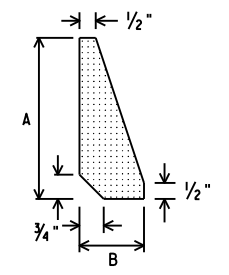
SECTION A-A

- ① Back up weld to be made before installing stiffener plate
- ② Weld W may be continued across clips to seal joint

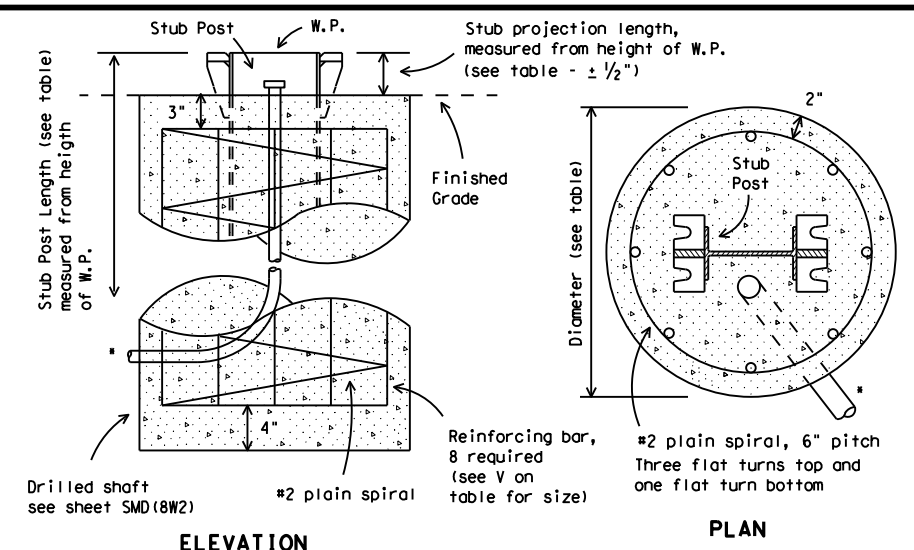
SIGN POST AND STUB POST  
(For W Shapes)



BOLT KEEPER PLATE  
30 Ga galv. sheet steel



STIFFENER PLATE  
DETAIL

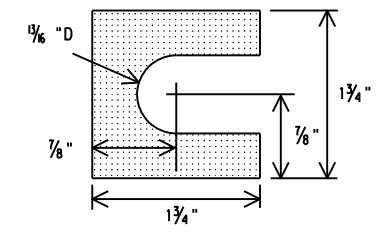


ELEVATION

PLAN

FOUNDATION DETAIL

\*Note: For signs with electrical apparatus, see ED(10) for conduit required in foundation.



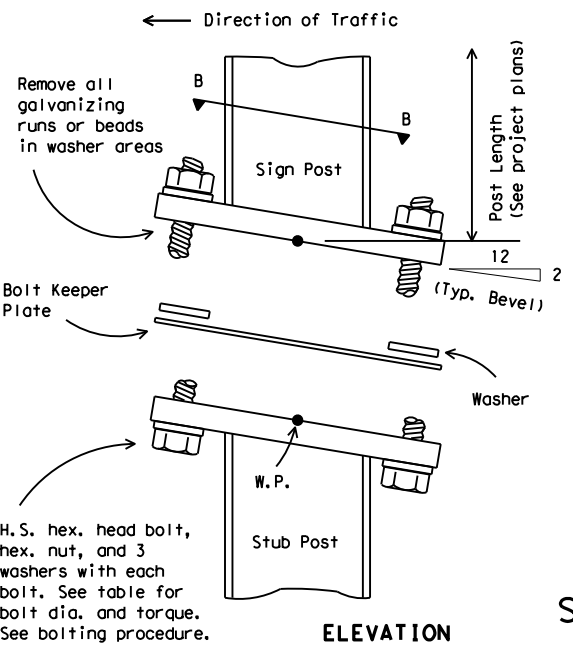
SHIM DETAIL

Furnish two .012\"+ thick and two .032\"+ thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

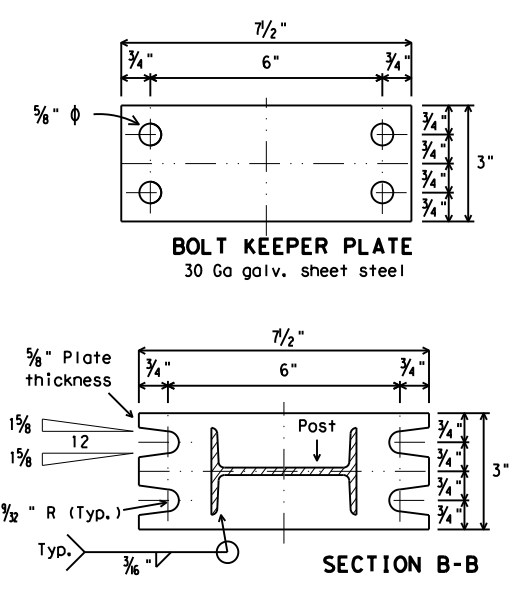
- BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:**
1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
  2. Shim as required to plumb post.
  3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
  4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not over-tighten.
  5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

Dimensions Post Size	Base Connection Data Table										Perforated Fuse Plate Data Table							Bolt Keeper Data			Foundation Data								
	Bolt Size & Torque	A	B	C	D	E	t <sub>1</sub>	t <sub>2</sub>	W	R	F	G	J	K	M	d <sub>1</sub>	d <sub>2</sub>	t <sub>3</sub>	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length	P	S	U	Stub length	Stub projection	Dr. Shaft diameter	Bar V Size	
W6x9	5/8" φ × 2 3/4"										4 1/4"	2"	4"	2 1/4"	1"	9/16"	3/4"	1/4"	1/2"	1.01	1 1/2"	8 3/8"		9 7/8"	2'-0"	3"			#5
W6x12	440-450 inch pounds	5"	2"	1 1/4"	2 3/4"	1 1/8"	3/4"	1/2"	1/4"	1/32"	5"	2 1/2"	6"	3 1/2"	1 1/2"	1/16"	1/4"	3/8"	5/8"	2.51	2 1/4"	8 1/2"	1"	10"	2'-0"	3"			#5
W6x15	36-38 foot pounds										5"	2 1/2"	5 1/4"	2 3/4"	1 1/4"	1/16"	1/16"	3/8"	5/8"	2.26	2 1/4"	10 5/8"		10"	2'-6"	3"			#6
W8x18											5 1/2"	2 1/2"	5 1/4"	2 3/4"	1 1/4"	13/16"	1"	1/2"	3/4"	3.35	2 1/4"	11"		12 3/8"	2'-6"	3"			#7
W8x21	3/4" φ × 3 1/2"										5 1/2"	2 1/2"	5 1/4"	2 3/4"	1 1/4"	13/16"	1"	1/2"	3/4"	3.35	2 1/4"	11"		12 3/8"	3'-0"	2 1/2"			#8
W10x22	740-750 inch pounds	6"	2 1/4"	1 3/8"	3 1/2"	1 1/4"	1"	3/4"	5/16"	13/32"	6"	3"	5 3/4"	2 3/4"	1 3/8"	13/16"	1 1/8"	1/2"	3/4"	4.03	2 1/4"	12 7/8"	1 1/2"	14 5/8"	3'-0"	2 1/2"			#9
W10x26	62-63 foot pounds										6"	3"	6 1/2"	3 1/2"	1 5/8"	13/16"	1 5/16"	1/2"	3/4"	4.47	2 1/4"	13 3/8"	1 1/2"	14 7/8"	3'-0"	2 1/2"			#10
W12x26											6"	3"	6 1/2"	3 1/2"	1 5/8"	13/16"	1 5/16"	1/2"	3/4"	4.47	2 1/4"	15"		16 3/4"	3'-0"	2 1/2"			#11
S3x5.7	1/2" φ × 2 1/2"	See Detail Below										3 3/4"	1 1/2"	2 5/8"	1 1/2"	5/8"	9/16"	3/8"	1/4"	1/2"	0.60	1 1/2"	See Detail Below			3'-3 1/2"	3 1/2"	12"	Non-reinforced
S4x7.7	440-450 inch pounds	See Detail Below										3 3/4"	1 1/2"	2 5/8"	1 1/2"	5/8"	9/16"	3/8"	1/4"	1/2"	0.60	1 1/2"	See Detail Below			3'-3 1/2"	3 1/2"	12"	Non-reinforced

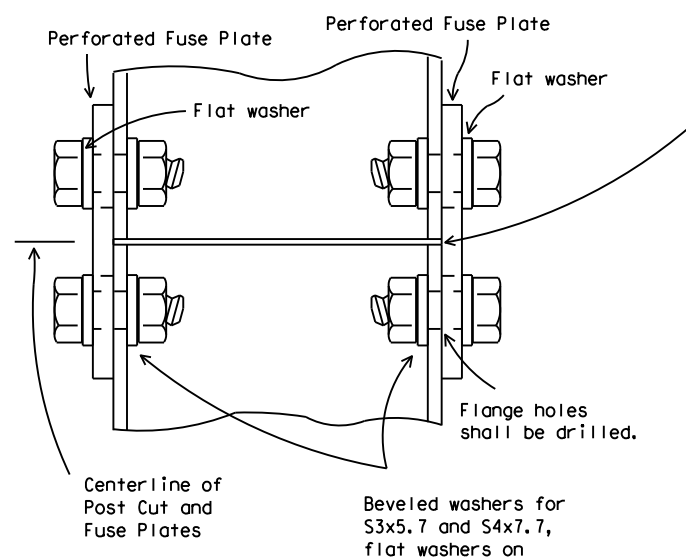
③ Foundation design shall be Type G Mount, see SMD (TY G).



ELEVATION



SIGN POST AND STUB POST  
(For S4x7.7 and S3x5.7)



DETAIL "A"

Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

PERFORATED FUSE PLATE DETAIL

Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.

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 Traffic Operations Division

**SIGN MOUNTING DETAILS-  
 LARGE ROADSIDE SIGNS  
 FOUNDATION & STUB**

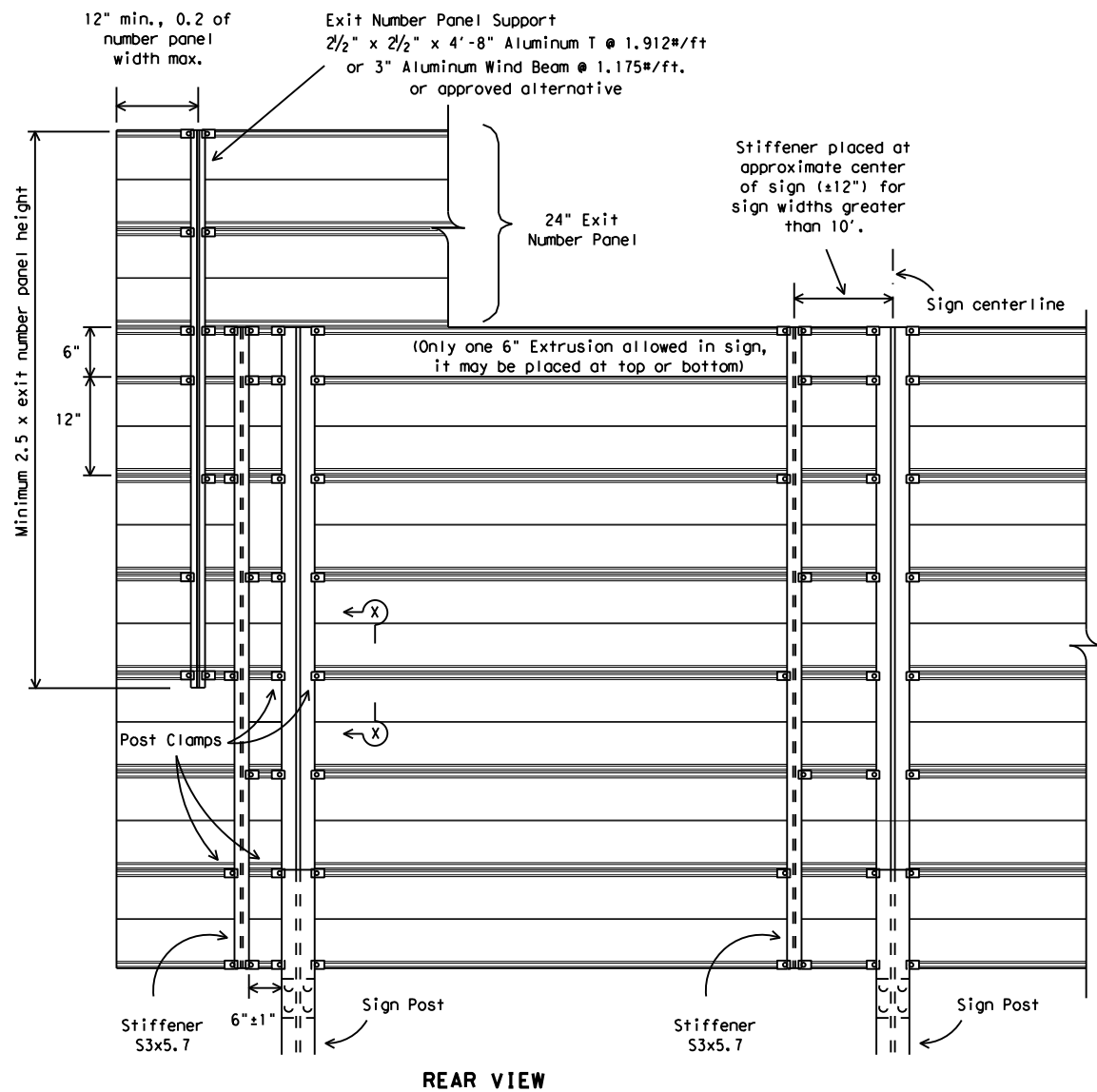
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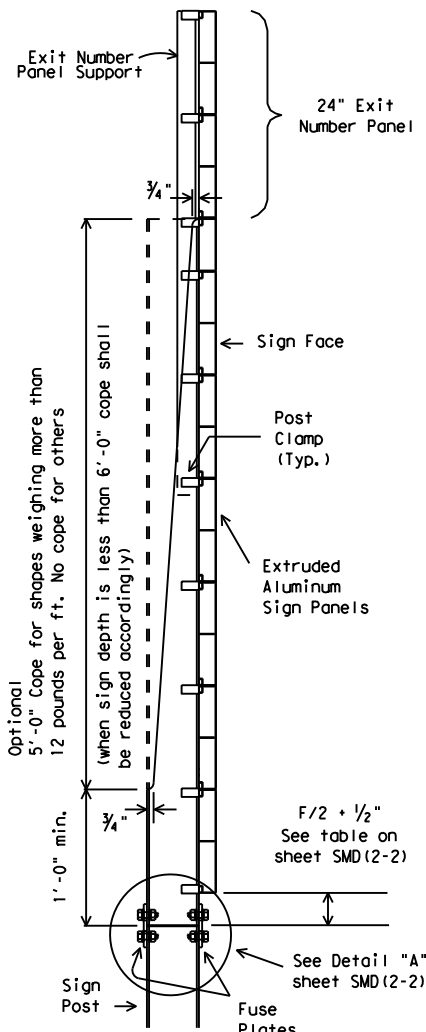
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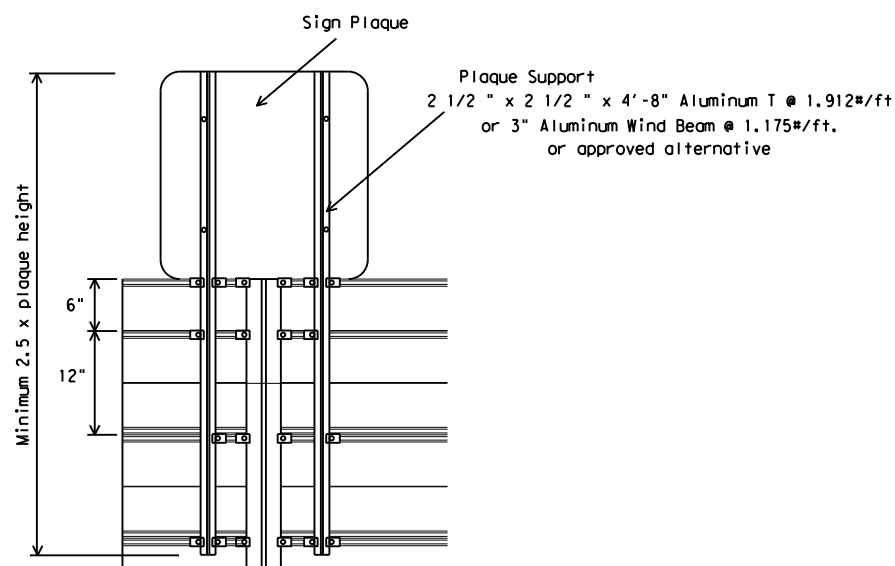


REAR VIEW

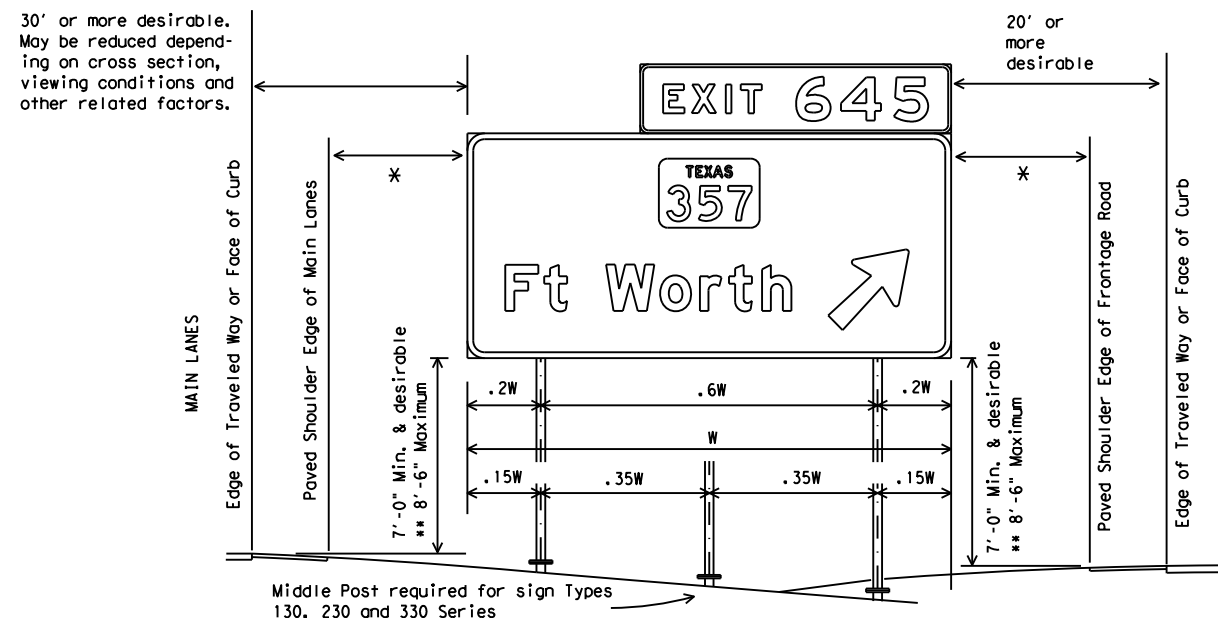
ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIDE VIEW



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

\* - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

\*\* The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

- Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
- Exit number panel support shall be symmetrical about number panel centerline.
- Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
- All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
- Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
- Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
- Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
- For fiberglass sign installation details, see manufacturer's recommendations.



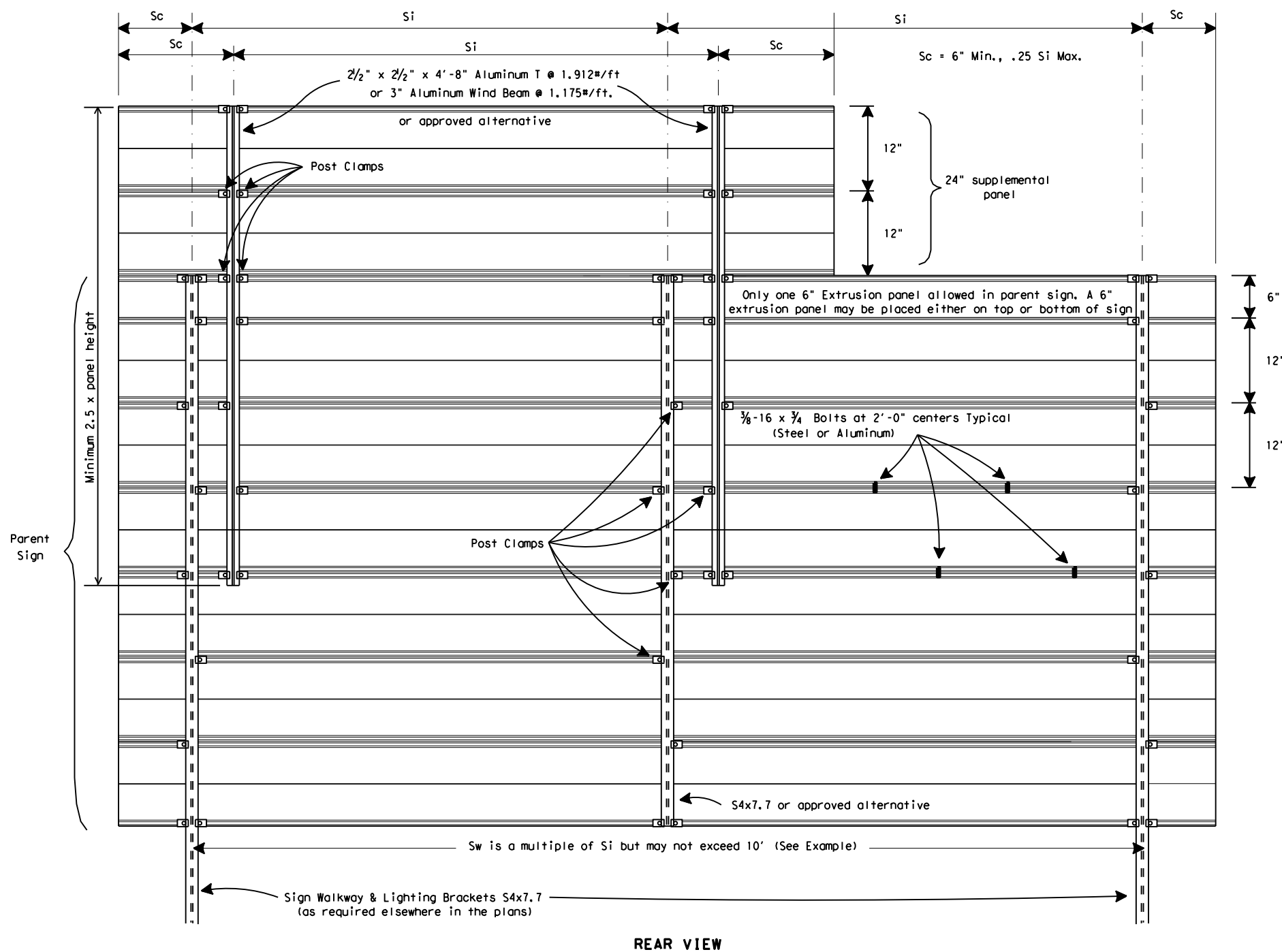
SIGN MOUNTING DETAILS-  
LARGE ROADSIDE SIGNS

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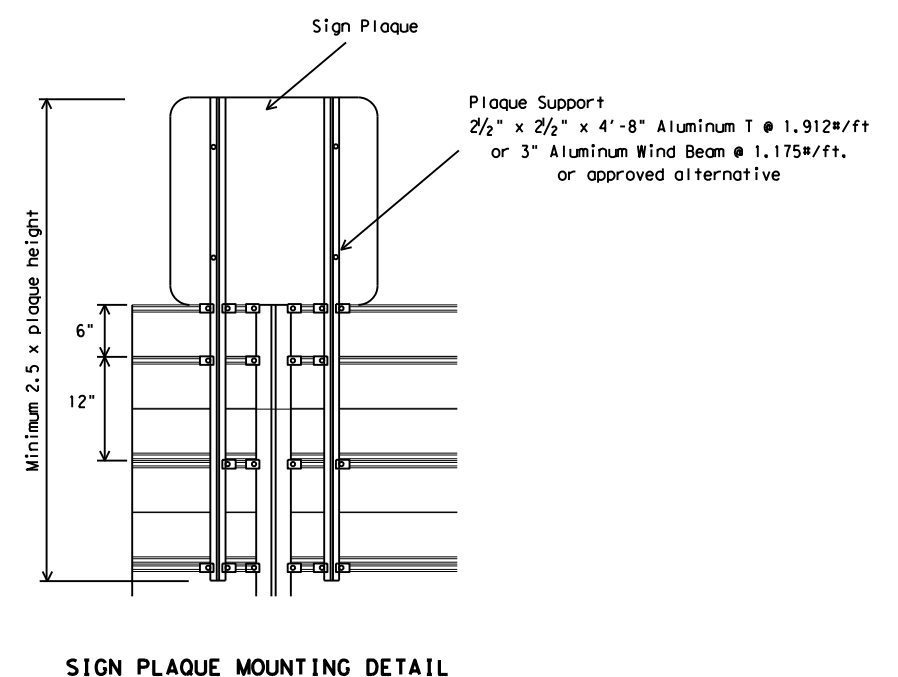
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EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si (Max.) or 10 feet.



"d" Deepest Sign in Group (Ft.)	MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)																			
	EXTRUDED ALUMINUM SIGN PANELS																			
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS											
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS							
WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE	WIND ZONE				
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10				
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10				
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10				
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10				
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10				

For fiberglass sign installations, see manufacturer's recommendations.

**Texas Department of Transportation**  
 Traffic Operations Division

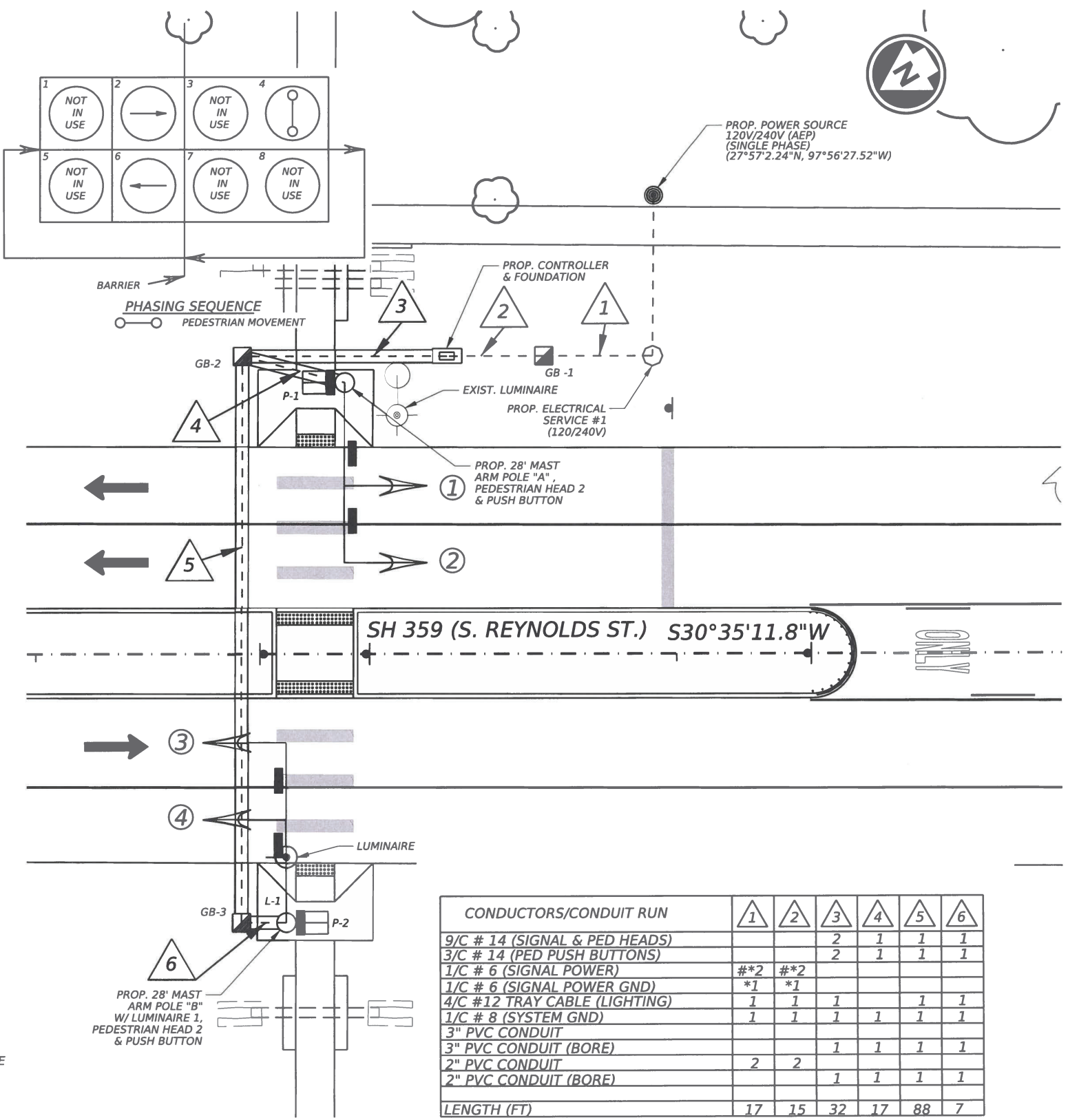
**SIGN MOUNTING DETAILS-  
 OVERHEAD SIGNS  
 EXTRUDED ALUMINUM  
 SMD(2-4)-08**

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DATE: 4/7/2024 8:24:19 PM  
 FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/16 - CRP/Design Projects/008702059/4 - Design/Plan Set/B - Traffic/SH359 HAWK SIGNAL CONDUIT & CONDUCTOR LAYOUT

**NOTES:**

- THE CONTRACTOR SHALL FURNISH & INSTALL A NEW TRAFFIC ACTUATED CONTROLLER, TRAFFIC SIGNAL POLES & FOUNDATIONS, NEW LED TRAFFIC SIGNAL HEADS, NEW CONDUIT, CABLES, SIGNS, GROUND BOXES, & CONTROLLER FOUNDATION.
- THE LOCATION SHOWN FOR THE CONDUIT RUNS, GROUND BOXES, UTILITIES, UNDERGROUND & ABOVE GROUND SIGNAL RELATED ITEMS ARE APPROXIMATE & SUBJECT TO CHANGE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
- VERIFY ALL UTILITY LOCATIONS BEFORE CONSTRUCTION.
- CONTRACTOR SHALL DETERMINE DRILL SHAFT LOCATIONS. TRAFFIC ENGINEER OR FIELD ENGINEER WILL VERIFY PRIOR TO PLACEMENT.
- CONTRACTOR SHALL CONNECT FIELD WIRING ON CONTROLLER.
- COIL 5 FT CONDUCTOR INSIDE THE SIGNAL HEADS, GROUND BOXES, POLE BASE, CONTROLLER AS PER ITEM 684 SPECIFICATION, ADDITIONAL CABLE IS SUBSIDIARY TO ITEM 684. ADDITIONAL 5 FT COIL HAS BEEN ADDED TO QUANTITY SHEET.
- COIL 5 FT OF TRAY CABLE INSIDE GROUND BOXES, POLE BASE, ADDITIONAL CABLE IS SUBSIDIARY TO ITEM 621.
- SIGNAL HEAD SHALL HAVE MINIMUM CLEARANCE OF 19 FEET ABOVE THE ROADWAY SURFACE.
- TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
- ANGLE OF LUMINAIRES ARE SHOWN AS APPROXIMATIONS ONLY. ORIENT THEM AS DIRECTED BY THE ENGINEER. LUMINAIRES TO BE DIRECTED PERPENDICULAR TO ROADWAY.
- CONTRACTOR SHALL FURNISH & DELIVER TS2 TYPE2 CONTROLLER CABINET & ASSEMBLY TO TXDOT SIGNAL SHOP FOR PROGRAMMING & TESTING FOR TWO WEEKS IN ADVANCE PRIOR TO CONTRACTOR INSTALLING EQUIPMENT IN THE FIELD. COORDINATE DROP OFF & PICKUP WITH CARLOS CARILLO AT 361-946-5079.
- ALL TRAFFIC SIGNAL HEADS SHALL HAVE REFLECTIVE VENTED BACKPLATES ALONG WITH ARTICULATED MOUNTING BRACKETS
- CONTACT AEP & ENGINEER IN THE FIELD FOR THE COORDINATION & PLACEMENT OF ELECTRICAL SERVICES PRIOR TO CONSTRUCTION. DO NOT REMOVE OR INSTALL TRAFFIC SIGNALS UNTIL COORDINATION HAS BEEN DISCUSSED.
- CONTRACTOR MUST HAVE A REPRESENTATIVE ON-CALL WITH AN AVAILABILITY OF 24 HOURS IN ORDER TO ADDRESS ANY ISSUES THAT MAY ARISE DURING CONSTRUCTION & GIVE CONTACT INFORMATION TO THE TRAFFIC ENGINEER OR ENGINEER IN THE FIELD.
- STRIPING IN CONDUIT & CONDUCTOR LAYOUT SHEET ARE IN SEPERATE SHEETS ON THE PLAN SET.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE CONNECTION OF THE ELECTRICAL SERVICE WITH TXDOT REPRESENTATIVE JOE TELLEZ. CONTACT HIM EITHER BY EMAIL (Joe.Tellez@txdot.gov) OR PHONE (512-568-8432).



**LEGEND**

- - PROP. ELECTRICAL SERVICE
- - PROP. SIGNAL HEAD
- - PROP. GROUND BOX (TY D) W/ APRON
- - - - - PROP. PVC CONDUIT
- ▬▬▬▬ - PROP. PVC CONDUIT (BORE)
- ⊙ - PROP. LUMINAIRE 250 W EQ. LED (MOUNTED TO SIGNAL POLE)
- ▭ - PROP. PEDESTRIAN HEAD
- ▬ - PROPOSED SIGN TO BE MOUNTED ON MAST ARM OR POLE
- ▭ - PROP. CONTROLLER CABINET
- ↔ - DIRECTION OF TRAFFIC
- ① - SIGNAL HEAD ID
- L-1 - LUMINAIRE ID
- △ - CONDUIT RUN ID
- P-1 - PEDESTRIAN HEAD ID
- GB-1 - GROUND BOX ID
- ⚡ - PROP. GROUND MOUNTED SIGN

CONDUCTORS/CONDUIT RUN	1	2	3	4	5	6
9/C # 14 (SIGNAL & PED HEADS)			2	1	1	1
3/C # 14 (PED PUSH BUTTONS)			2	1	1	1
1/C # 6 (SIGNAL POWER)	#*2	#*2				
1/C # 6 (SIGNAL POWER GND)	*1	*1				
4/C #12 TRAY CABLE (LIGHTING)	1	1	1		1	1
1/C # 8 (SYSTEM GND)	1	1	1	1	1	1
3" PVC CONDUIT						
3" PVC CONDUIT (BORE)			1	1	1	1
2" PVC CONDUIT	2	2				
2" PVC CONDUIT (BORE)			1	1	1	1
LENGTH (FT)	17	15	32	17	88	7

# ONE CONDUCTOR IS A NEUTRAL CONDUCTOR  
 \* INSTALL SIGNAL POWER CONDUCTORS IN 2" CONDUIT

TRAFFIC SIGNAL POLES				
POLE NUMBER	QUANTITY	SIGNAL POLE DESIGNATION	FOUNDATION TYPE	FOUNDATION DEPTH
A	1	28-100	36-A	13.2'
B	1	28L-100	36-A	13.2'

CABLING IN POLES & MAST ARMS	PED BUTTON		PED HEADS		VEHICULAR HEADS				ILLUMINATION
	P-1	P-2	P-1	P-2	1	2	3	4	L-1
9/C # 14 (SIGNAL & PED HEADS)(FT)			10	10	34	46	46	34	
3/C # 14 (PED PUSH BUTTONS)(FT)	5	5							
4/C #12 TRAY CABLE (LIGHTING)(FT)									45



*Jorge A. Perez*  
 04/01/2024

**SH 359**  
**HAWK SIGNAL CONDUIT & CONDUCTOR LAYOUT**

© TxDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		80

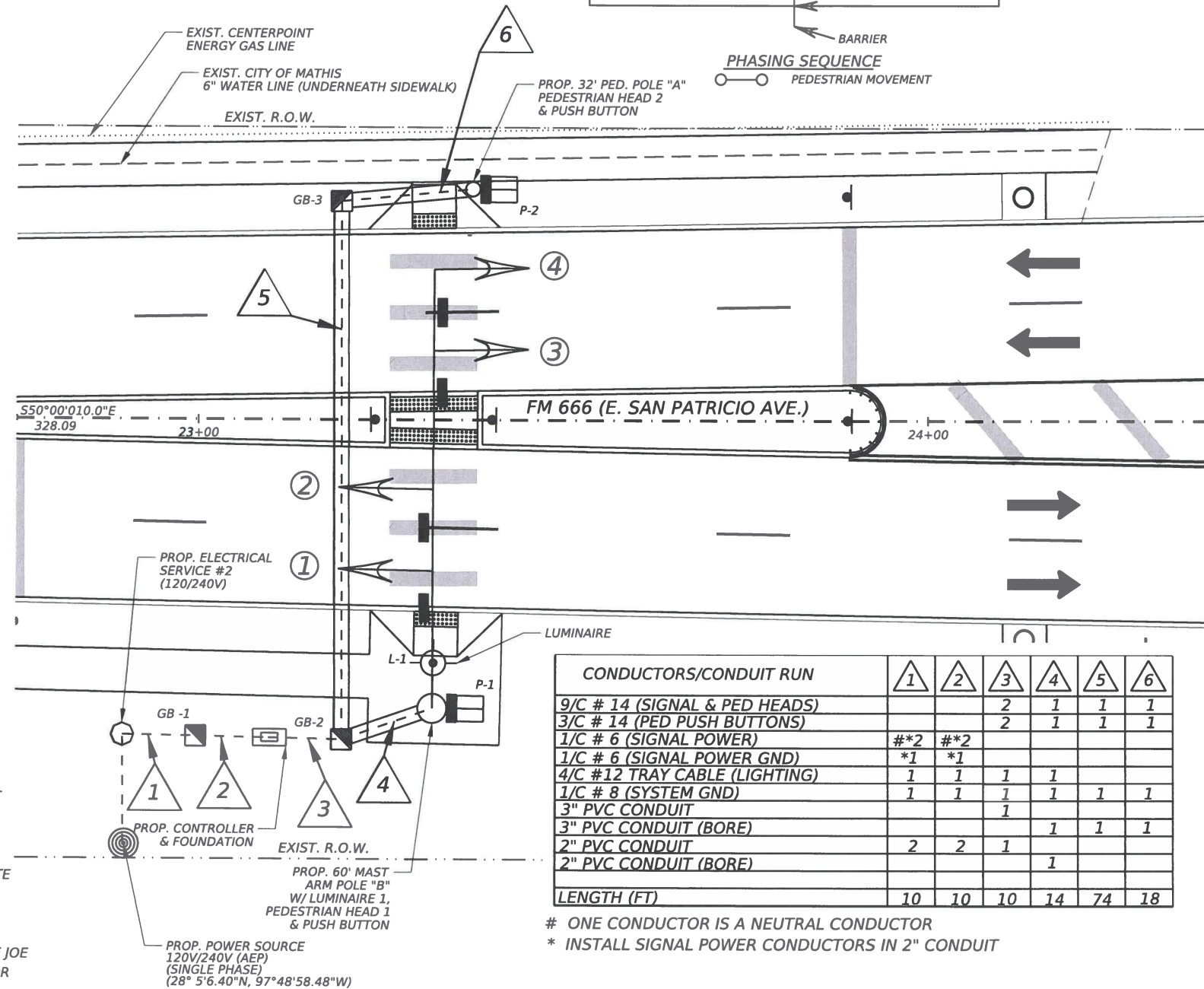


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**NOTES:**

- THE CONTRACTOR SHALL FURNISH & INSTALL A NEW TRAFFIC ACTUATED CONTROLLER, TRAFFIC SIGNAL POLES & FOUNDATIONS, NEW LED TRAFFIC SIGNAL HEADS, NEW CONDUIT, CABLES, SIGNS, GROUND BOXES, & CONTROLLER FOUNDATION.
- THE LOCATION SHOWN FOR THE CONDUIT RUNS, GROUND BOXES, UTILITIES, UNDERGROUND & ABOVE GROUND SIGNAL RELATED ITEMS ARE APPROXIMATE & SUBJECT TO CHANGE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
- VERIFY ALL UTILITY LOCATIONS BEFORE CONSTRUCTION.
- CONTRACTOR SHALL DETERMINE DRILL SHAFT LOCATIONS. TRAFFIC ENGINEER OR FIELD ENGINEER WILL VERIFY PRIOR TO PLACEMENT.
- CONTRACTOR SHALL CONNECT FIELD WIRING ON CONTROLLER.
- COIL 5 FT CONDUCTOR INSIDE THE SIGNAL HEADS, GROUND BOXES, POLE BASE, CONTROLLER AS PER ITEM 684 SPECIFICATION, ADDITIONAL CABLE IS SUBSIDIARY TO ITEM 684. ADDITIONAL 5 FT COIL HAS BEEN ADDED TO QUANTITY SHEET.
- COIL 5 FT OF TRAY CABLE INSIDE GROUND BOXES, POLE BASE, ADDITIONAL CABLE IS SUBSIDIARY TO ITEM 621.
- SIGNAL HEAD SHALL HAVE MINIMUM CLEARANCE OF 19 FEET ABOVE THE ROADWAY SURFACE.
- TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
- ANGLE OF LUMINAIRES ARE SHOWN AS APPROXIMATIONS ONLY. ORIENT THEM AS DIRECTED BY THE ENGINEER. LUMINAIRES TO BE DIRECTED PERPENDICULAR TO ROADWAY.
- CONTRACTOR SHALL FURNISH & DELIVER TS2 TYPE2 CONTROLLER CABINET & ASSEMBLY TO TXDOT SIGNAL SHOP FOR PROGRAMMING & TESTING FOR TWO WEEKS IN ADVANCE PRIOR TO CONTRACTOR INSTALLING EQUIPMENT IN THE FIELD. COORDINATE DROP OFF & PICKUP WITH CARLOS CARILLO AT 361-946-5079.
- ALL TRAFFIC SIGNAL HEADS SHALL HAVE REFLECTIVE VENTED BACKPLATES ALONG WITH ARTICULATED MOUNTING BRACKETS
- CONTACT AEP & ENGINEER IN THE FIELD FOR THE COORDINATION & PLACEMENT OF ELECTRICAL SERVICES PRIOR TO CONSTRUCTION. DO NOT REMOVE OR INSTALL TRAFFIC SIGNALS UNTIL COORDINATION HAS BEEN DISCUSSED.
- CONTRACTOR MUST HAVE A REPRESENTATIVE ON-CALL WITH AN AVAILABILITY OF 24 HOURS IN ORDER TO ADDRESS ANY ISSUES THAT MAY ARISE DURING CONSTRUCTION & GIVE CONTACT INFORMATION TO THE TRAFFIC ENGINEER OR ENGINEER IN THE FIELD.
- STRIPING IN CONDUIT & CONDUCTOR LAYOUT SHEET ARE IN SEPERATE SHEETS ON THE PLAN SET.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE CONNECTION OF ELECTRICAL SERVICE WITH TXDOT REPRESENTATIVE JOE TELLEZ. CONTACT HIM EITHER BY EMAIL (JOE.TELLEZ@TXDOT.GOV) OR BY PHONE (512-568-8432).

# PIRATE STADIUM PARKING LOT



**LEGEND**

- PROP. ELECTRICAL SERVICE
- PROP. SIGNAL HEAD
- PROP. GROUND BOX (TY D) W/ APRON
- PROP. PVC CONDUIT
- PROP. PVC CONDUIT (BORE)
- PROP. LUMINAIRE 250 W EQ. LED (MOUNTED TO SIGNAL POLE)
- PROP. PEDESTRIAN HEAD
- PROPOSED SIGN TO BE MOUNTED ON MAST ARM OR POLE
- PROP. CONTROLLER CABINET
- DIRECTION OF TRAFFIC
- SIGNAL HEAD ID
- LUMINAIRE ID
- CONDUIT RUN ID
- PEDESTRIAN HEAD ID
- GROUND BOX ID

CONDUCTORS/CONDUIT RUN	1	2	3	4	5	6
9/C # 14 (SIGNAL & PED HEADS)			2	1	1	1
3/C # 14 (PED PUSH BUTTONS)			2	1	1	1
1/C # 6 (SIGNAL POWER)	#*2	#*2				
1/C # 6 (SIGNAL POWER GND)	*1	*1				
4/C #12 TRAY CABLE (LIGHTING)	1	1	1	1		
1/C # 8 (SYSTEM GND)	1	1	1	1	1	1
3" PVC CONDUIT			1			
3" PVC CONDUIT (BORE)				1	1	1
2" PVC CONDUIT	2	2	1			
2" PVC CONDUIT (BORE)				1		
<b>LENGTH (FT)</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>14</b>	<b>74</b>	<b>18</b>

# ONE CONDUCTOR IS A NEUTRAL CONDUCTOR  
 \* INSTALL SIGNAL POWER CONDUCTORS IN 2" CONDUIT

TRAFFIC SIGNAL POLES				
POLE NUMBER	QUANTITY	SIGNAL POLE DESIGNATION	FOUNDATION TYPE	FOUNDATION DEPTH
A	1	PED. POLE	24-A	5.7'
B	1	60L	48-A	21.9'

CABLING IN POLES & MAST ARMS	PED BUTTON		PED HEADS		VEHICULAR HEADS				ILLUMINATION
	P-1	P-2	P-1	P-2	1	2	3	4	L-1
9/C # 14 (SIGNAL & PED HEADS)(FT)			10	10	39	50	68	79	
3/C # 14 (PED PUSH BUTTONS)(FT)	5	5							
4/C #12 TRAY CABLE (LIGHTING)(FT)									45



*Jorge A. Perez*  
 04/07/2024

**Texas Department of Transportation**

**FM 666**

**HAWK SIGNAL CONDUIT & CONDUCTOR LAYOUT**

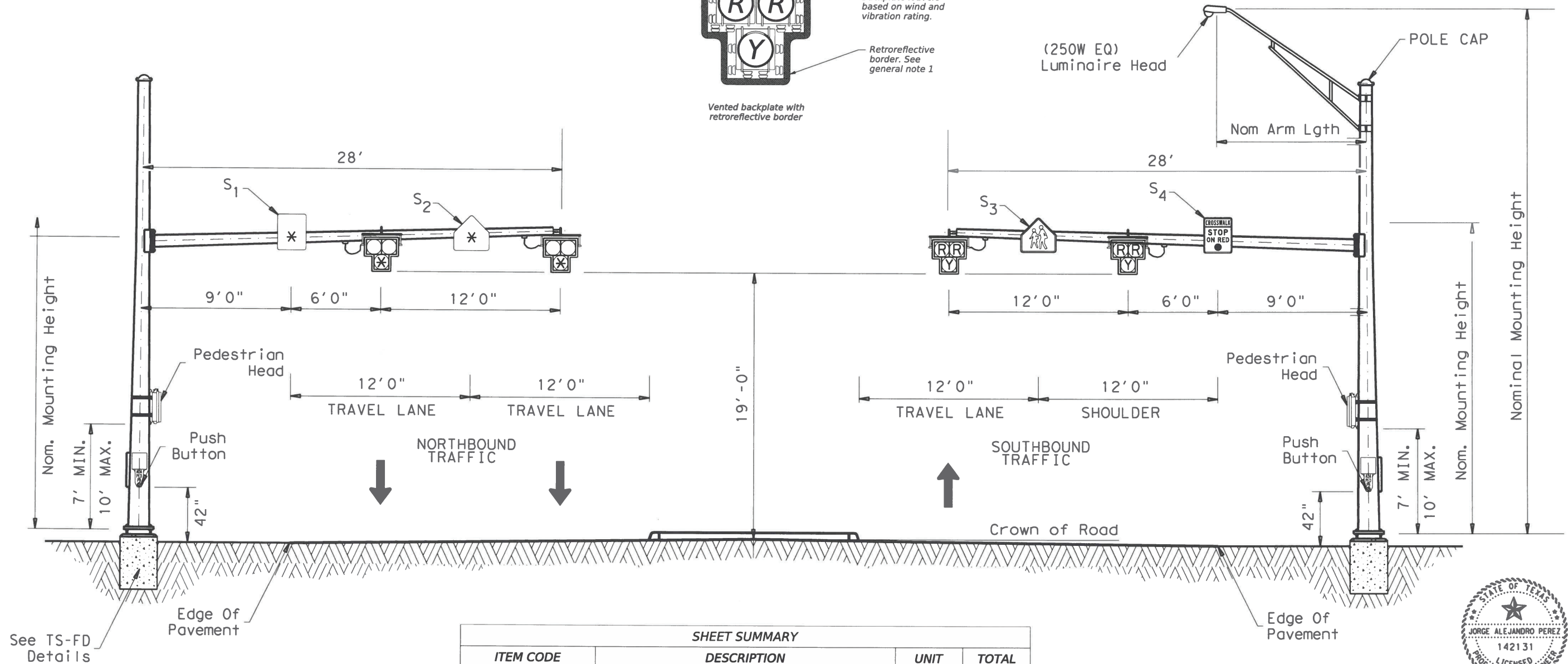
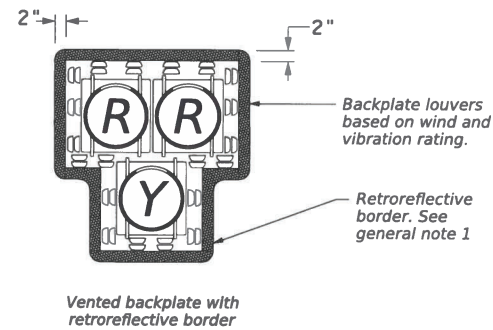
©TxDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		81

# POLE A - NORTHBOUND SH 359 28' MAST ARM

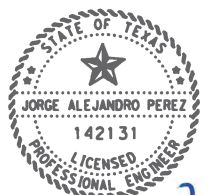
# POLE B - SOUTHBOUND SH 359 28' MAST ARM

## PEDESTRIAN HYBRID BEACON



### SHEET SUMMARY

ITEM CODE	DESCRIPTION	UNIT	TOTAL
416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	28
624 6010	GROUND BOX TY D (162922)W/APRON	EA	3
628 6143	ELC SRV TY D 120/240 060(NS)SS(E)GC(U)	EA	1
680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
682 6003	VEH SIG SEC (12")LED(YEL)	EA	4
682 6005	VEH SIG SEC (12")LED(RED)	EA	8
682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	2
682 6033	BACK PLATE (12")(1 SEC)(VENTED)ALUM	EA	12
686 6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	1
686 6031	INS TRF SIG PL AM(S)1 ARM(28')LUM	EA	1
688 6001	PED DETECT PUSH BUTTON (APS)	EA	2
688 6003	PED DETECTOR CONTROLLER UNIT	EA	2
6367 6002	INSTALLATION OF CELLULAR MODEM	EA	1



*Jorge A. Perez*  
01/01/2024

### SH 359 PEDESTRIAN HYBRID BEACON DETAIL & SIGNAL TABLES

NOT TO SCALE

SHEET 1 OF 1



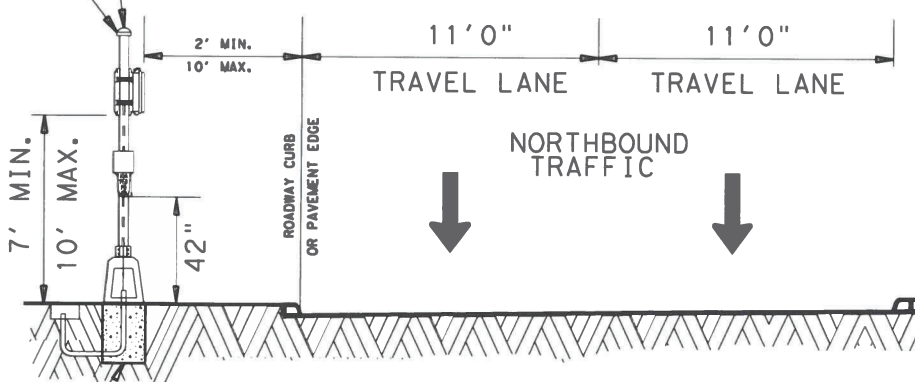
CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.	82	



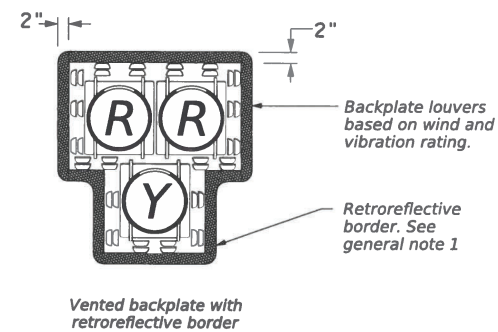
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POLE A  
 NORTHBOUND FM 666  
 PEDESTAL POLE

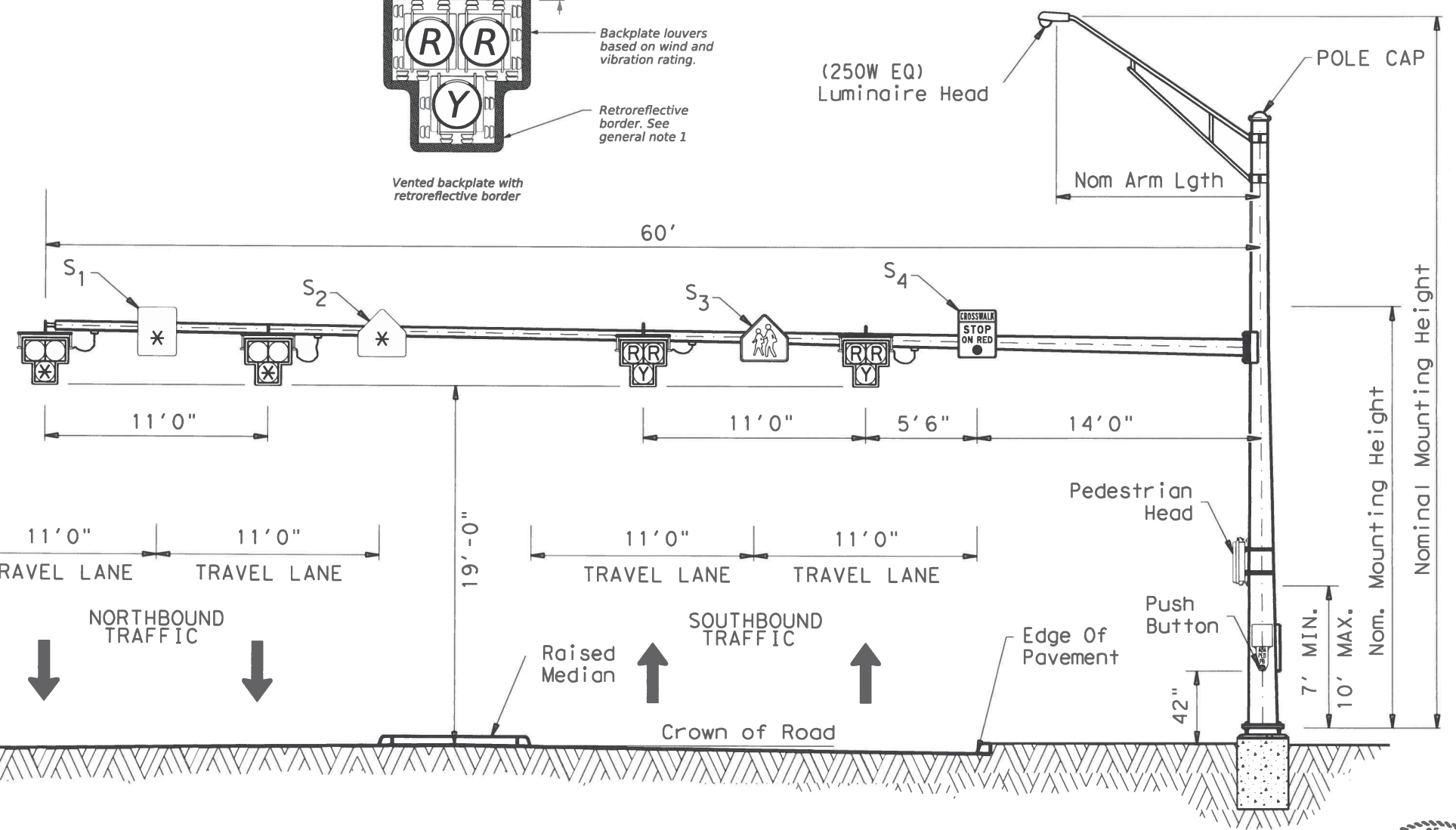
POLE CAP  
 7' MIN.  
 10' MAX.  
 42"  
 ROADWAY CURB  
 OR PAVEMENT EDGE  
 See TS-FD  
 Details



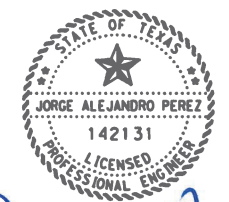
PEDESTRIAN HYBRID BEACON



POLE B - SOUTHBOUND FM 666  
 60' MAST ARM



SHEET SUMMARY				
ITEM CODE		DESCRIPTION	UNIT	TOTAL
416	6030	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF	6
416	6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	22
624	6010	GROUND BOX TY D (162922)W/APRON	EA	3
628	6143	ELC SRV TY D 120/240 060(NS)SS(E)GC(U)	EA	1
680	6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
682	6003	VEH SIG SEC (12")LED(YEL)	EA	4
682	6005	VEH SIG SEC (12")LED(RED)	EA	8
682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA	2
682	6033	BACK PLATE (12")(1 SEC)(VENTED)ALUM	EA	12
686	6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA	1
687	6001	PED POLE ASSEMBLY	EA	1
688	6001	PED DETECT PUSH BUTTON (APS)	EA	2
688	6003	PED DETECTOR CONTROLLER UNIT	EA	2
6367	6002	INSTALLATION OF CELLULAR MODEM	EA	1



*Jorge A. Perez*  
 2011072024

FM 666  
 PEDESTRIAN HYBRID  
 BEACON DETAIL &  
 SIGNAL TABLES

NOT TO SCALE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY		SHEET NO.
CRP	JIM WELLS, ETC.		83

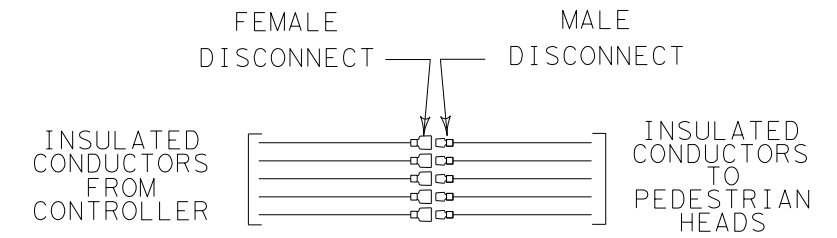


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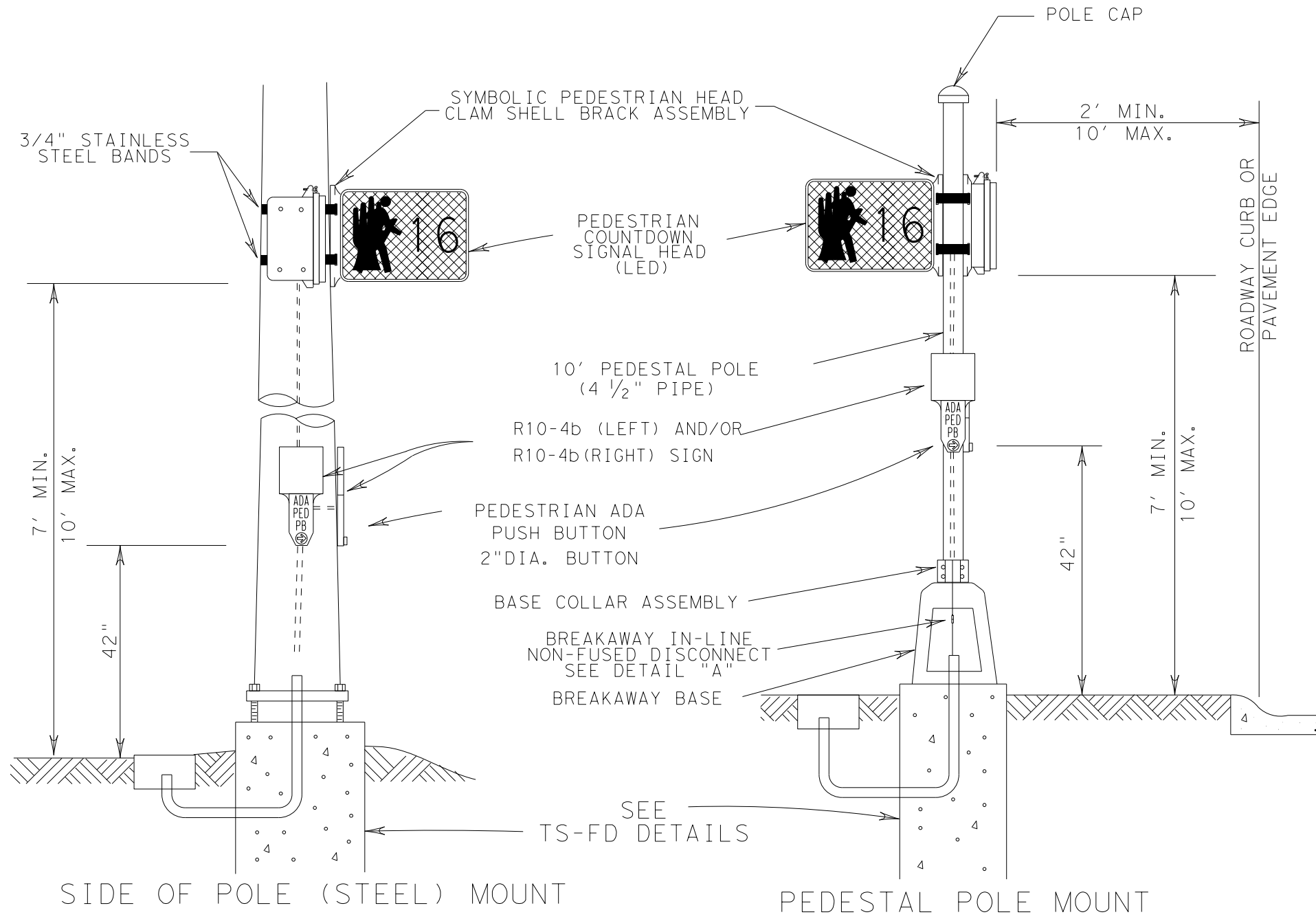
SEE INTERSECTION PLAN VIEW & MATERIALS LIST FOR NUMBER & LOCATION OF PEDESTRIAN SIGNALS AND ADA PUSH BUTTONS.

THE CONTRACTOR SHALL MOUNT THE PEDESTRIAN HEADS AT A UNIFORM HEIGHT FOR EACH INTERSECTION.

PROVIDE NON-FUSED WATERTIGHT BREAKAWAY ELECTRICAL CONNECTORS FOR BREAKAWAY POLES.



BREAKAWAY IN-LINE  
NON-FUSED DISCONNECT  
DETAIL "A"



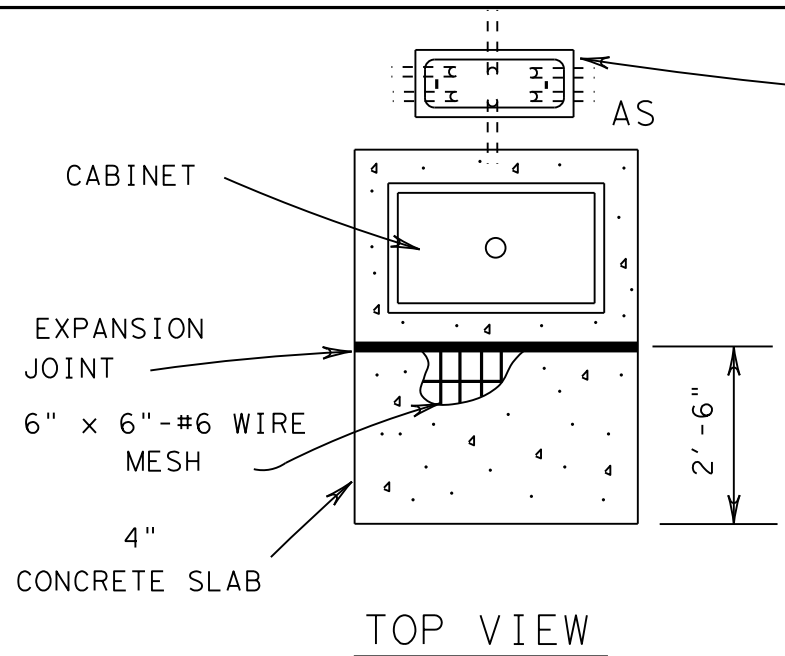
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REV. 6-14-01 JAS  
REV. 8-15-00 JAS  
REV. 4-07-07 DCT  
REV. 4-05-18 JAP

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**PEDESTRIAN SIGNAL  
DETAILS  
CORPUS CHRISTI DIST. STANDARD**

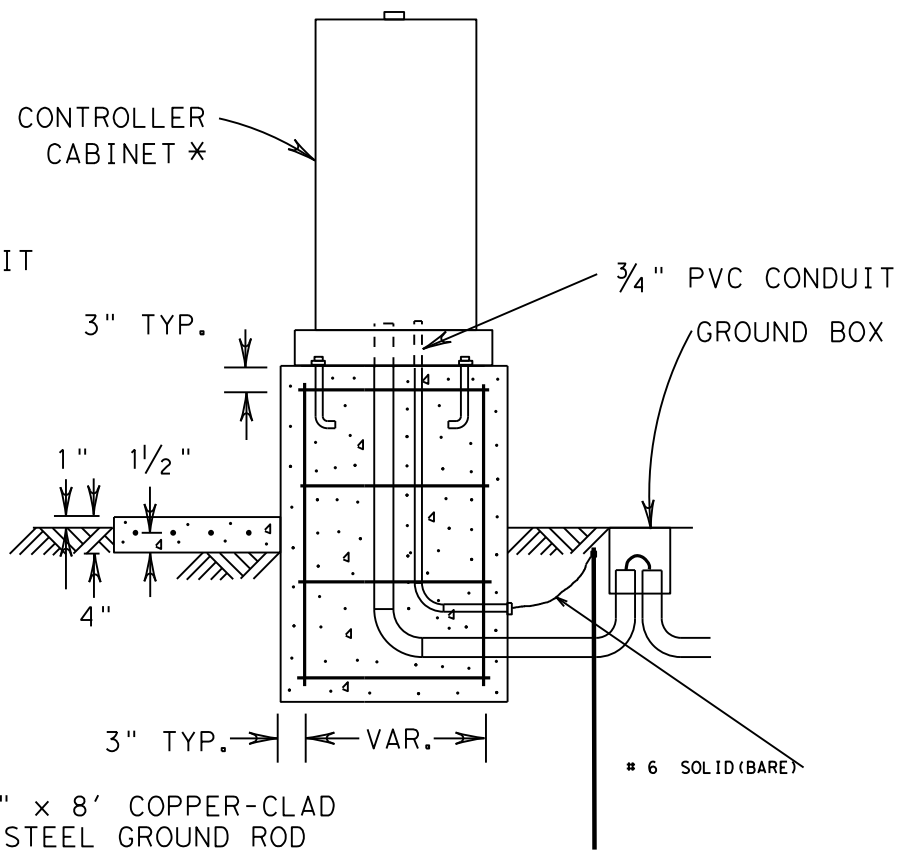
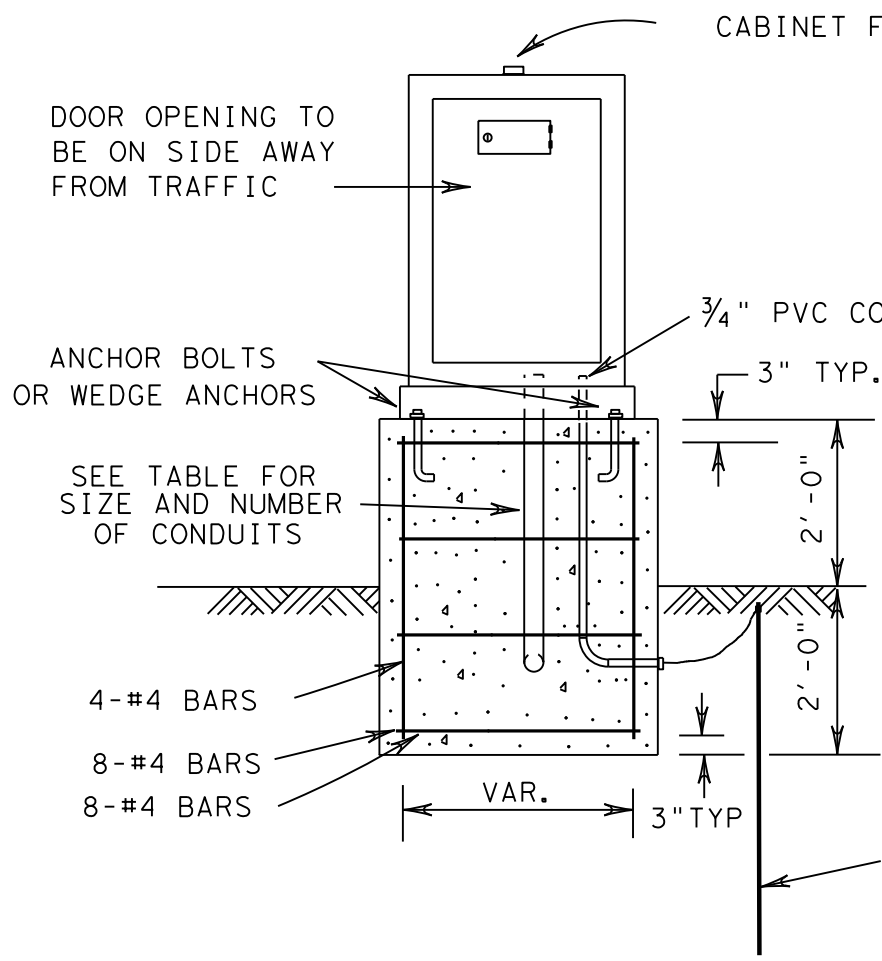
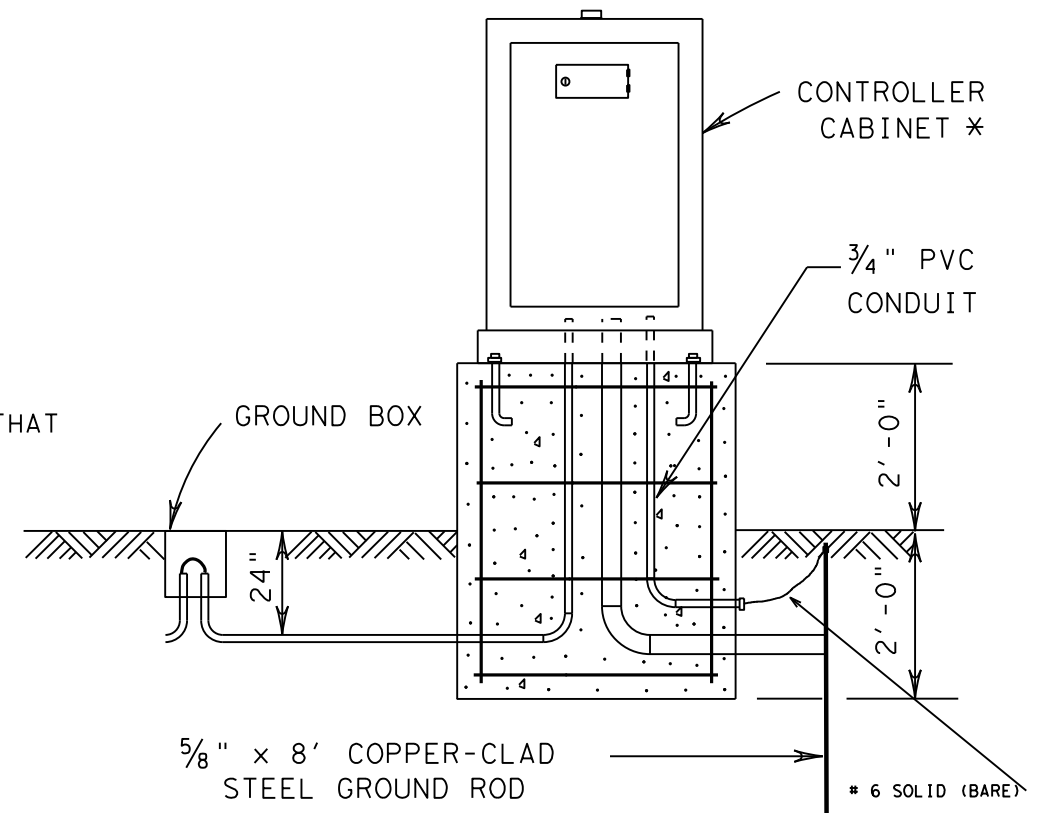
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			<b>84</b>
STATE	DISTRICT	COUNTY	
TEXAS	CRP	JIM WELLS, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NUMBER
0087	02	059, ETC.	SH 359, ETC.



GROUND BOX (SEE PLAN LAYOUT FOR NUMBER AND LOCATION)

**NOTES:**

- 1 THE CONTROLLER CABINET SHALL BE SEALED BETWEEN CABINET AND FOUNDATION WITH A SILICONE SEALING COMPOUND AS APPROVED BY THE ENGINEER. THE SEALING COMPOUND USED SHALL HAVE A MELTING POINT OF NOT LESS THAN TWO HUNDRED (200) DEGREES FAHRENHEIT, AND SHALL NOT BE ADVERSELY AFFECTED BY THE SURROUNDING ATMOSPHERE OR MOISTURE.
- 2 CONDUIT TERMINATING IN THE CONTROLLER FOUNDATION SHALL EXTEND VERTICALLY APPROXIMATELY 2 INCHES ABOVE THE FOUNDATION.
- 3 AFTER ALL WIRING IS COMPLETE, CONDUIT TERMINATING IN THE CONTROLLER SHALL BE SEALED WITH A SEALANT TO BE MADE OF A POLYURETHANE OR EQUIVALENT MATERIAL COMPOSITION THAT WILL CURE IN THE PRESENCE OF MOISTURE.
- 4 FINAL PLACEMENT OF GROUND ROD TO BE APPROVED BY ENGINEER.

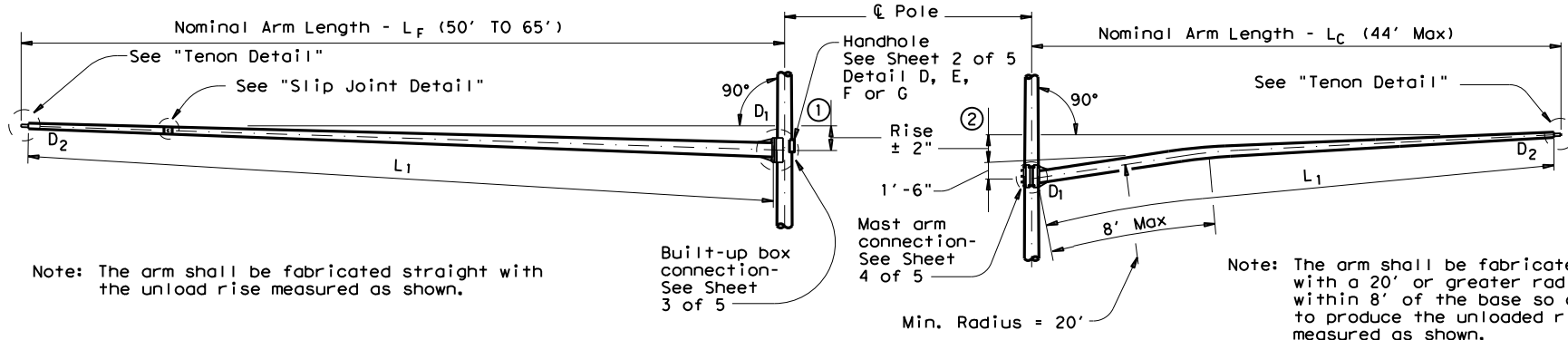


ALL CONCRETE FOR CONTROLLER FOUNDATIONS SHALL BE CLASS A. CONTROLLER FOUNDATIONS SHALL BE POURED IN PLACE. PRECAST FOUNDATIONS WILL NOT BE PERMITTED.

CONTEND. DGN  
11231415167181910

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<b>CONTROLLER FOUNDATION DETAILS CORPUS CHRISTI DIST. STANDARD</b>			
FED. RD. DIV. NO.	STATE PROJECT NO.		SHEET NUMBER
6			85
STATE	DISTRICT	COUNTY	
TEXAS	CRP	JIM WELLS, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NUMBER
0087	02	059, ETC.	SH 359, ETC.

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act"; No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the consequences or damages resulting from its use.

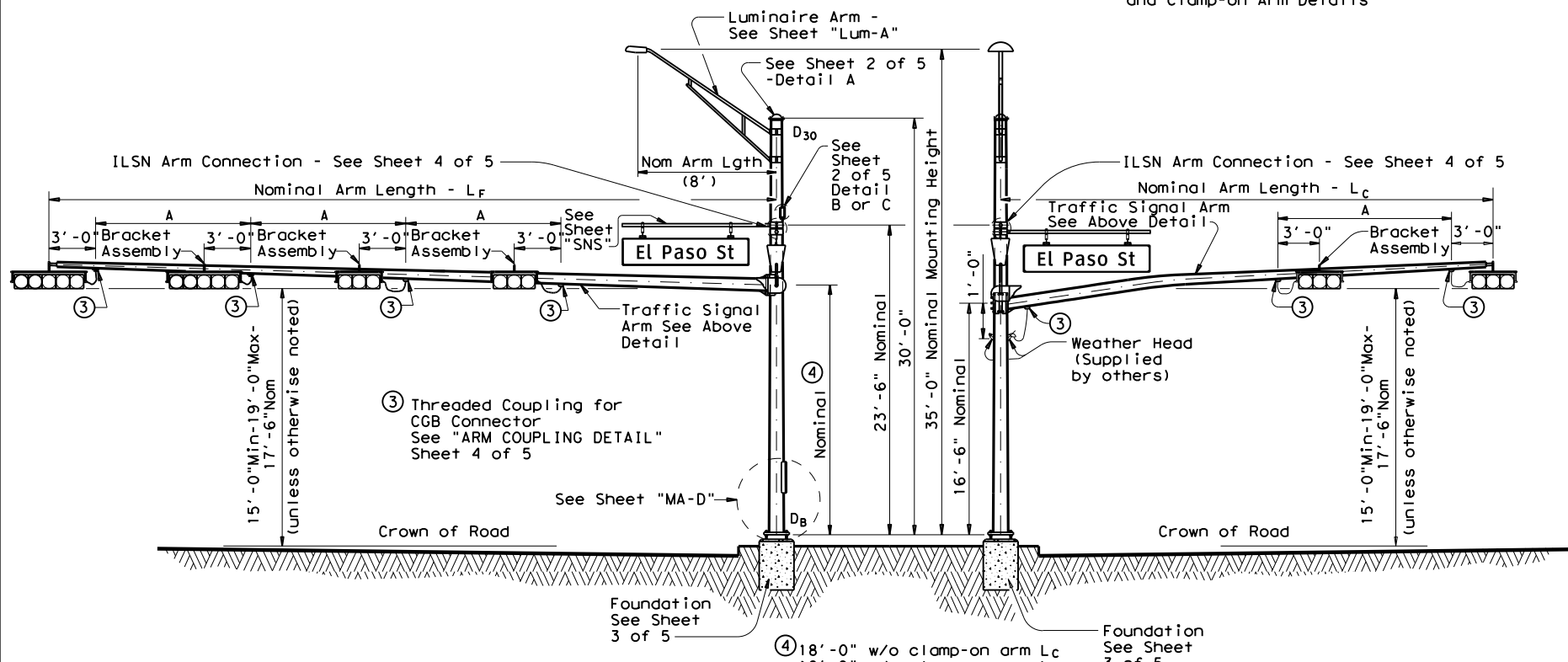


**CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)**

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details

**FIXED MOUNT TRAFFIC SIGNAL ARM**

① See Sheet 3 of 5 for Arm Rise



**ELEVATION**

(Showing fixed mount arm)

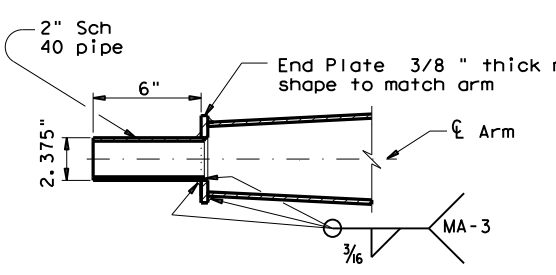
**STRUCTURE ASSEMBLY**

**ELEVATION**

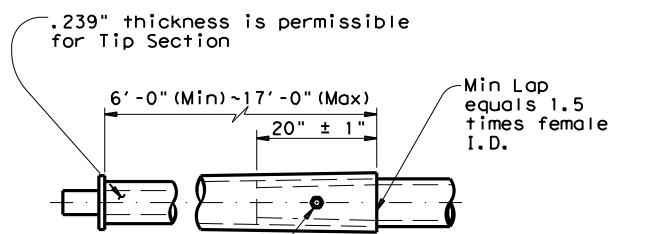
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



**TENON DETAIL**



**SLIP JOINT DETAIL (FIXED MOUNT ARM)**

**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 can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

- ⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.
- ⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole 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.

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. Material, fabrication tolerances, and shipping practices shall also 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.

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

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation  
Traffic Operations Division

**TRAFFIC SIGNAL SUPPORT STRUCTURES  
LONG MAST ARM ASSEMBLY  
(50 TO 65 FT)  
(80 AND 100 MPH WIND ZONE)  
LMA(1)-12**

Sheet 1 of 5

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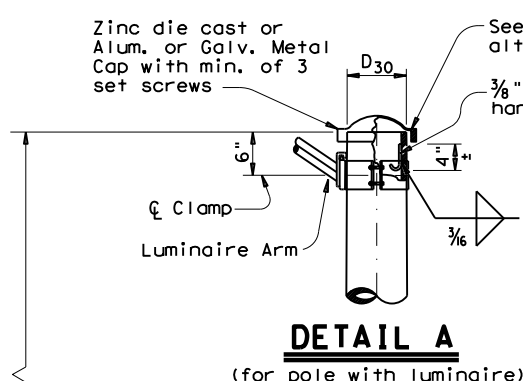
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0087 02 1-12	059, ETC.	SH	359, ETC.
DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.	86	



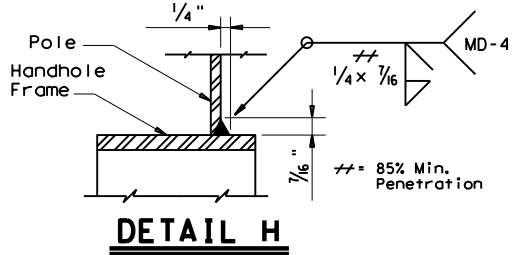
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MATERIALS	
Round Shafts or Polygonal Shafts ⑦	ASTM A595 Gr. A, A588, A1008 HSLAS Gr. 50 Class 2, A1011 HSLAS Gr. 50 Class 2, A572 Gr. 50 or A1011 SS Gr. 50 ⑧
Plates ⑦	ASTM A36, A588, or A572 Gr. 50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe ⑦	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

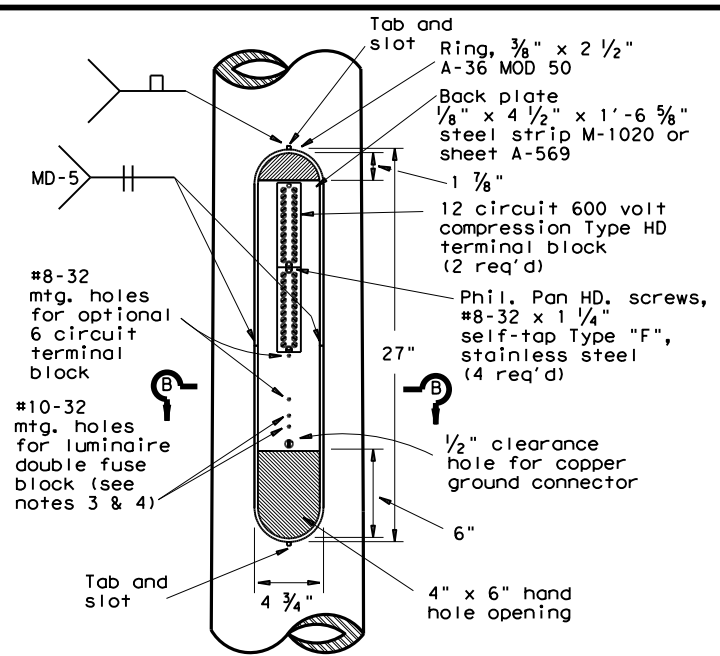
- ⑦ ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.
- ⑧ ASTM A1011 SS Gr. 50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness 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.



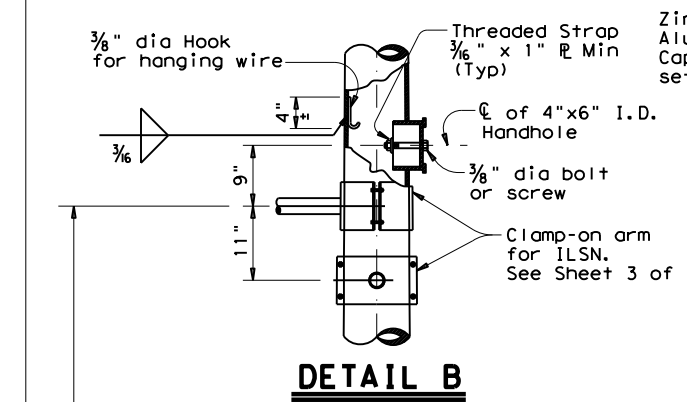
**DETAIL A**  
(for pole with luminaire)



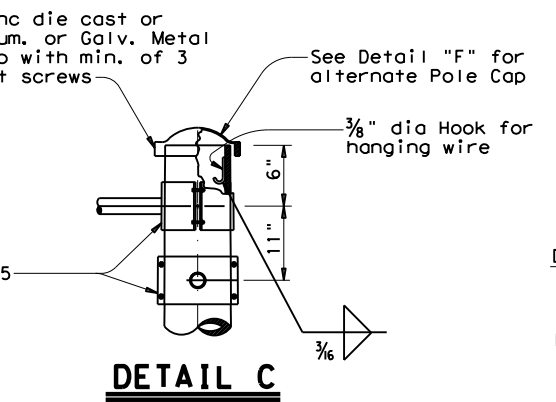
**DETAIL H**



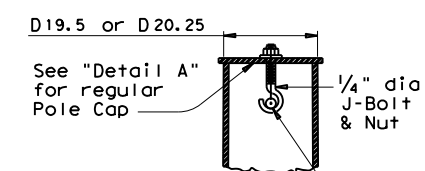
**ACCESS COMPARTMENT**



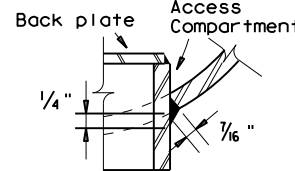
**DETAIL B**  
(If ILSN applied)



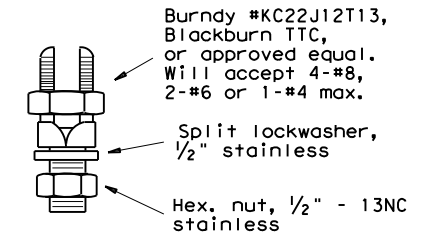
**DETAIL C**



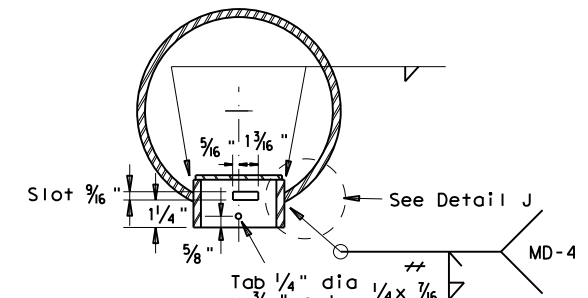
**SECTION Y-Y**



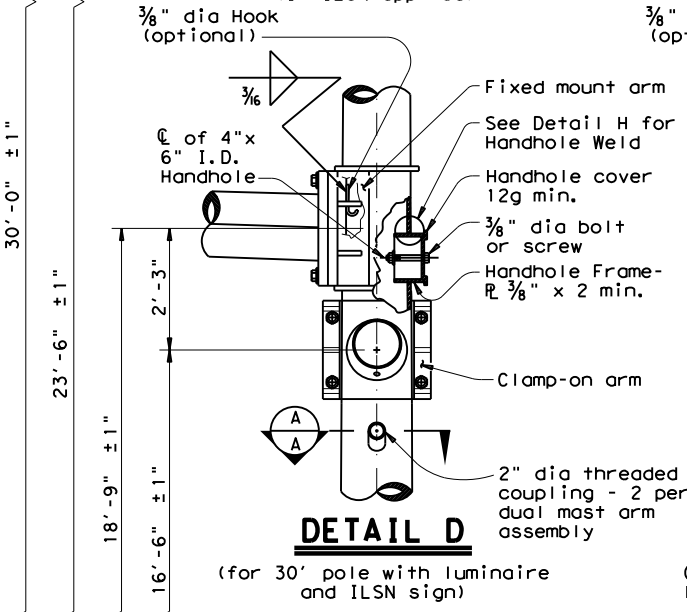
**DETAIL J**



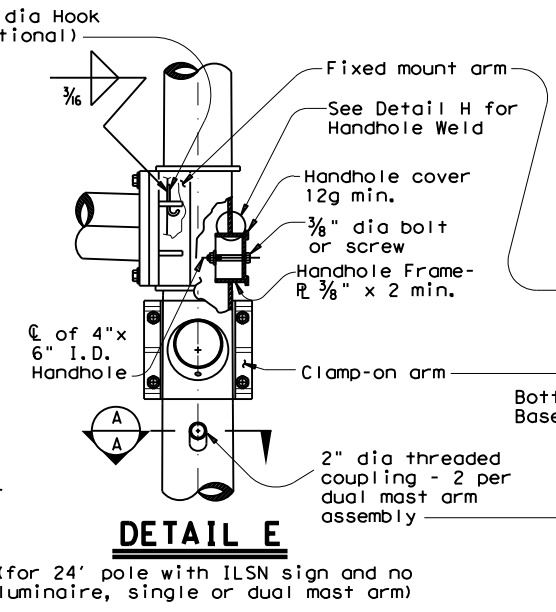
**COPPER GROUND CONNECTOR**



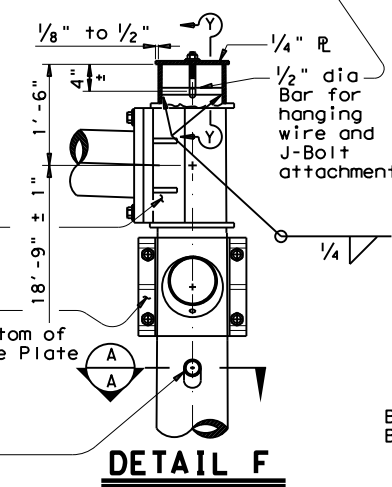
**SECTION B-B**



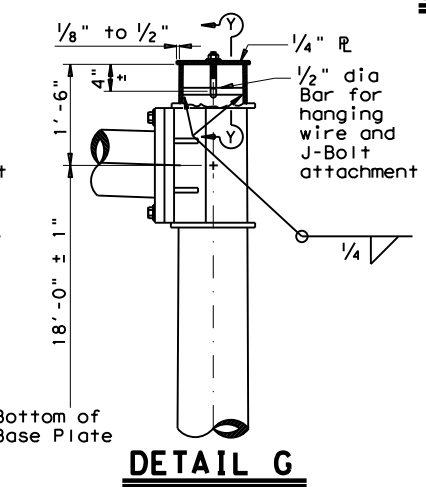
**DETAIL D**  
(for 30' pole with luminaire and ILSN sign)



**DETAIL E**  
(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)

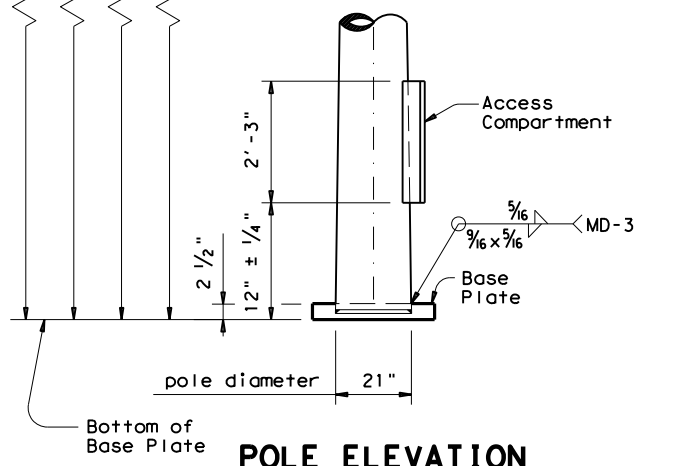


**DETAIL F**  
(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)

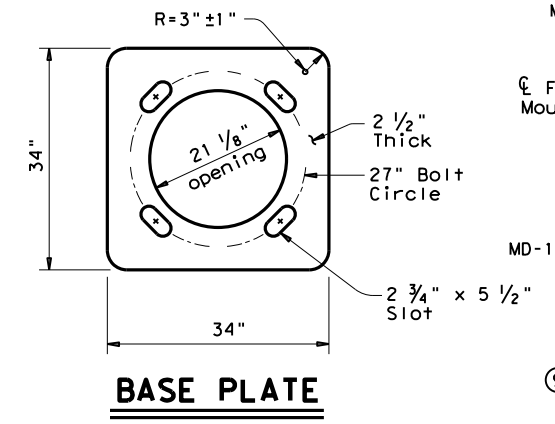


**DETAIL G**  
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

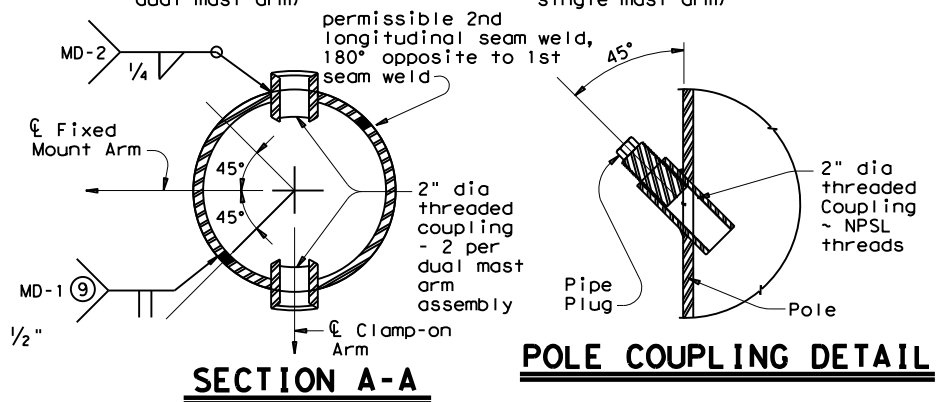
- ACCESS COMPARTMENT NOTES:**
- The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
  - 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.
  - 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.
  - Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



**POLE ELEVATION**



**BASE PLATE**



**SECTION A-A**

**POLE COUPLING DETAIL**

- ⑨ Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

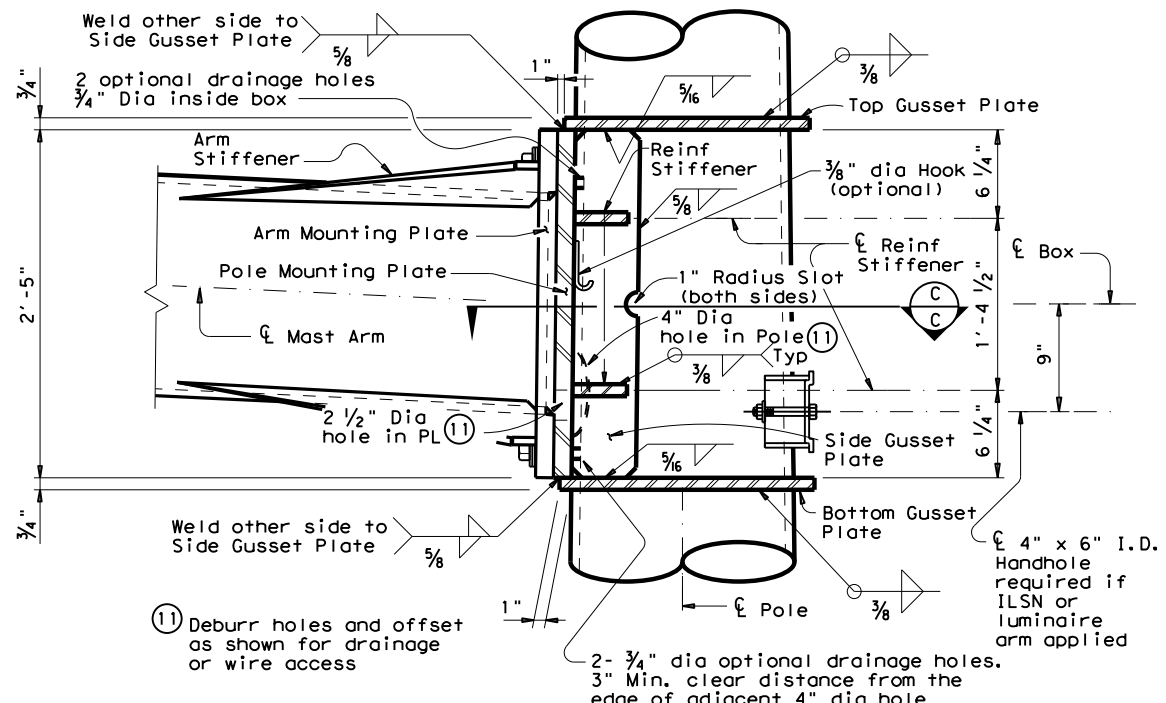
**Texas Department of Transportation**  
 Traffic Operations Division  
**TRAFFIC SIGNAL SUPPORT STRUCTURES**  
**LONG MAST ARM ASSEMBLY**  
 (50 TO 65 FT)  
 (80 AND 100 MPH WIND ZONE)  
**LMA(2)-12**

Sheet 2 of 5

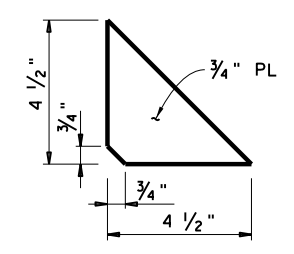
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		DIST	COUNTY	SHEET NO.	
		CRP	JIM WELLS, ETC.	<b>87</b>	

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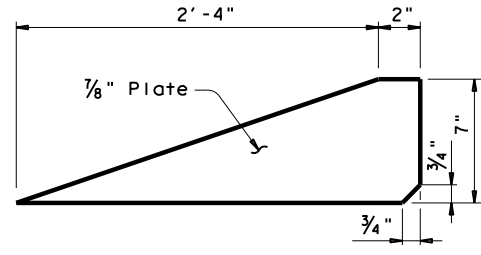
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**BUILT-UP BOX CONNECTION**



**REINFORCING STIFFENER**



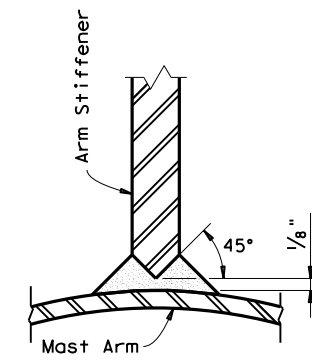
**ARM STIFFENER**

(Cut to match arm inclination and taper)

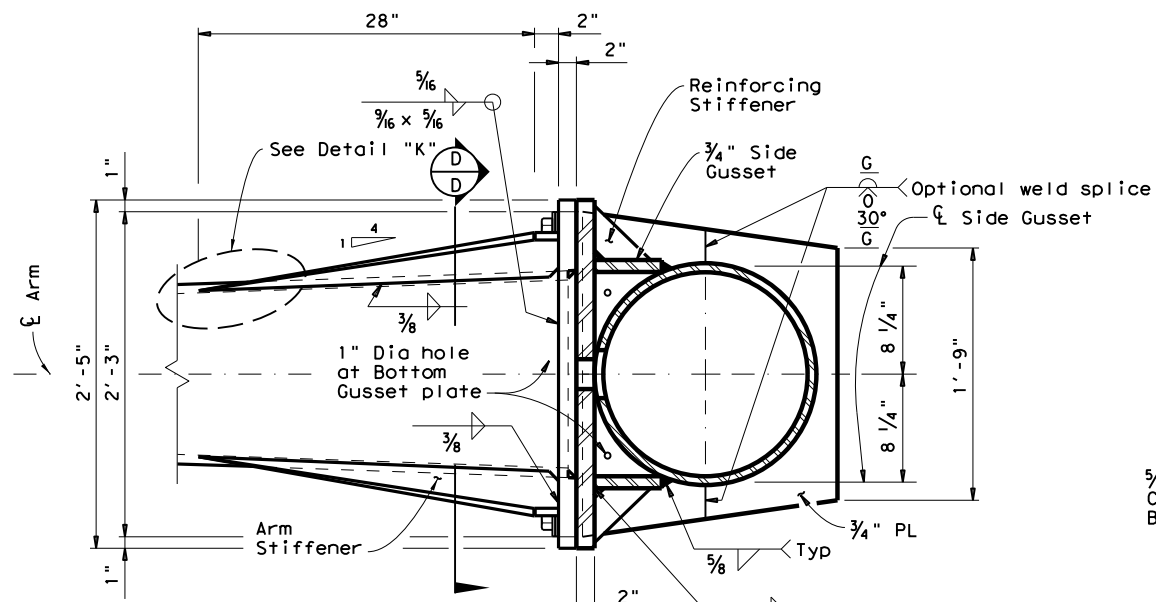
Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.

Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

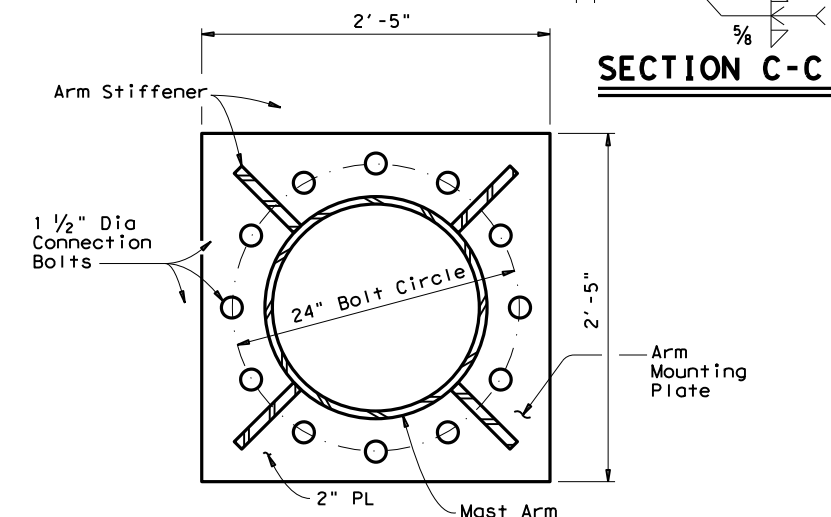
**DETAIL "K"**



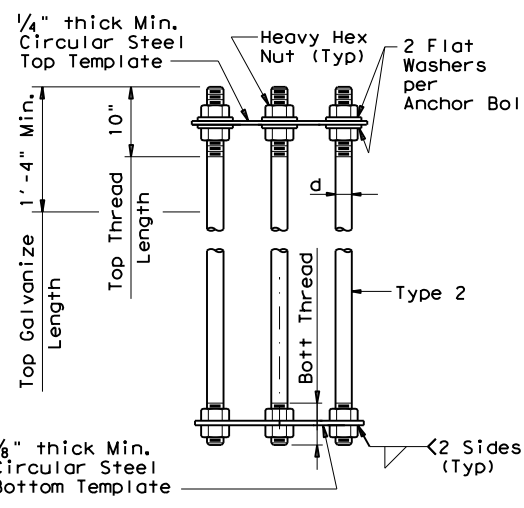
**SECTION F-F**



**SECTION C-C**



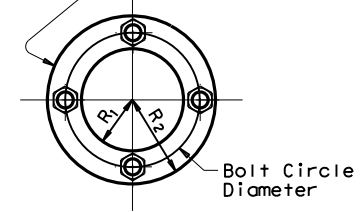
**SECTION D-D**



**NUT ANCHOR (TYPE 2)**

**ANCHOR BOLT ASSEMBLY**

Steel Template with holes 1/16" greater than bolt diameter



**TEMPLATE DETAIL**

Fixed Mount Arm L <sub>F</sub>	ROUND POLES (13)					Foundation Type
	D <sub>B</sub>	D <sub>19.5</sub>	D <sub>20.25</sub>	D <sub>24</sub>	D <sub>30</sub>	
ft.	in.	in.	in.	in.	(12)thk in.	
50', 55', 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L <sub>F</sub>	ROUND ARMS (13)				
	L <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	(12)thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'- 11"
65	64	18.5	9.6	.3125	4'- 4"

- D<sub>B</sub> = Pole Base O.D.
- D<sub>19.5</sub> = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
- D<sub>20.25</sub> = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
- D<sub>24</sub> = Pole Top O.D. with ILSN w/out Luminaire
- D<sub>30</sub> = Pole Top O.D. with Luminaire
- D<sub>1</sub> = Arm Base O.D.
- D<sub>2</sub> = Arm End O.D.
- L<sub>1</sub> = Shaft Length
- L<sub>F</sub> = Fixed Arm Length

- (12) Thickness shown is minimum, thicker materials may be used.
- (13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.

**GENERAL NOTES:**

Built-up Box Connection: For the welded arm-to-pole connection as a built-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length #	Top Thread	Bottom Thread	Bolt Circle	R <sub>2</sub>	R <sub>1</sub>
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

\*Min dimension given, longer bolts are acceptable.

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)			FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION	
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	F <sub>y</sub> (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft		SHEAR Kips
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

- (14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- (15) Foundation Design Loads are the allowable moments and shears at the base of the structure.
- (16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- (17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- (18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Texas Department of Transportation  
 Traffic Operations Division

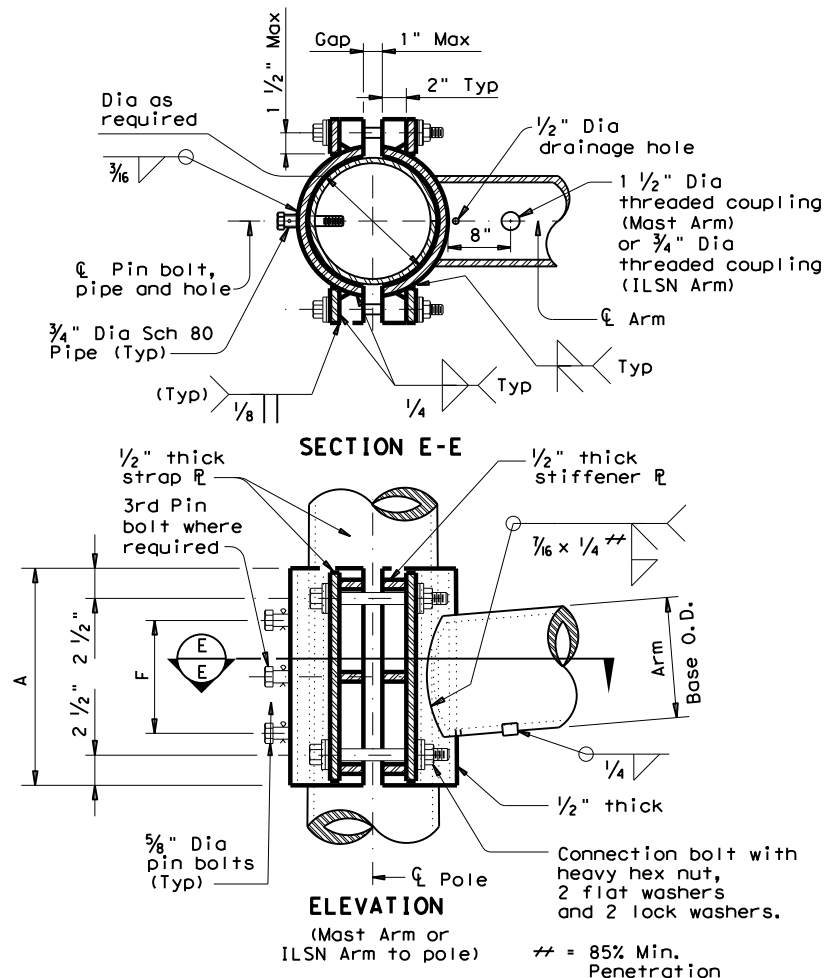
**TRAFFIC SIGNAL SUPPORT STRUCTURES LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)**

Sheet 3 of 5 **LMA (3)-12**

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**CLAMP-ON CONNECTION**

80 MPH WIND										
Clamp-on Arm LC	ROUND ARMS					POLYGONAL ARMS				
	L <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	thk (12)	Rise	L <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	thk (12)	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"

100 MPH WIND										
Clamp-on Arm LC	ROUND ARMS					POLYGONAL ARMS				
	L <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	thk (12)	Rise	L <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D<sub>1</sub> = Arm Base O.D.  
 D<sub>2</sub> = Arm End O.D.  
 L<sub>1</sub> = Shaft Length  
 LC = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

CLAMP-ON ARM CONNECTION					
ILSN Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Sch 40 pipe Dia	Thick				
in.	in.	in.	in.	in.	ea
3	.216	10	4	3/4	2

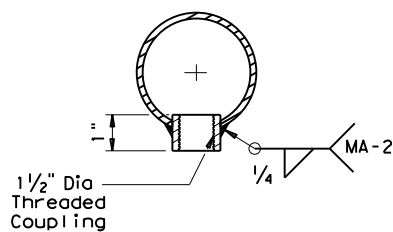
Mast Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Base Dia	Thick				
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 1/4	3
9.5	.239	18	12	1 1/4	3
10.0	.239	18	12	1 1/4	3
10.5	.239	18	12	1 1/4	3
11.0	.239	18	12	1 1/4	3
11.5	.239	18	12	1 1/4	3

**GENERAL NOTES:**

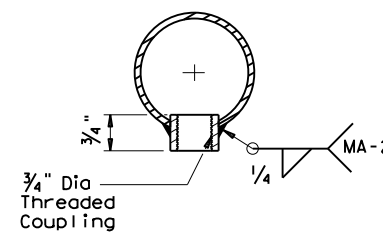
Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 1/2" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 1/2" diameter hole shall be cut in the front clamp plate for wire 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 part shall apply to all similar parts on the detail.

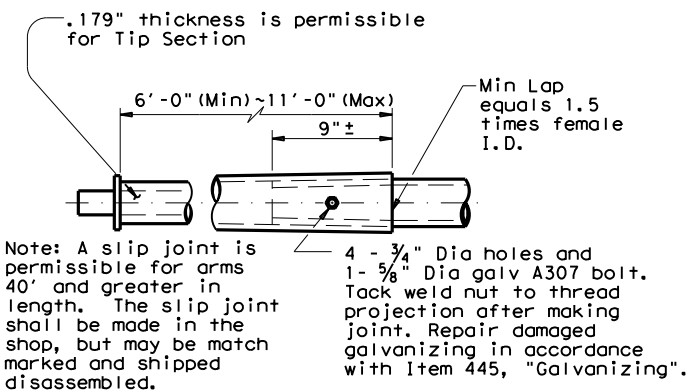
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and 3/4" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" diameter hole for each pin bolt. An 1/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



**ARM COUPLING DETAIL**



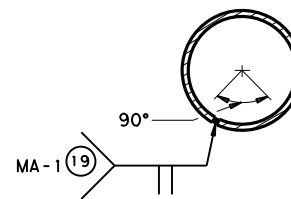
**ILSN ARM COUPLING DETAIL**



**SLIP JOINT DETAIL (CLAMP-ON ARM)**

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**



**ARM WELD DETAIL**

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm. 60% Min penetration. 100% penetration within 6" of circumferential base welds.

Texas Department of Transportation  
 Traffic Operations Division

**TRAFFIC SIGNAL SUPPORT STRUCTURES  
 LONG MAST ARM ASSEMBLY  
 (50 TO 65 FT)  
 (80 AND 100 MPH WIND ZONE)**

Sheet 4 of 5 **LMA(4)-12**

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	DIST	COUNTY	SHEET NO.	
	CRP	JIM WELLS, ETC.	89	



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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		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm)		Poles with no Luminaire and no ILSN See note above
	See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		See note above plus one small hand hole				
Single Mast Arm							
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity	
50	50L		50S		50		
55	55L		55S		55		
60	60L		60S		60		
65	65L		65S		65		
Dual Mast Arm							
Lf ft.	Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	20	5020L		5020S		5020	
	24	5024L		5024S		5024	
	28	5028L		5028S		5028	
	32	5032L		5032S		5032	
	36	5036L		5036S		5036	
	40	5040L		5040S		5040	
55	20	5520L		5520S		5520	
	24	5524L		5524S		5524	
	28	5528L		5528S		5528	
	32	5532L		5532S		5532	
	36	5536L		5536S		5536	
	40	5540L		5540S		5540	
60	20	6020L		6020S		6020	
	24	6024L		6024S		6024	
	28	6028L		6028S		6028	
	32	6032L		6032S		6032	
	36	6036L		6036S		6036	
	40	6040L		6040S		6040	
65	20	6520L		6520S		6520	
	24	6524L		6524S		6524	
	28	6528L		6528S		6528	
	32	6532L		6532S		6532	
	36	6536L		6536S		6536	
	40	6540L		6540S		6540	
	44	6544L		6544S		6544	

Foundation Summary Table \*\*

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet)
			48-A
Total Drill Shaft Length			

Notes

\*\* Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.


\*\*\* Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Abbreviations

Lf= Fixed Arm Length

Lc= Clamp-on Arm Length (44' Max.)

Shipping Parts List								
Traffic Signal Arms (Fixed Mount) (1 per pole) Ship each arm with listed equipment attached								
Nominal Arm Length	Type IV Arm (4 Signals)			Luminaire Arms (1 per 30' pole)				
	3 Bracket Assembly and 4 CGB Connectors			Nominal Arm Length		Quantity		
ft.	Designation	Quantity	8' Arm					
50	50IV		ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers					
55	55IV		Nominal Arm Length		Quantity			
60	60IV		7' Arm					
65	65IV		9' Arm					
Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached								
Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)			
	2 CGB connector and 1 clamp w/bolts and washers		1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers			
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			
Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached								
Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)			
	2 CGB connector and 1 clamp w/bolts and washers		1 Bracket Assembly and 3 CGB connectors, and 1 clamp		2 Bracket Assembly and 4 CGB connectors, and 1 clamp			
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity		
20	20I-100							
24	24I-100		24II-100					
28	28I-100		28II-100					
32			32II-100		32III-100			
36			36II-100		36III-100			
40					40III-100			
44					44III-100			
Anchor Bolt Assemblies (1 per pole) 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". Templates may be removed for shipment.								
Anchor Bolt Diameter	Anchor Bolt Length	Quantity						
2 1/2 "	5' - 3"							



**LONG MAST  
ARM ASSEMBLY  
PARTS LIST**

**LMA (5) - 12**

Sheet 5 of 5

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DN: JK	CK: GRB	DW: FDN	CK: CAL
CONTRACT	SECTION	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.	90	

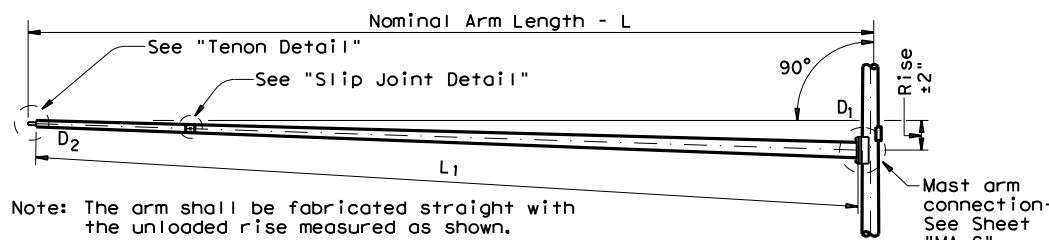
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Arm Length ft.	ROUND POLES					POLYGONAL POLES					Foundation Type
	D <sub>B</sub> in.	D <sub>19</sub> in.	D <sub>24</sub> in.	D <sub>30</sub> in.	① thk in.	D <sub>B</sub> in.	D <sub>19</sub> in.	D <sub>24</sub> in.	D <sub>30</sub> in.	① thk in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
32	13.0	10.3	9.6	8.8	.239	14.0	11.0	10.2	9.3	.239	36-A
36	13.5	10.8	10.1	9.3	.239	15.0	12.0	11.2	10.3	.239	36-A
40	14.0	11.3	10.6	9.8	.239	16.0	13.0	12.2	11.3	.239	36-B
44	14.5	11.8	11.1	10.3	.239	16.5	13.5	12.7	11.8	.239	36-B

Arm Length ft.	ROUND ARMS					POLYGONAL ARMS				
	L <sub>1</sub> ft.	D <sub>1</sub> in.	D <sub>2</sub> in.	① thk in.	Rise	L <sub>1</sub> ft.	D <sub>1</sub> in.	② D <sub>2</sub> in.	① thk in.	Rise
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D<sub>B</sub> = Pole Base O.D.  
D<sub>19</sub> = Pole Top O.D. with no Luminaire and no ILSN  
D<sub>24</sub> = Pole Top O.D. with ILSN w/out Luminaire  
D<sub>30</sub> = Pole Top O.D. with Luminaire  
D<sub>1</sub> = Arm Base O.D.  
D<sub>2</sub> = Arm End O.D.  
L<sub>1</sub> = Shaft Length  
L = Nominal Arm Length

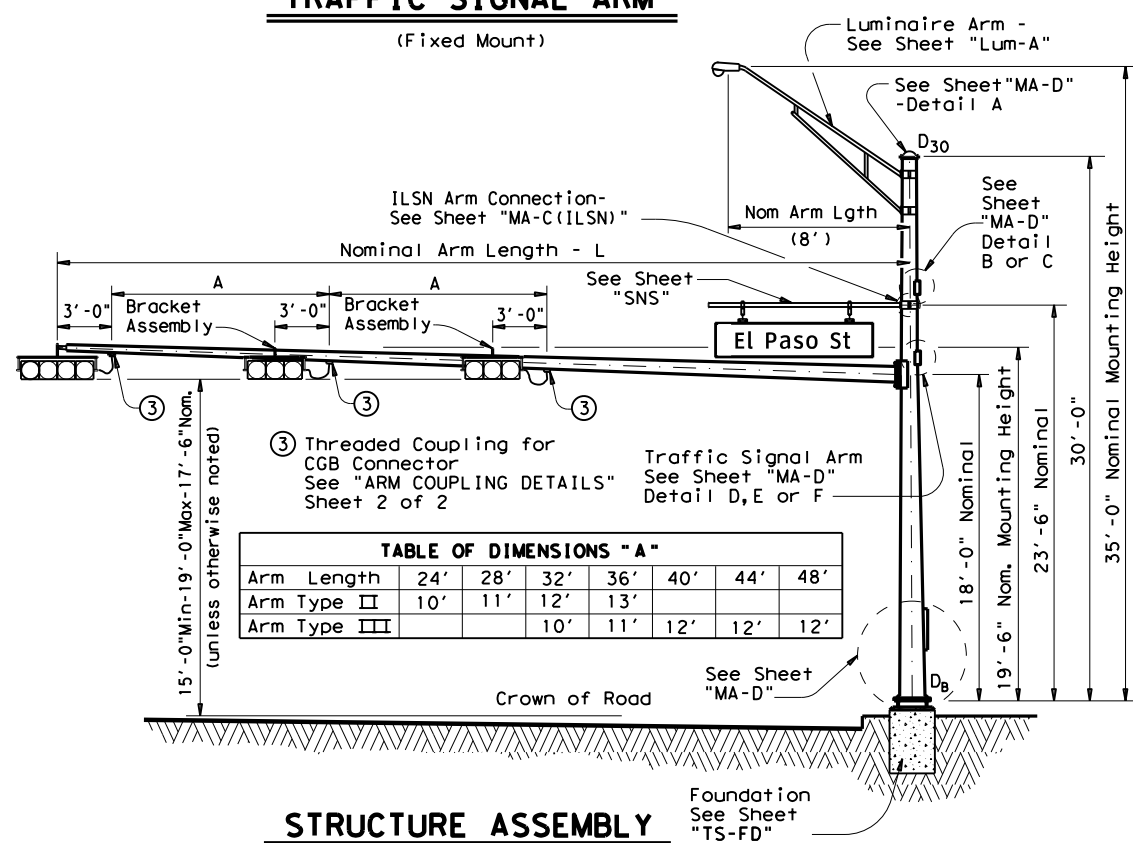
- ① Thickness shown are minimums, thicker materials may be used.
- ② D<sub>2</sub> may be increased by up to 1" for polygonal arms.



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

**TRAFFIC SIGNAL ARM**

(Fixed Mount)



Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

**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 ft.	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-100		20S-100		20-100	
24	24L-100		24S-100		24-100	
28	28L-100		28S-100		28-100	
32	32L-100		32S-100		32-100	
36	36L-100		36S-100		36-100	
40	40L-100		40S-100		40-100	
44	44L-100		44S-100		44-100	

Traffic Signal Arms (1 per pole) Ship each arm with the listed equipment attached

Nominal Arm Length ft.	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

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

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 1/2"	3'-4"	
1 3/4"	3'-10"	
2"	4'-3"	

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".

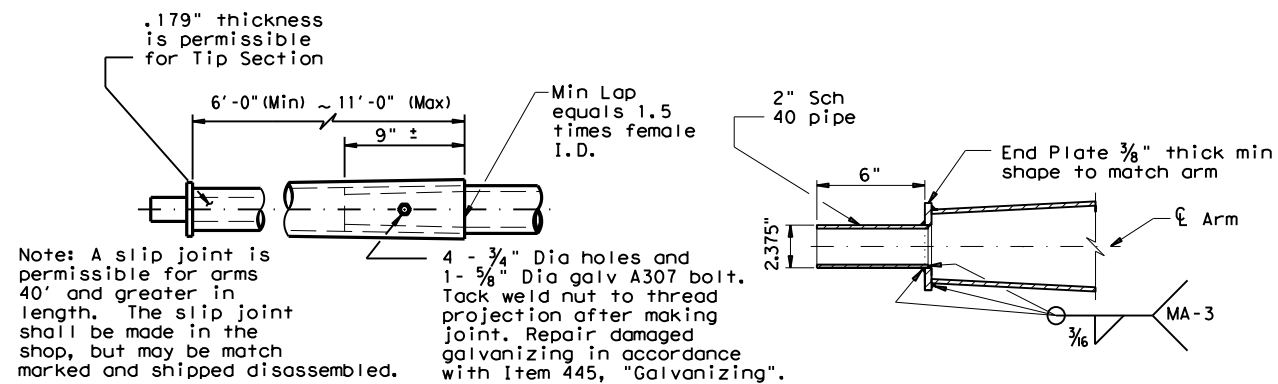
Templates may be removed for shipment.

**Texas Department of Transportation**  
 Traffic Operations Division  
**TRAFFIC SIGNAL SUPPORT STRUCTURES**  
**SINGLE MAST ARM ASSEMBLY**  
**(100 MPH WIND ZONE)**  
**SMA-100(1)-12**

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REVISIONS					
5-96	11-99	1-12	0087	02	059, ETC. SH 359, ETC.
			DIST	COUNTY	SHEET NO.
			CRP	JIM WELLS, ETC.	91

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**SLIP JOINT DETAIL**

**TENON DETAIL**

**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-DP-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.

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

**BRACKET ASSEMBLY**

**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 100 mph plus a 1.3 gust factor.

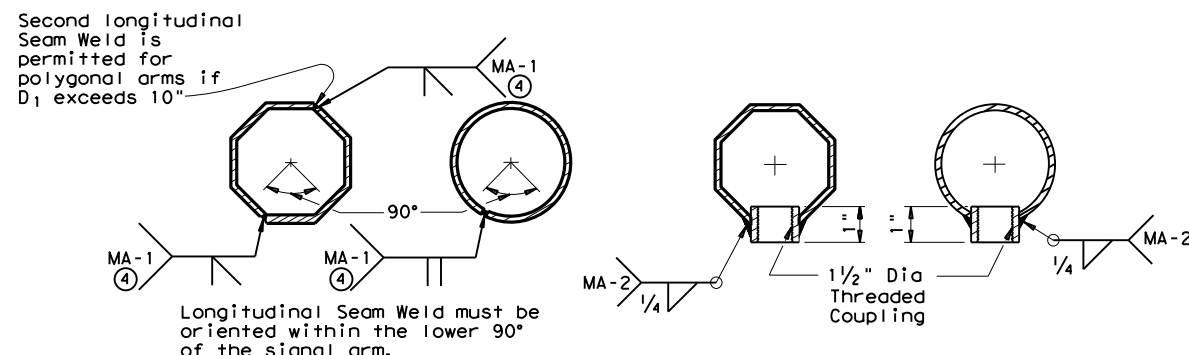
Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective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



**ARM WELD DETAIL**

**ARM COUPLING DETAILS**

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

**Texas Department of Transportation**  
 Traffic Operations Division  
**TRAFFIC SIGNAL SUPPORT STRUCTURES**  
**SINGLE MAST ARM ASSEMBLY**  
**(100 MPH WIND ZONE)**  
**SMA-100(2)-12**

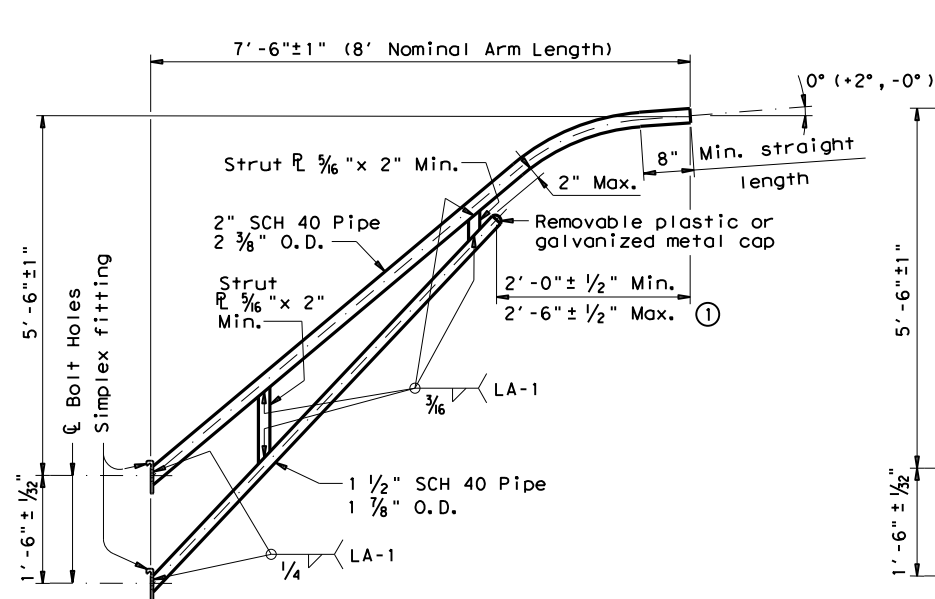
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5-96	0087 02	059, ETC. SH 359, ETC.			
1-12		DIST	COUNTY	SHEET NO.	
		CRP	JIM WELLS, ETC.	<b>92</b>	



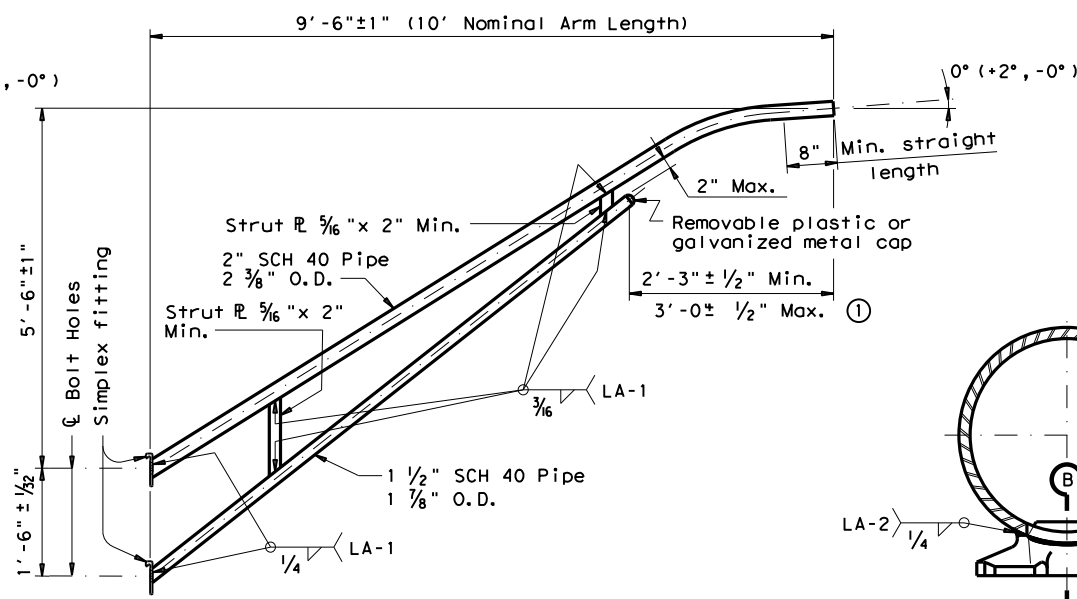
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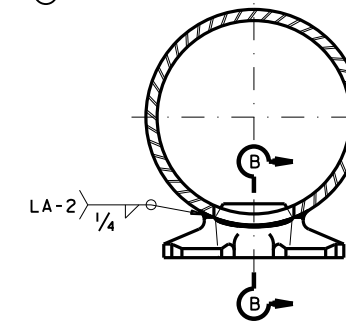
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8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT 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

- 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.
- Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- 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.
- 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.

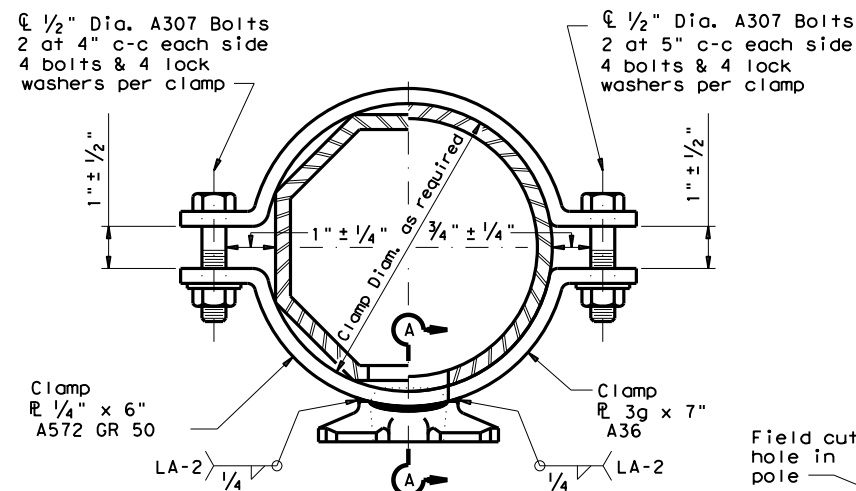
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified Fabricator 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.

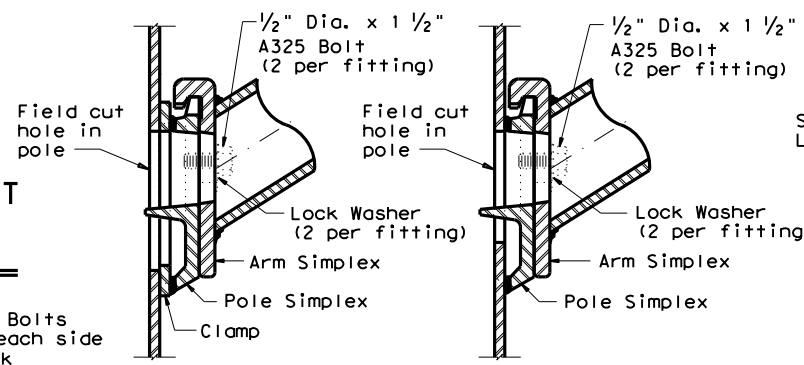
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly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



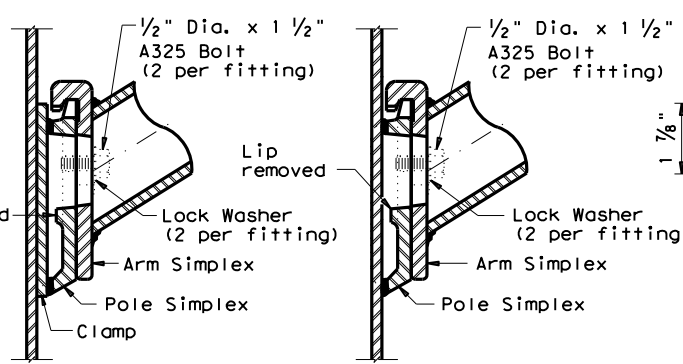
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



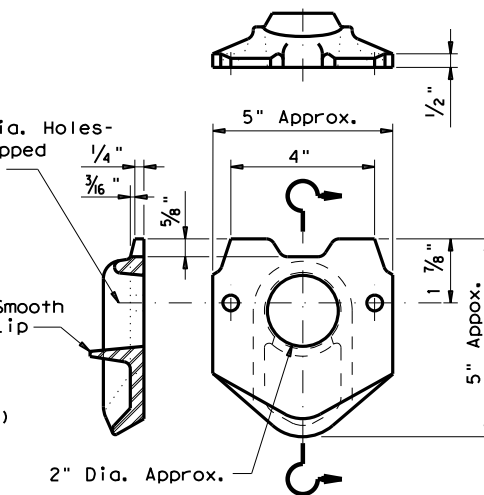
UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

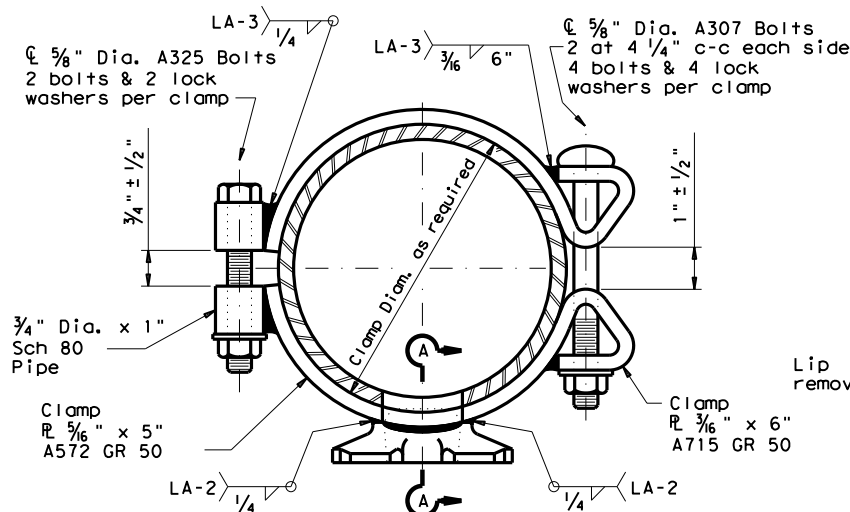


SECTION A-A

SECTION B-B

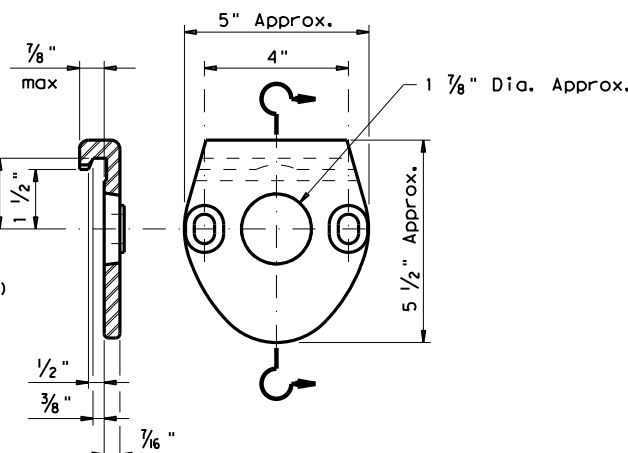


POLE SIMPLEX DETAIL



CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



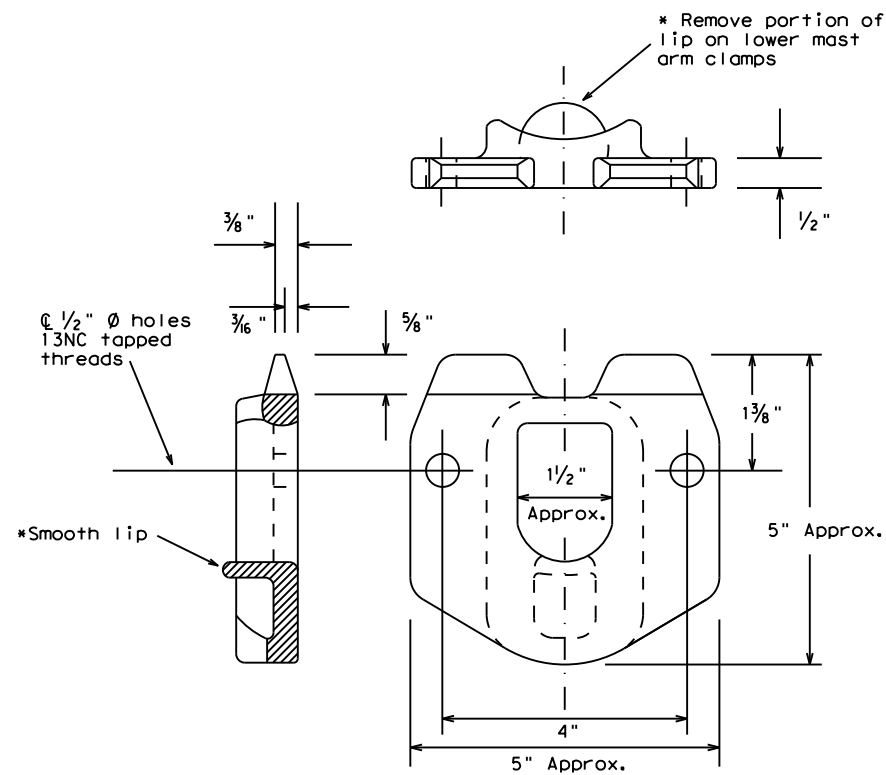
ARM SIMPLEX DETAIL

Texas Department of Transportation  
Traffic Operations Division  
**STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES**  
ARM DETAILS  
**LUM-A-12**

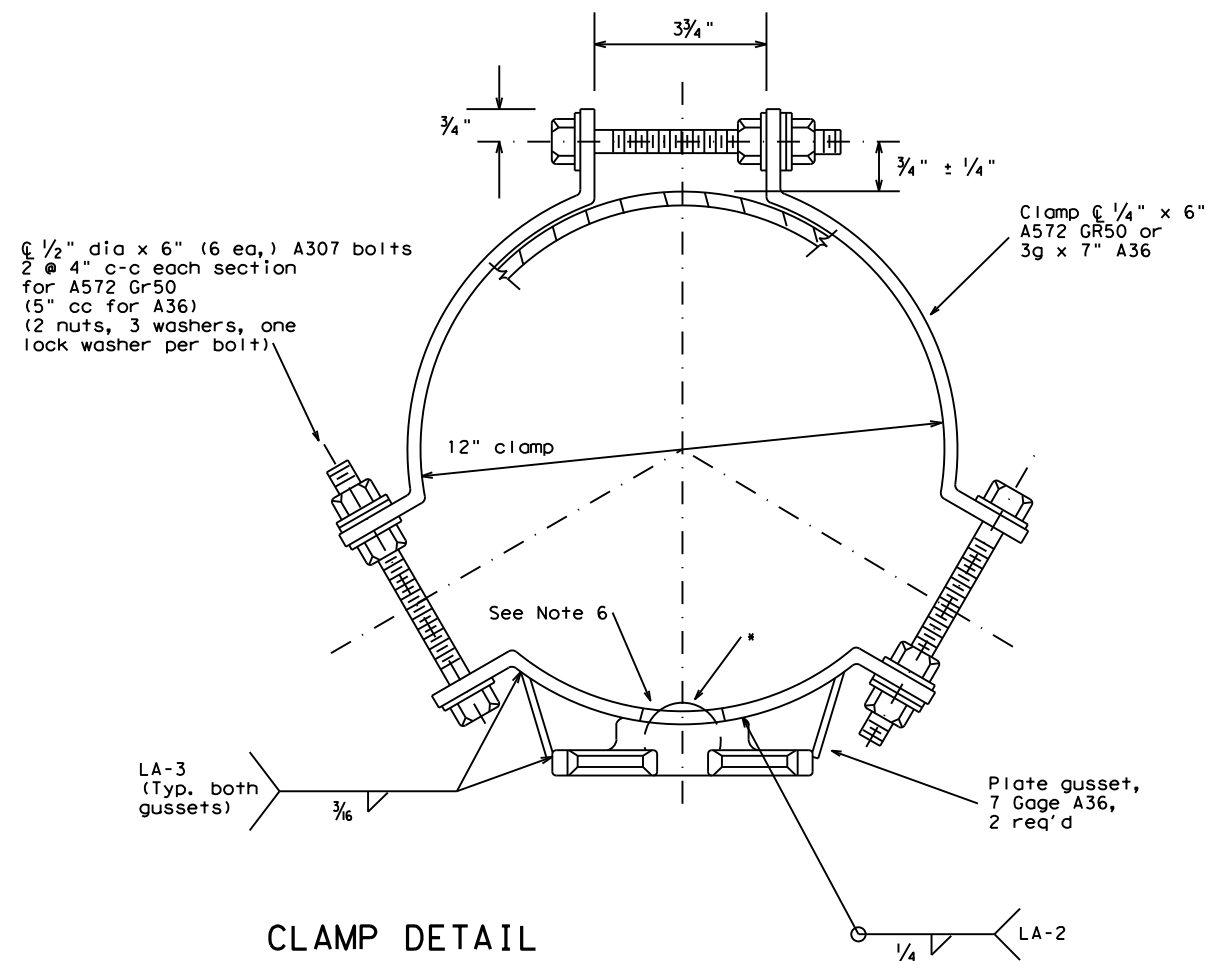
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1-12		DIST	COUNTY	SHEET NO.	
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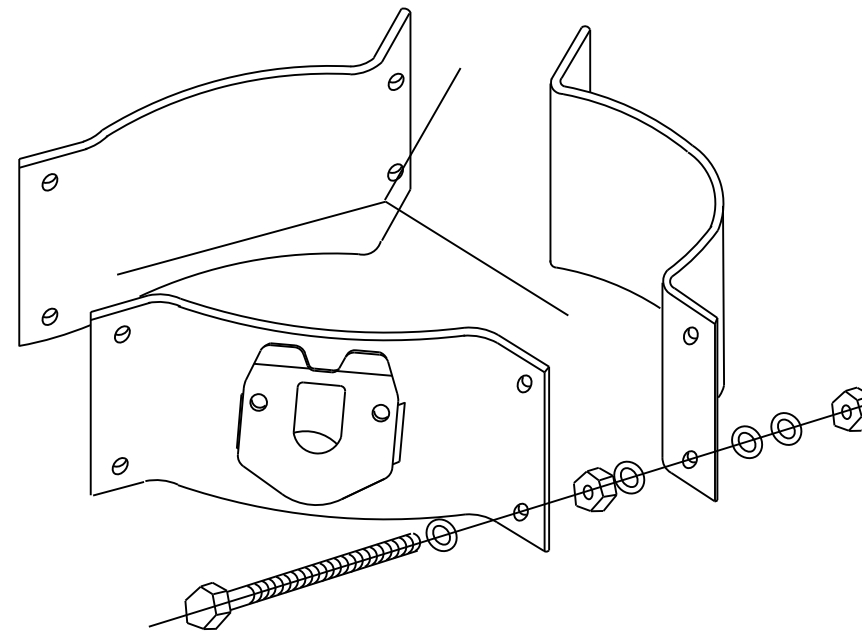
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POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

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.

Texas Department of Transportation  
Traffic Operations Division

CLAMP ON  
FITTING ASSEMBLY FOR  
LUMINAIRE MAST ARM

CFA-12

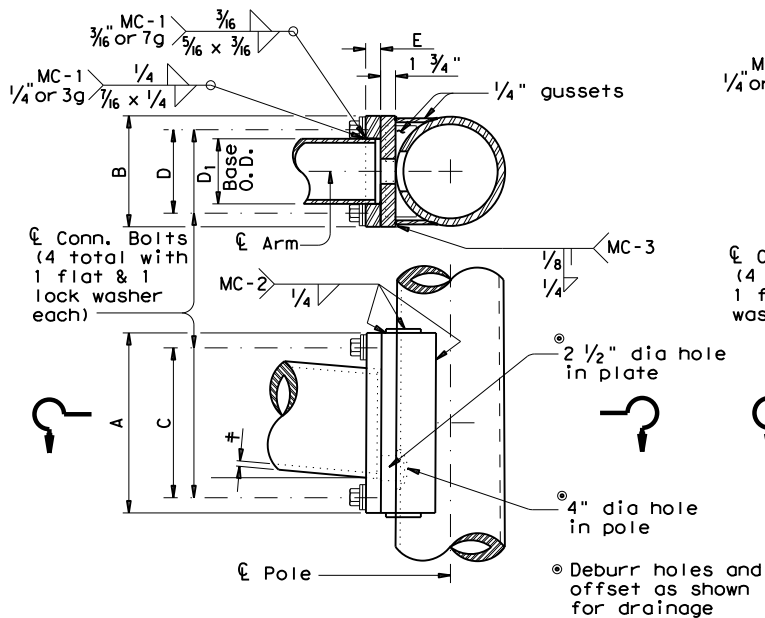
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11-99		0087	02	059, ETC.	SH 359, ETC.
1-12		DIST	COUNTY	SHEET NO.	
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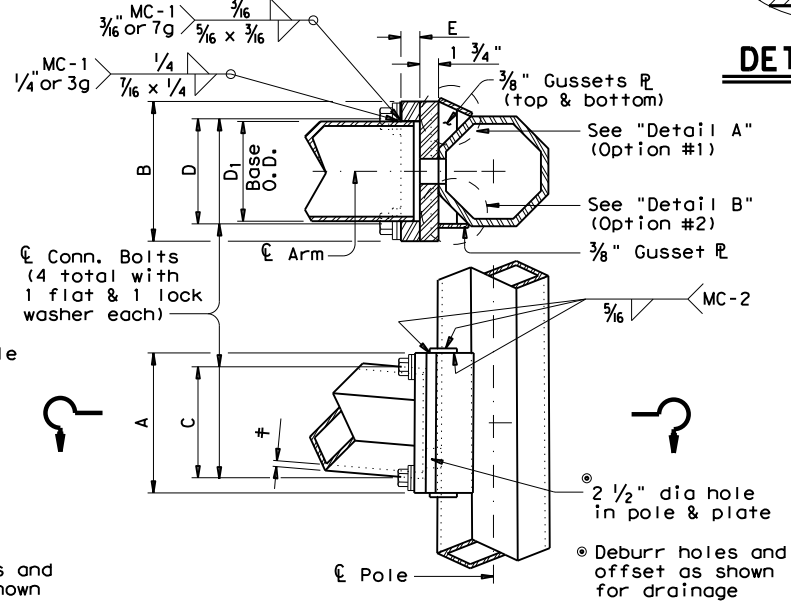
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ARM SIZE		A	B	C	D	E	CONN. BOLT DIA
D <sub>1</sub>	Ø	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	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

ARM SIZE		A	B	C	D	E	CONN. BOLT DIA
D <sub>1</sub>	Ø	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



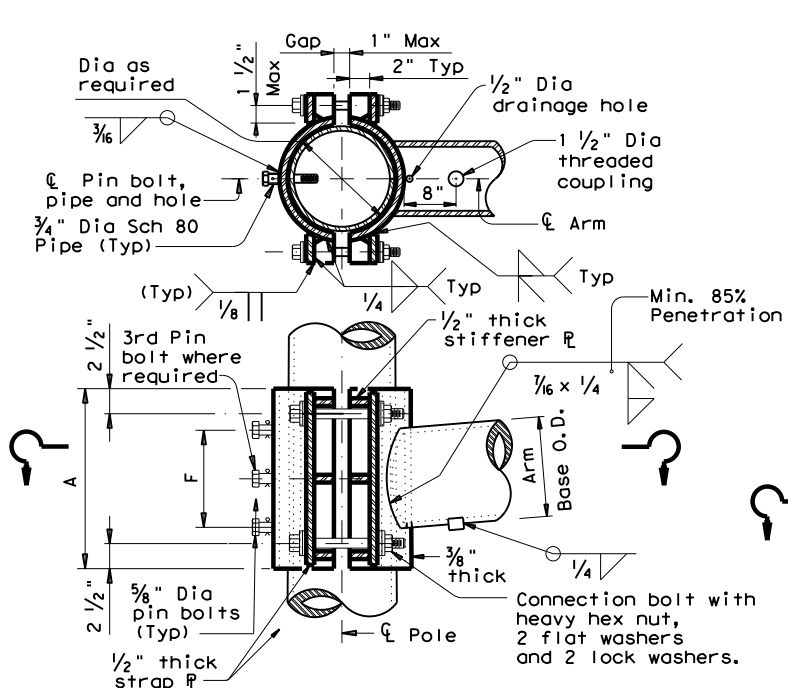
**FIXED MOUNT DETAIL 1**



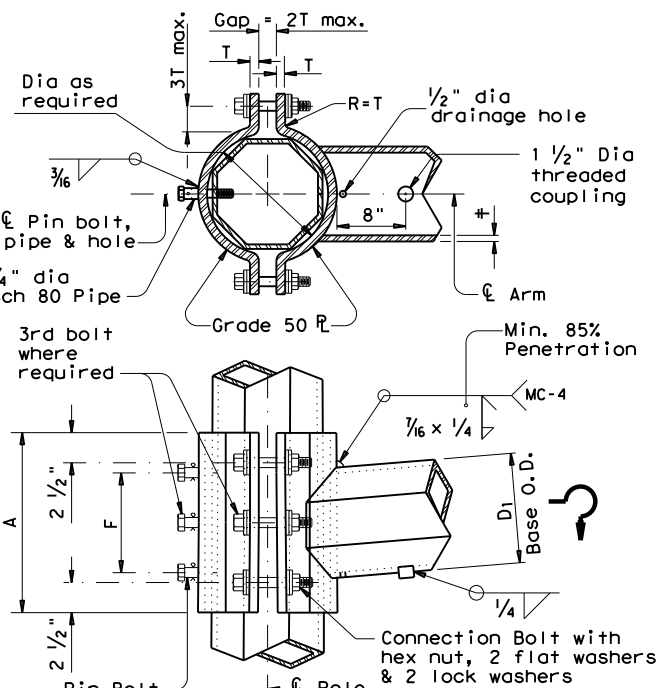
**FIXED MOUNT DETAIL 2**

ARM SIZE		A	F	CONN. BOLTS		PIN BOLTS	
D <sub>1</sub>	Ø	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

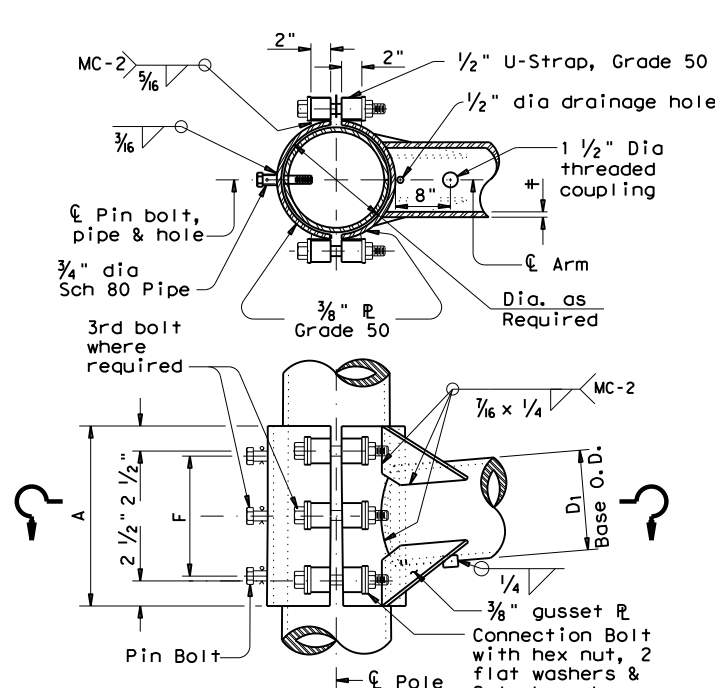
ARM SIZE		A	F	T	CONN. BOLTS		PIN BOLTS	
D <sub>1</sub>	Ø	in.	in.	in.	No.	Dia	No.	Dia
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8



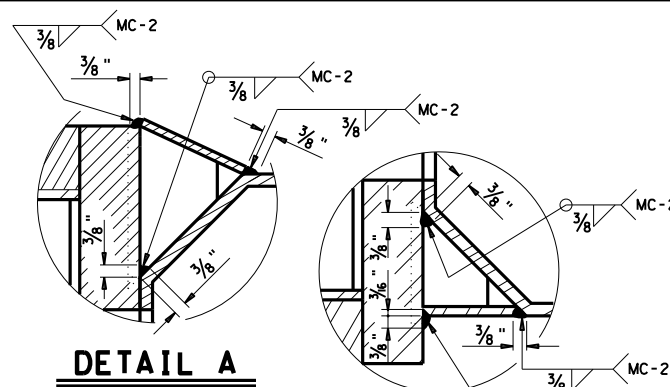
**CLAMP-ON DETAIL 1**



**CLAMP-ON DETAIL 2**

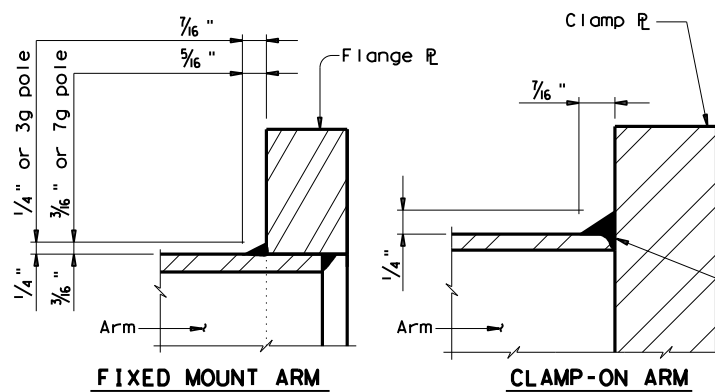


**CLAMP-ON DETAIL 3**



**DETAIL A**

**DETAIL B**



**FIXED MOUNT ARM**

**CLAMP-ON ARM**

**ARM BASE WELD DETAILS**

ARM SIZE		A	F	CONN. BOLTS		PIN BOLTS	
D <sub>1</sub>	Ø	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

MATERIALS	
Round Shafts or Polygonal Shafts <sup>1</sup>	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 <sup>2</sup>
Plates <sup>1</sup>	ASTM A36, A588, or A572 Gr. 50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe <sup>1</sup>	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

- <sup>1</sup> 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.
- <sup>2</sup> 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 during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on 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.

Texas Department of Transportation  
Traffic Operations Division

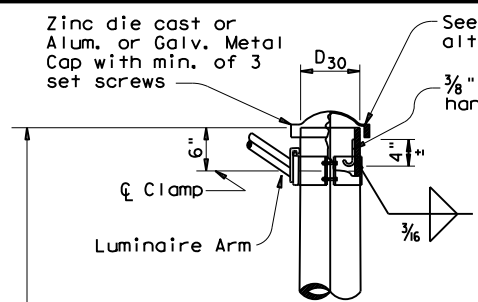
**STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES  
MAST ARM CONNECTIONS  
MA-C-12**

© TxDOT August 1995		DN: MS	CK: JSY	DW: MMF	CK: JSY
REVISIONS					
5-96	CON	SECT	JOB	HIGHWAY	
5-09	0087	02	059, ETC.	SH 359, ETC.	
1-12	DIST	COUNTY		SHEET NO.	
	CRP	JIM WELLS, ETC.		95	



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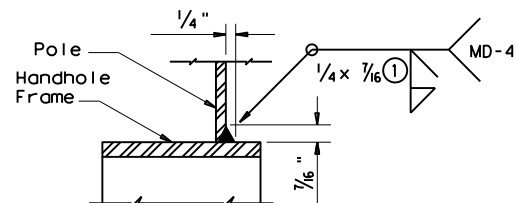
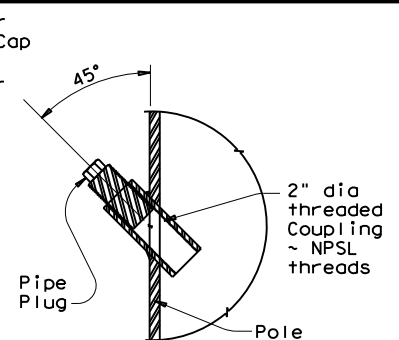
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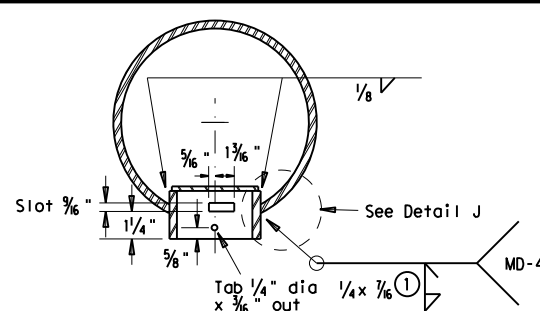
**DETAIL A**

(for pole with luminaire)

**POLE COUPLING DETAIL**

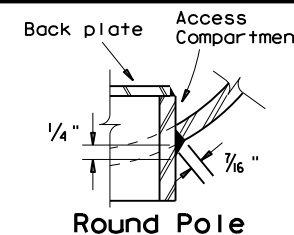


**DETAIL G**

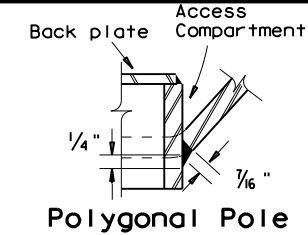


**SECTION X-X**

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

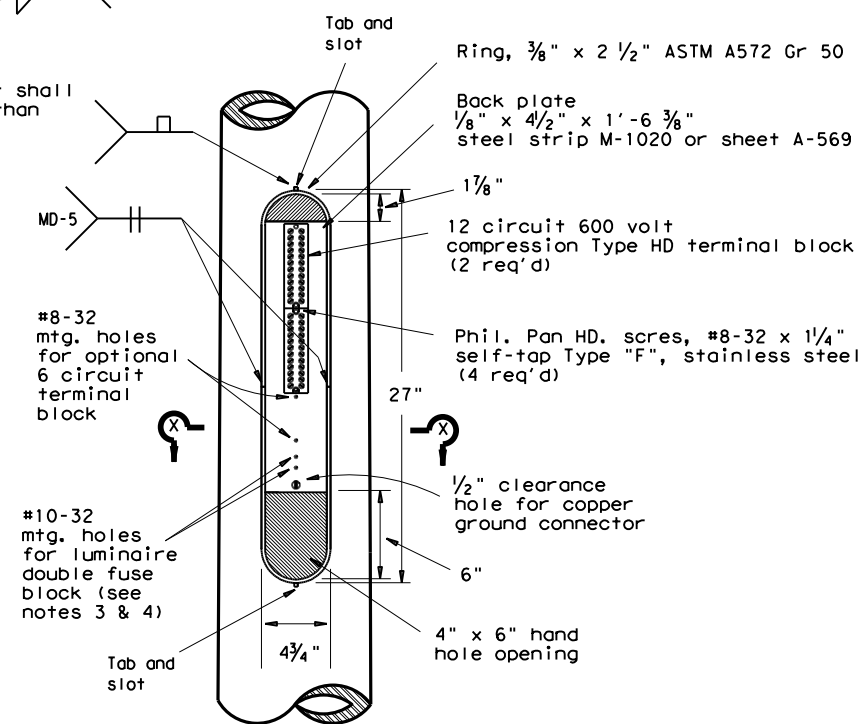


**Round Pole**



**Polygonal Pole**

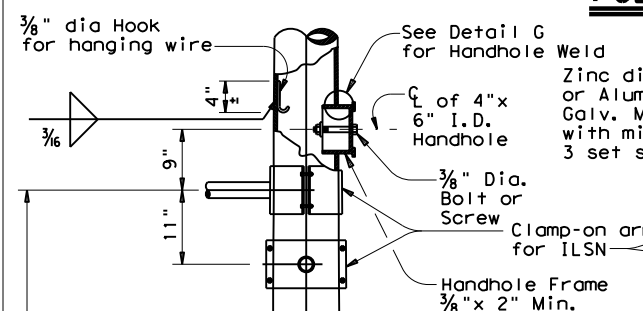
**DETAIL J**



**ACCESS COMPARTMENT**

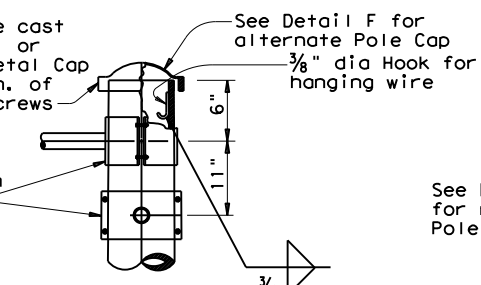
**NOTES:**

- 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.
- 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.
- 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.
- Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

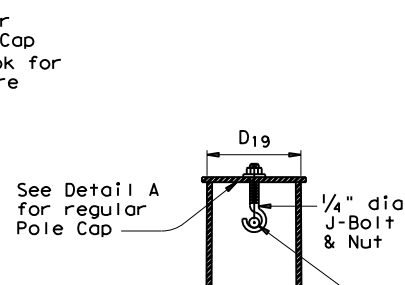


**DETAIL B**

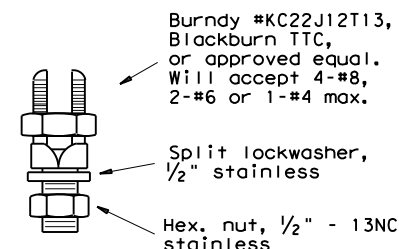
(If ILSN applied)



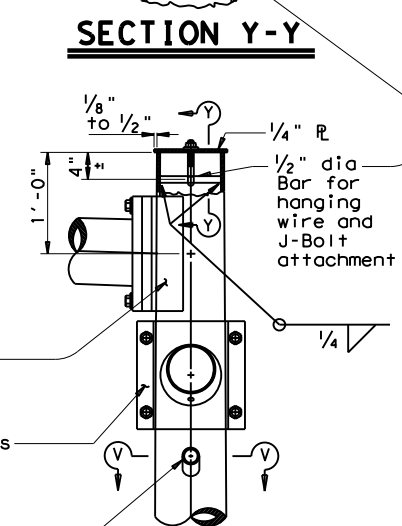
**DETAIL C**



**SECTION Y-Y**

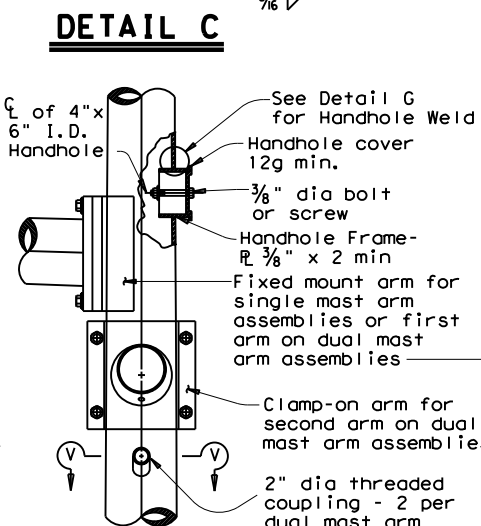


**COPPER GROUND CONNECTOR**



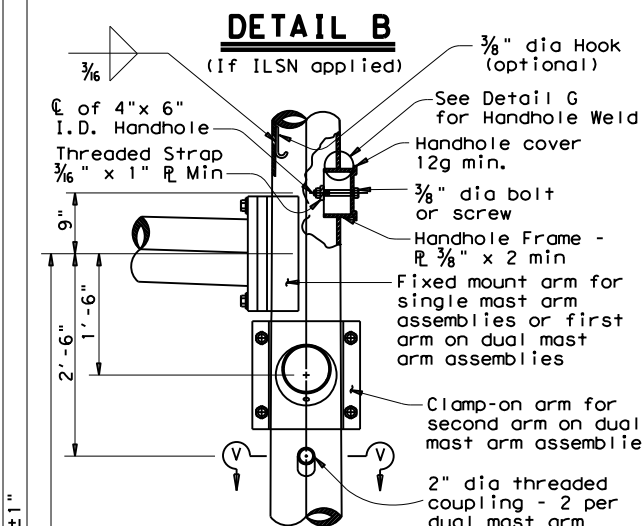
**DETAIL F**

(for 19' pole with no ILSN sign and no luminaire)



**DETAIL E**

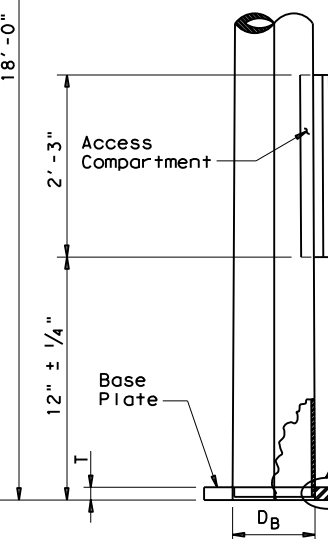
(for 24' pole with ILSN sign and no luminaire)



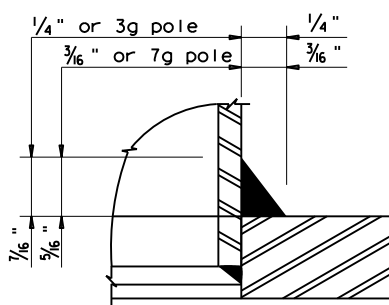
**DETAIL D**

(for 30' pole with luminaire and ILSN sign)

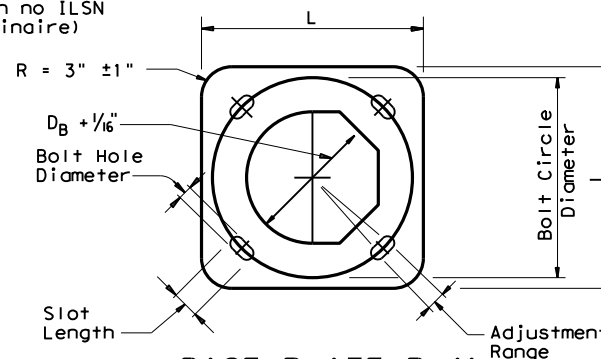
Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base R Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



**POLE ELEVATION**



**DETAIL H**



**BASE PLATE PLAN**

- 85% Min. penetration
- 60% Min. penetration  
100% penetration within 6" of circumferential base welds.

Texas Department of Transportation  
Traffic Operations Division

**TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS**

MA-D-12

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REVISIONS					
0087	02	059, ETC.	SH 359, ETC.		
DIST		COUNTY		SHEET NO.	
CRP		JIM WELLS, ETC.		96	

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DATE: FILE:

**FOUNDATION DESIGN TABLE**

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)			FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION	
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft		SHEAR Kips
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	3/4"	36	12 3/4"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 1/2"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 3/4"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 1/4"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

**NOTES:**

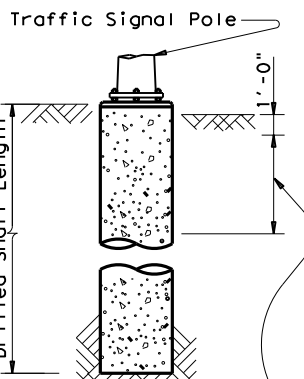
- Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- Foundation Design Loads are the allowable moments and shears at the base of the structure.
- Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- 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
SH359 "POLE A"	10	36-A	1			14		
SH359 "POLE B"	10	36-A	1			14		
FM666 "POLE A"	10	24-A	1	6				
TOTAL DRILLED SHAFT LENGTHS				6		28		

**FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)**

80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
		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' x 24'	40' x 36' 44' x 36'



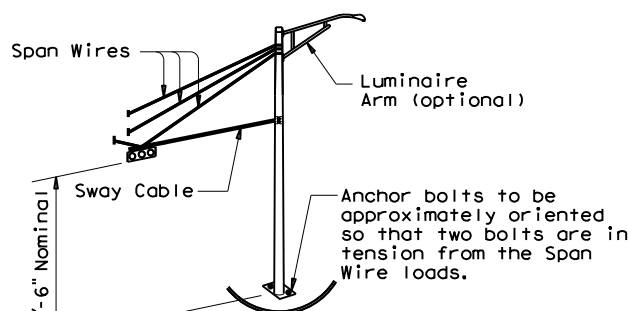
**ANCHOR BOLT & TEMPLATE SIZES**

BOLT DIA IN.	(7) BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
3/4"	1'-6"	3"	—	12 3/4"	7 1/8"	5 5/8"
1 1/2"	3'-4"	6"	4"	17"	10"	7"
1 3/4"	3'-10"	7"	4 1/2"	19"	11 1/4"	7 3/4"
2"	4'-3"	8"	5"	21"	12 1/2"	8 1/2"
2 1/4"	4'-9"	9"	5 1/2"	23"	13 3/4"	9 1/4"

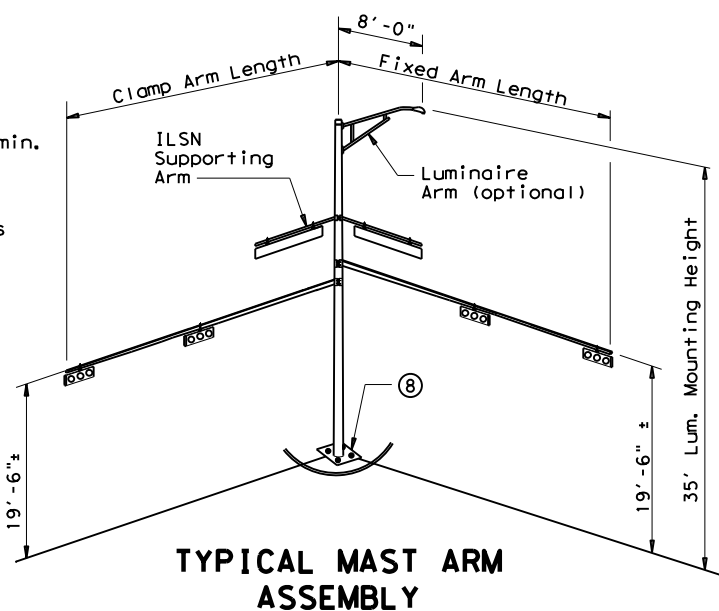
(7) Min dimensions given, longer bolts are acceptable.

**EXAMPLE:**

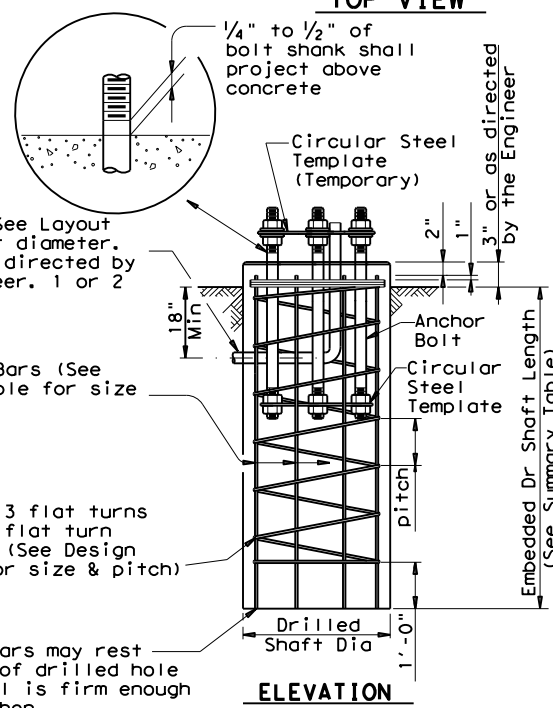
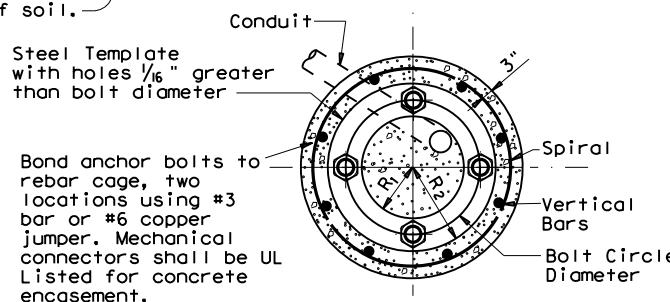
- For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
- For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



**TYPICAL STRAIN POLE ASSEMBLY**



**TYPICAL MAST ARM ASSEMBLY**



**FOUNDATION DETAILS**

**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".



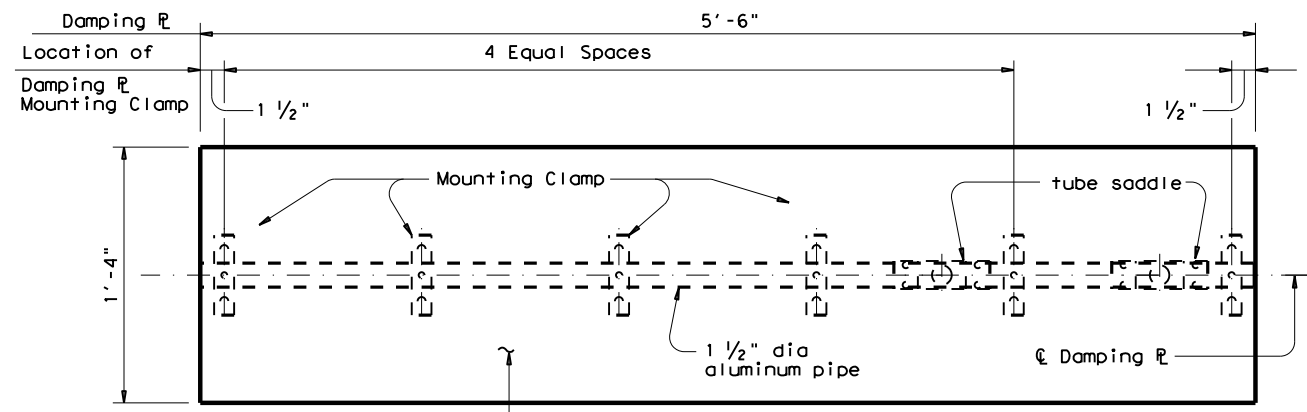
**TRAFFIC SIGNAL POLE FOUNDATION**

**TS-FD-12**

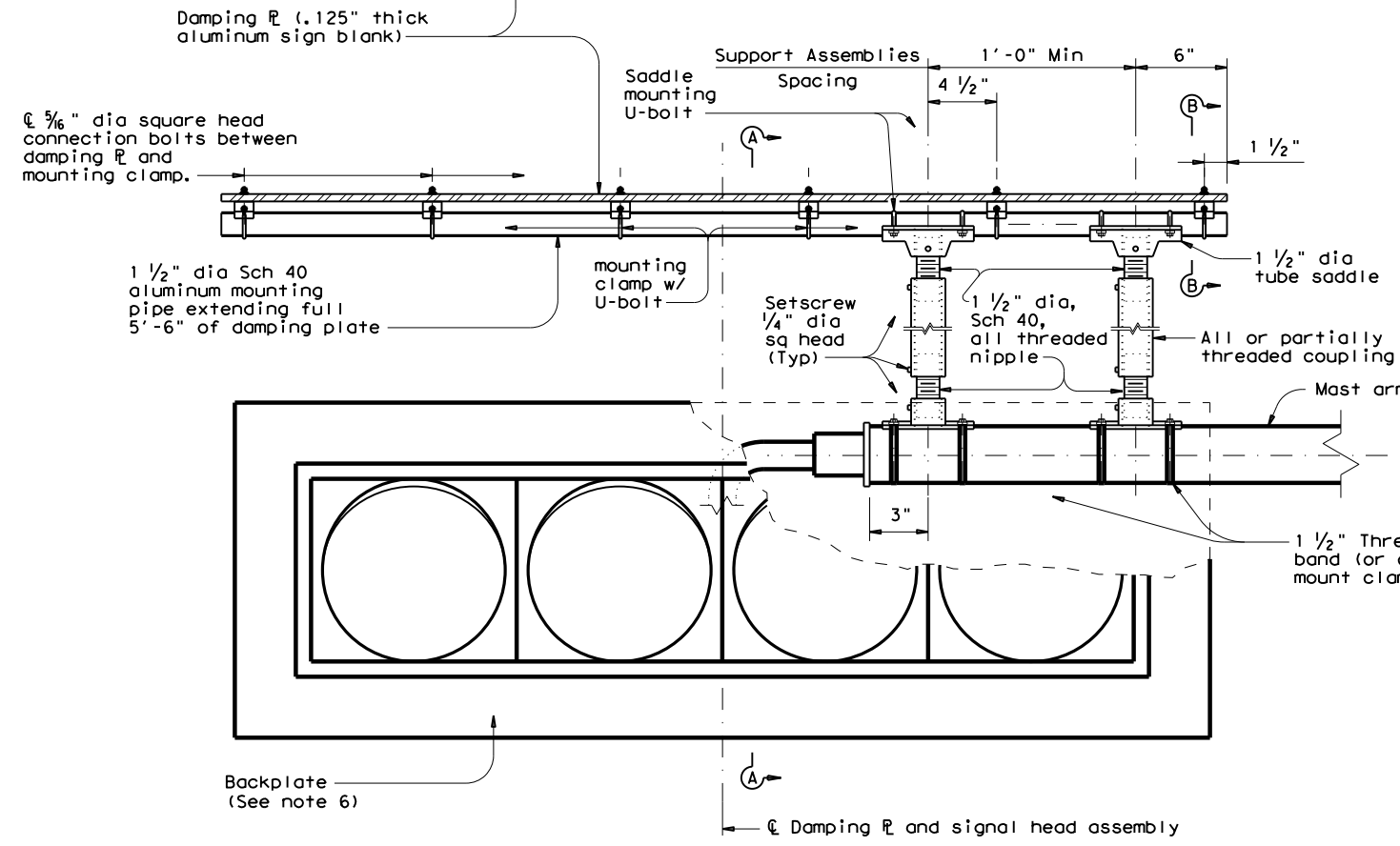
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REVISIONS		CONTRACT	SECTION	JOB	HIGHWAY
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		DIST	COUNTY	SHEET NO.	
		16	JIM WELLS, ETC.	97	

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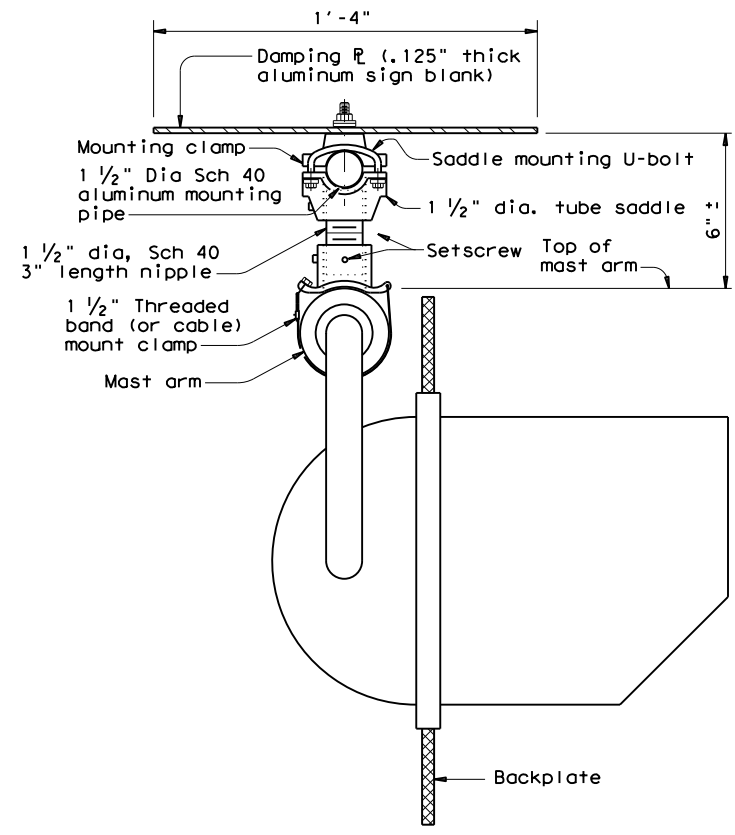


PLAN



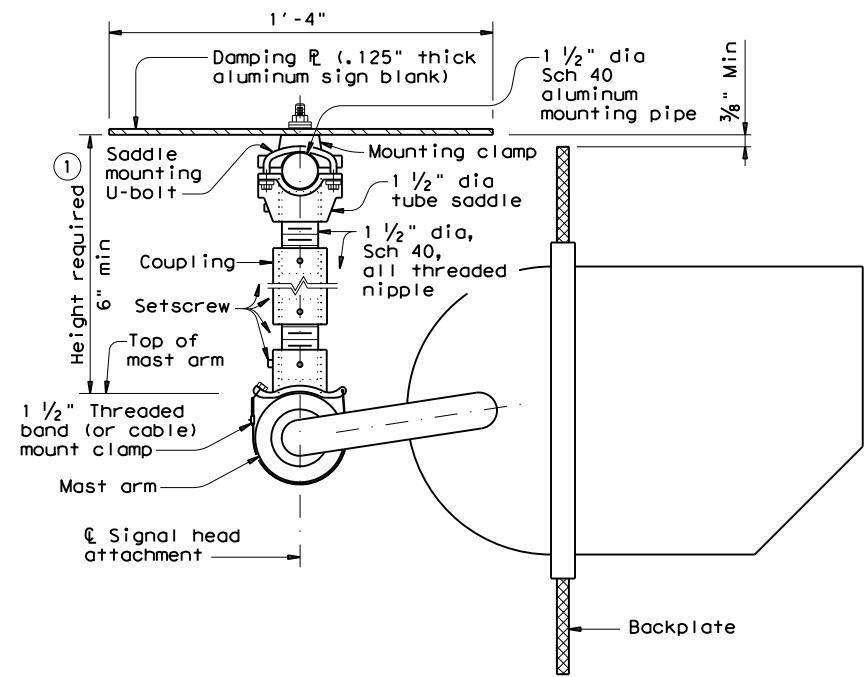
ELEVATION

**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

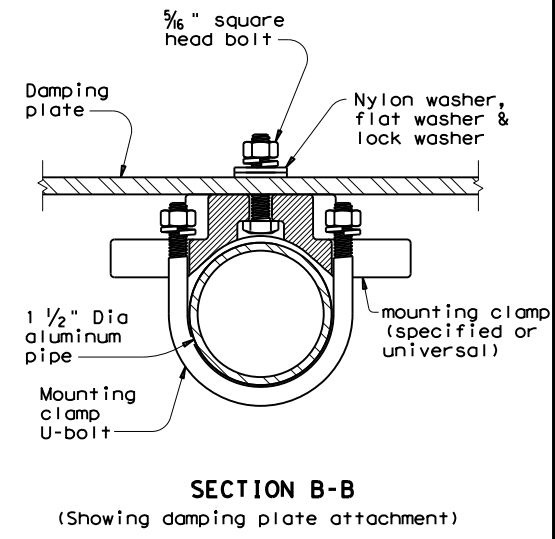
(Showing alternate placement of signal head)  
 (Mounting clamp U-bolt is not shown for clarity)

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:**

- 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.
- 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.
- 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.
- Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
- Contractor will verify applicable field dimensions before the installation.
- 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.



SECTION B-B

(Showing damping plate attachment)

Texas Department of Transportation Traffic Safety Division Standard

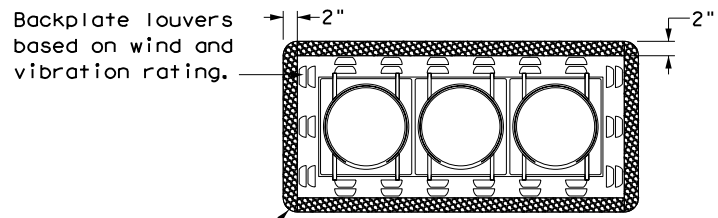
**MAST ARM DAMPING PLATE DETAILS**

**MA-DPD-20**

FILE: ma-dpd-20.dgn DWN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT  
 © TxDOT January 2012 CONT SECT JOB HIGHWAY  
 REVISIONS 0087 02 059, ETC. SH 359, ETC.  
 6-20 DIST COUNTY SHEET NO.  
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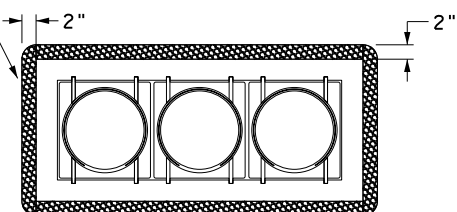


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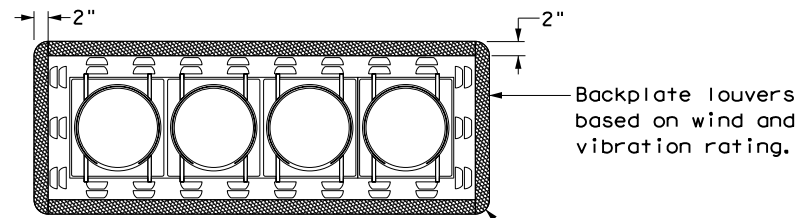
Vented backplate with retroreflective border

Retroreflective border. See general note 1



Backplate with retroreflective border

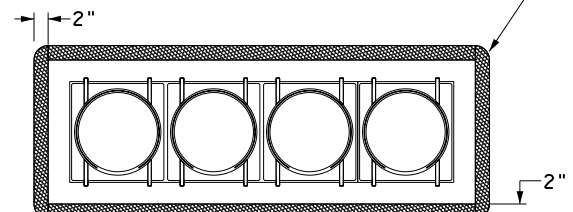
**THREE-SECTION HEAD**  
HORIZONTAL OR VERTICAL



Vented backplate with retroreflective border

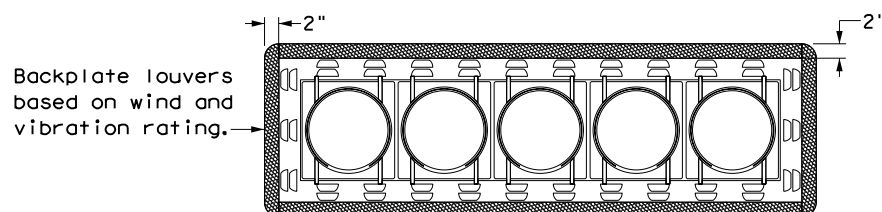
Backplate louvers based on wind and vibration rating.

Retroreflective border. See general note 1



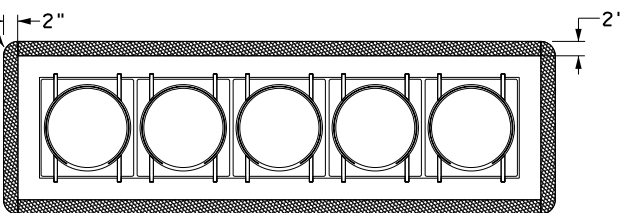
Backplate with retroreflective border

**FOUR-SECTION HEAD**  
HORIZONTAL OR VERTICAL



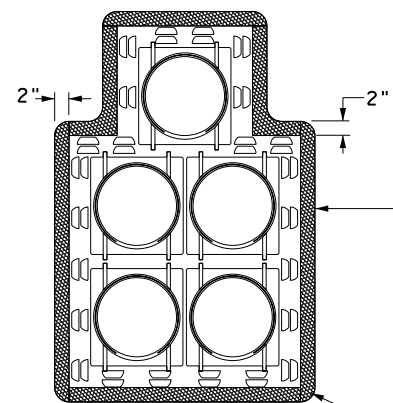
Vented backplate with retroreflective border

Retroreflective border. See general note 1



Backplate with retroreflective border

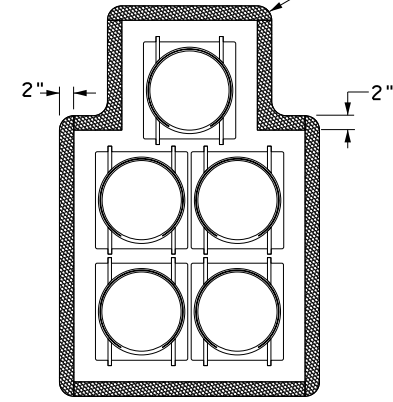
**FIVE-SECTION HEAD**  
HORIZONTAL OR VERTICAL



Vented backplate with retroreflective border

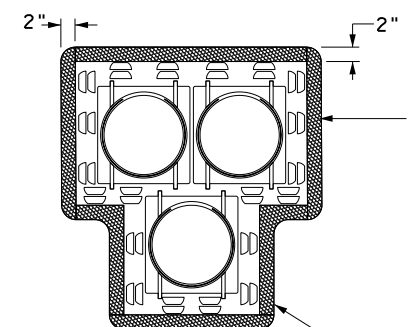
Backplate louvers based on wind and vibration rating.

Retroreflective border. See general note 1



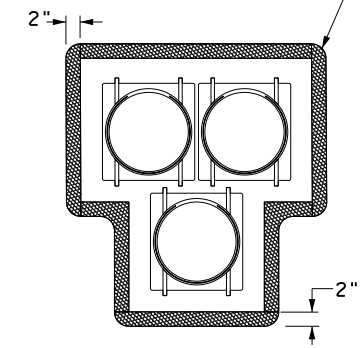
Backplate with retroreflective border

**FIVE-SECTION HEAD**  
CLUSTER



Backplate louvers based on wind and vibration rating.

Retroreflective border. See general note 1



Backplate with retroreflective border

**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<sub>FL</sub> or C<sub>FL</sub> 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

		<b>Texas Department of Transportation</b>		<b>Traffic Safety Division Standard</b>	
<p><b>TRAFFIC SIGNAL HEAD WITH BACKPLATE</b></p> <p><b>TS-BP-20</b></p>					
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT	
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0087	02	059, ETC.	SH 359, ETC.	
	DIST	COUNTY	SHEET NO.		
CRP	JIM WELLS, ETC.		99		

**ELECTRICAL SERVICE DATA**

ELEC. SERVICE ID	ELECTRICAL SERVICE DESCRIPTION	SERVICE *CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT.BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
1	ELC SRV TY D 120/240 060 (NS)SS(E)GC(U)	2"	3#6	N/A	2P/60	2P/30	100	TRAFFIC SIGNALS	1P/30	24	3.2
								ILLUMINATION	2P/15	1.42	
2	ELC SRV TY D 120/240 060 (NS)SS(E)GC(U)	2"	3#6	N/A	2P/60	2P/30	100	TRAFFIC SIGNAL	1P/30	24	3.1
								ILLUMINATION	2P/15	0.71	

**SH 359, ETC.  
 ELECTRICAL SERVICE  
 DATA SHEET**

SHEET 1 OF 1



CONT	SECT	JOB	HIGHWAY
0087	02	059, ETC.	SH 359, ETC.
DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.	100	

DATE: 4/6/2024 6:00:04 PM  
 FILE: //txdot.projectwiseonline.com:txdot4/Documents/16 - CRP/Design Projects/091916/091916.dgn - CRP/Design Projects/091916/091916.dgn  
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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 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**

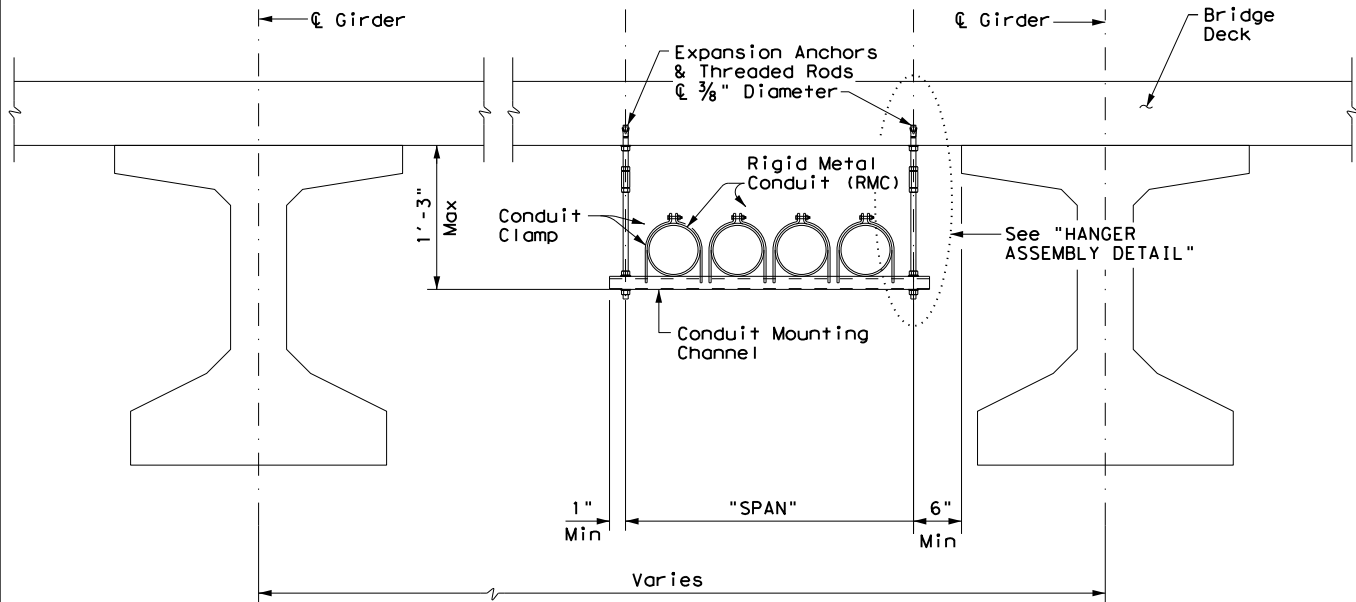
1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures 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.

		<b>Traffic Operations Division Standard</b>	
<h1>ELECTRICAL DETAILS CONDUITS &amp; NOTES</h1>			
<h2>ED(1) - 14</h2>			
FILE:	ed1-14.dgn	DW:	CK:
© TxDOT	October 2014	CONTRACT NO.	SECTION NO.
REVISIONS		JOB NO.	HIGHWAY
	0087 02	059, ETC.	SH 359, ETC.
DIST.	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.	101	



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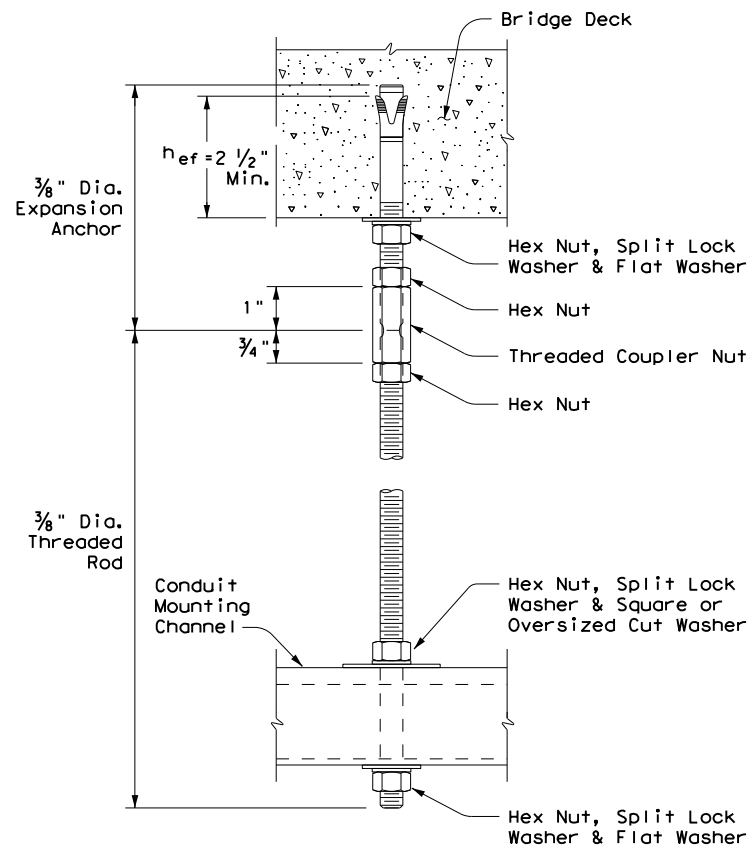
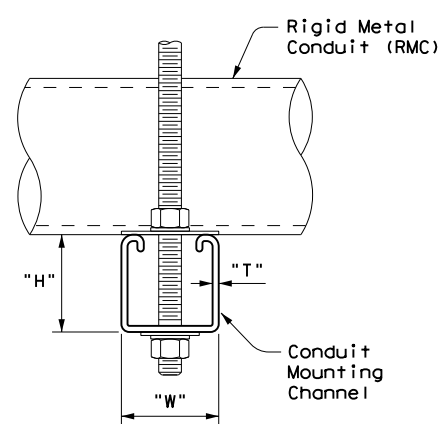
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CONDUIT HANGING DETAIL

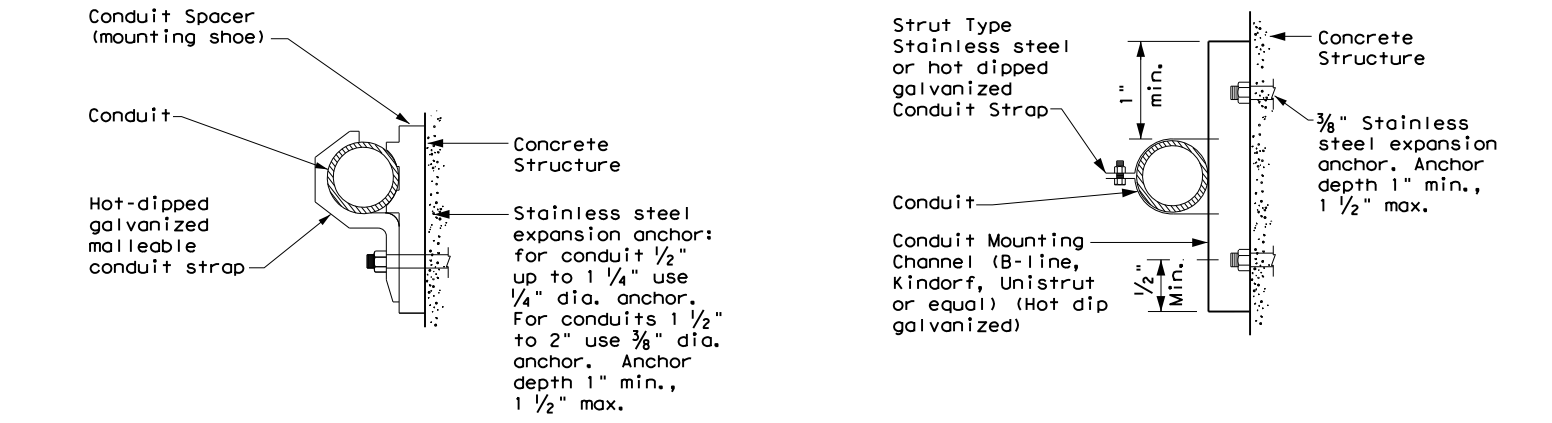
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 1/16"	12 Ga.

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



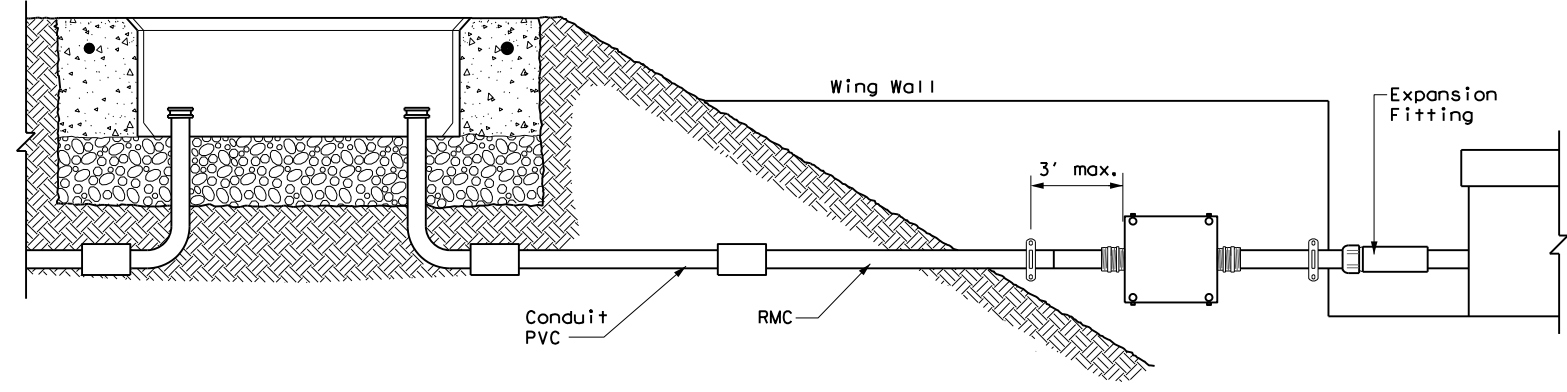
HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT



CONDUIT MOUNTING OPTIONS

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



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

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<sub>ef</sub>), as shown. Increase (h<sub>ef</sub>) 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<sub>ef</sub>). No lateral loads shall be introduced after conduit installation.

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS          CONDUIT SUPPORTS</h2>			
<h3>ED(2) - 14</h3>			
FILE:	ed2-14.dgn	DN:	TxDOT
© TxDOT	October 2014	CK:	TxDOT
REVISIONS		DW:	TxDOT
		CK:	TxDOT
		CONT	SECT
		0087	02
		059, ETC.SH 359, ETC.	
		DIST	COUNTY
		CRP	JIM WELLS, ETC.
		SHEET NO.	102

# 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.

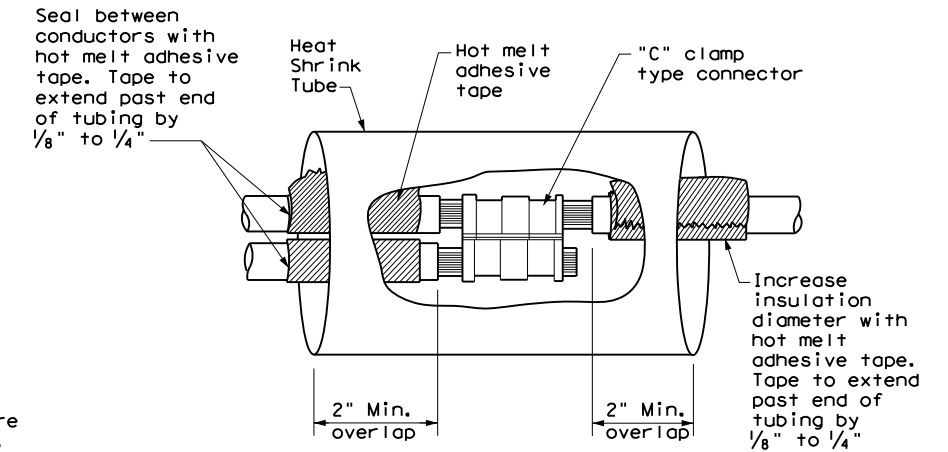
## B. CONSTRUCTION METHODS

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.



**SPLICE OPTION 1  
Compression Type**

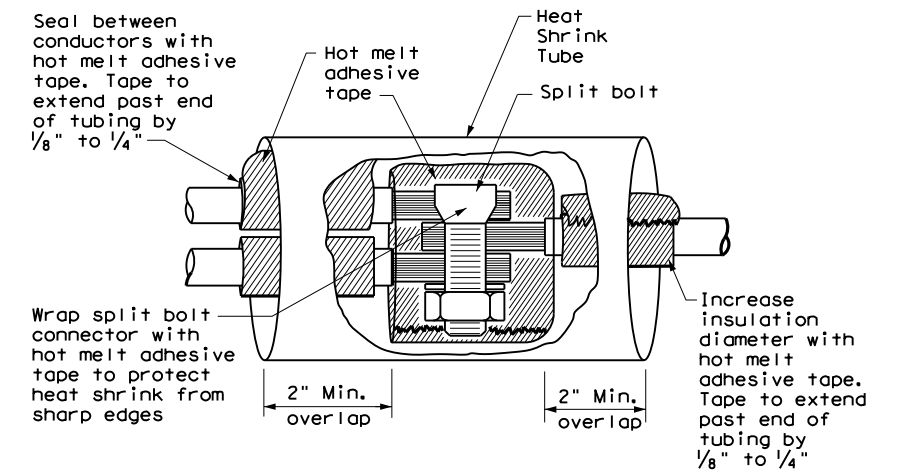
## GROUND RODS & GROUNDING ELECTRODES

### A. MATERIAL INFORMATION

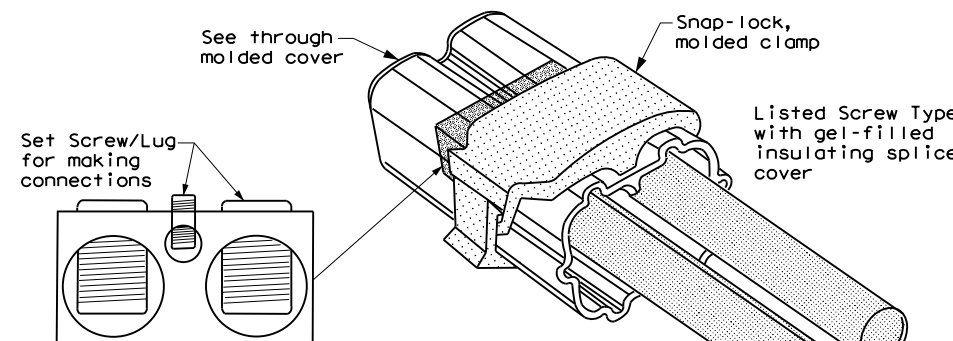
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in 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 2  
Split Bolt Type**



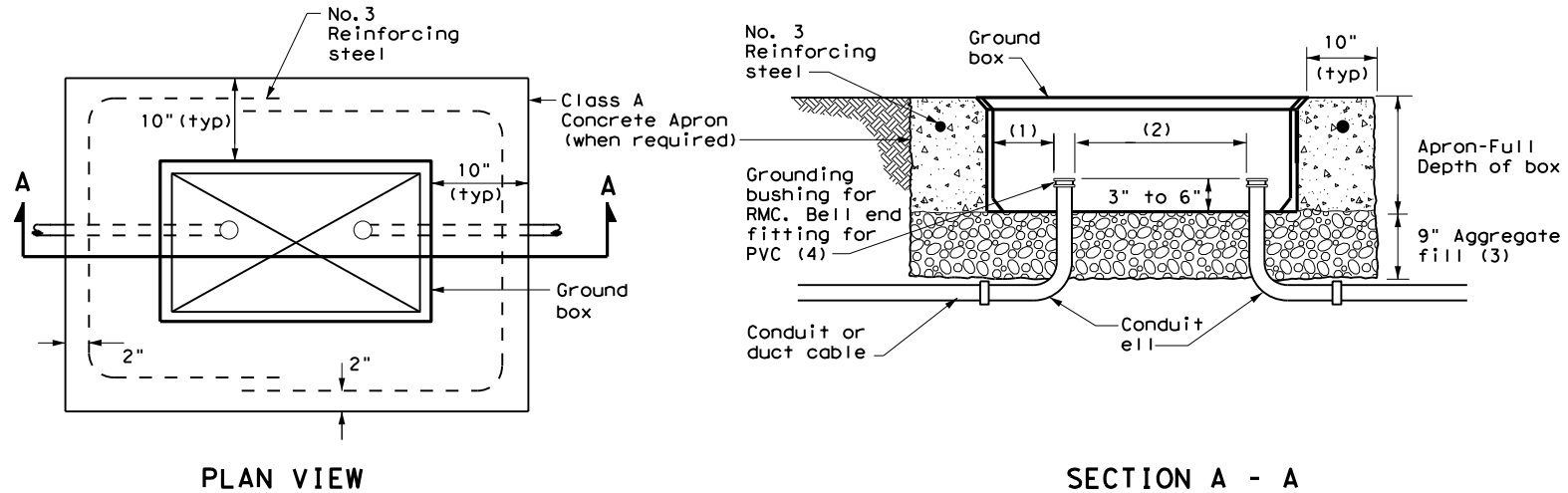
**SPLICE OPTION 3  
Listed Screw Type**

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		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUCTORS</h1>			
<h2>ED(3) - 14</h2>			
FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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REVISIONS	0087	02	059, ETC. SH 359, ETC.
	DIST	COUNTY	SHEET NO.
	CRP	JIM WELLS, ETC.	103

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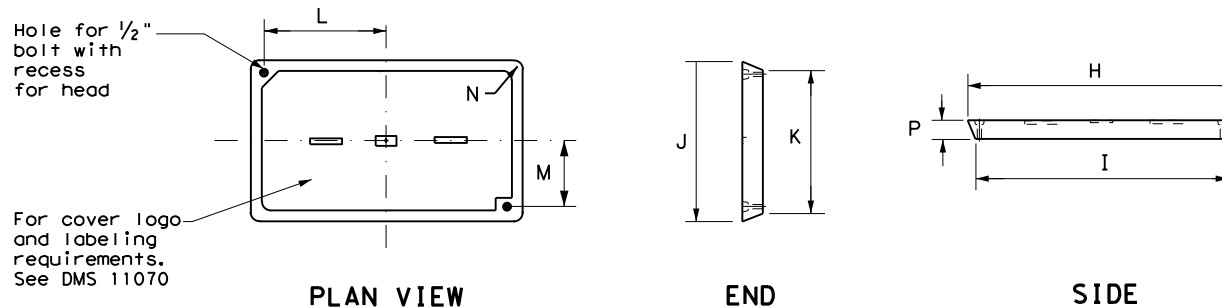


**APRON FOR GROUND BOX**

- (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



**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.

					<b>Traffic Operations Division Standard</b>		
<b>ELECTRICAL DETAILS GROUND BOXES</b>							
<b>ED(4) - 14</b>							
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		DIST	COUNTY	SHEET NO.			
		CRP	JIM WELLS, ETC.	104			



# 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.

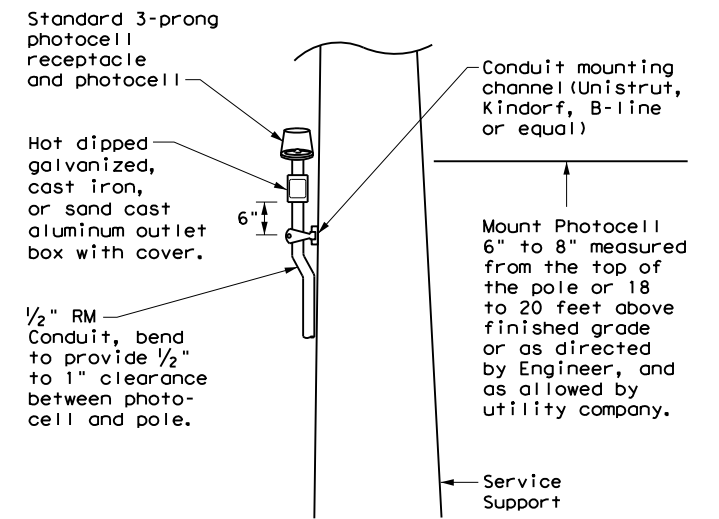
# PHOTOELECTRIC CONTROL

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 *xSize	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/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		Luminaires	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	

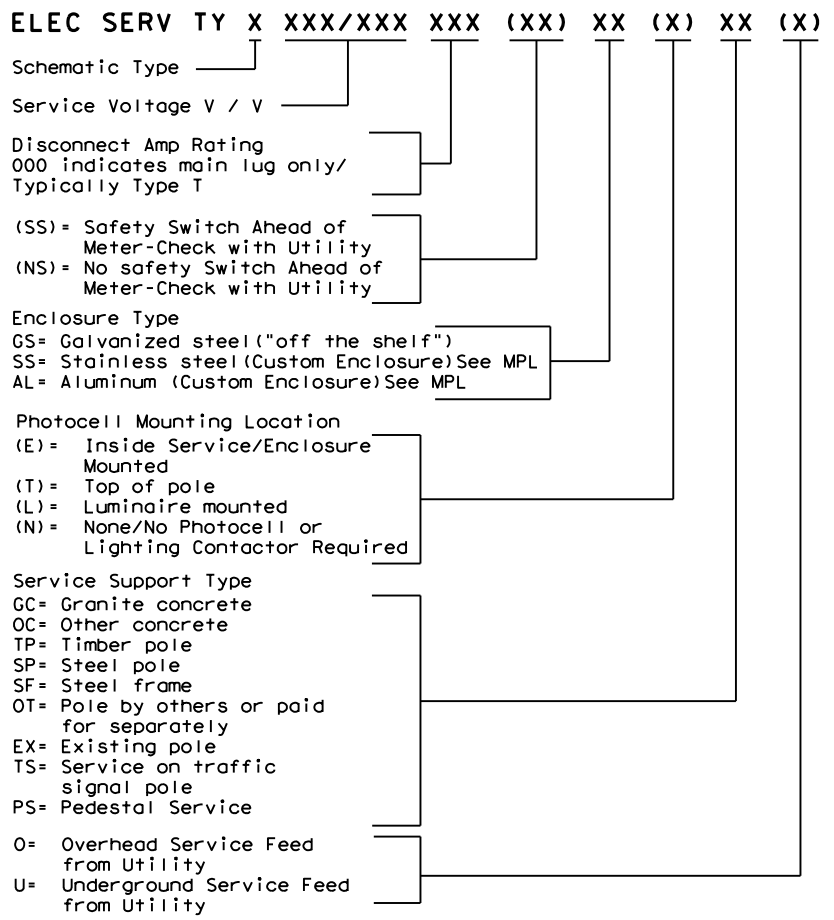
\* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.  
 \*\* Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.



## TOP MOUNTED PHOTOCELL

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

## EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE



Texas Department of Transportation

Traffic Operations Division Standard

### ELECTRICAL DETAILS SERVICE NOTES & DATA

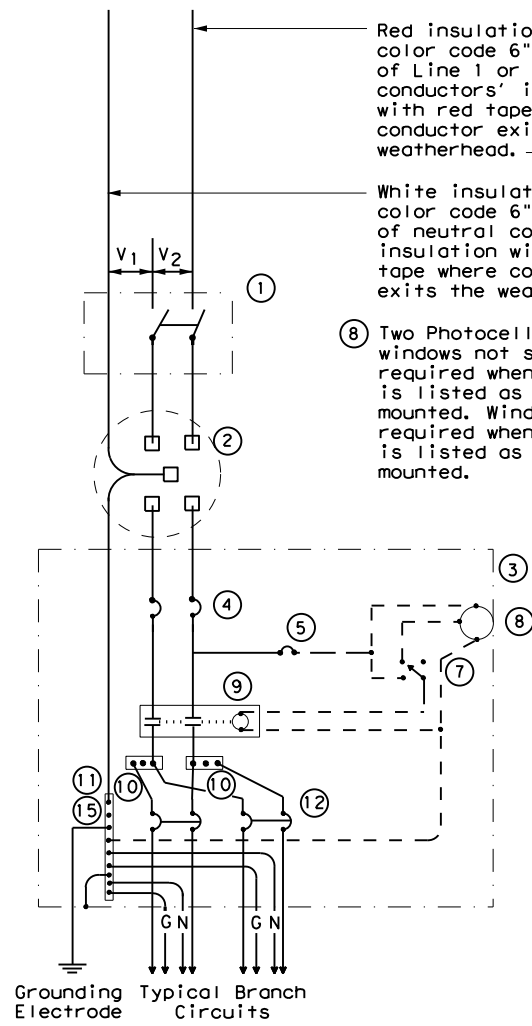
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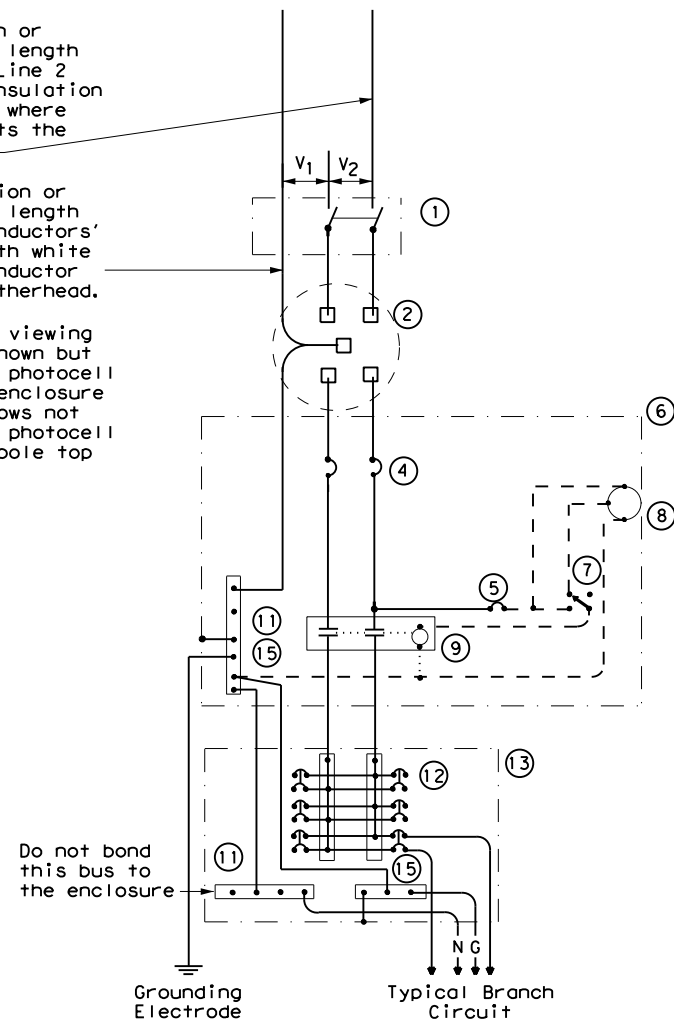
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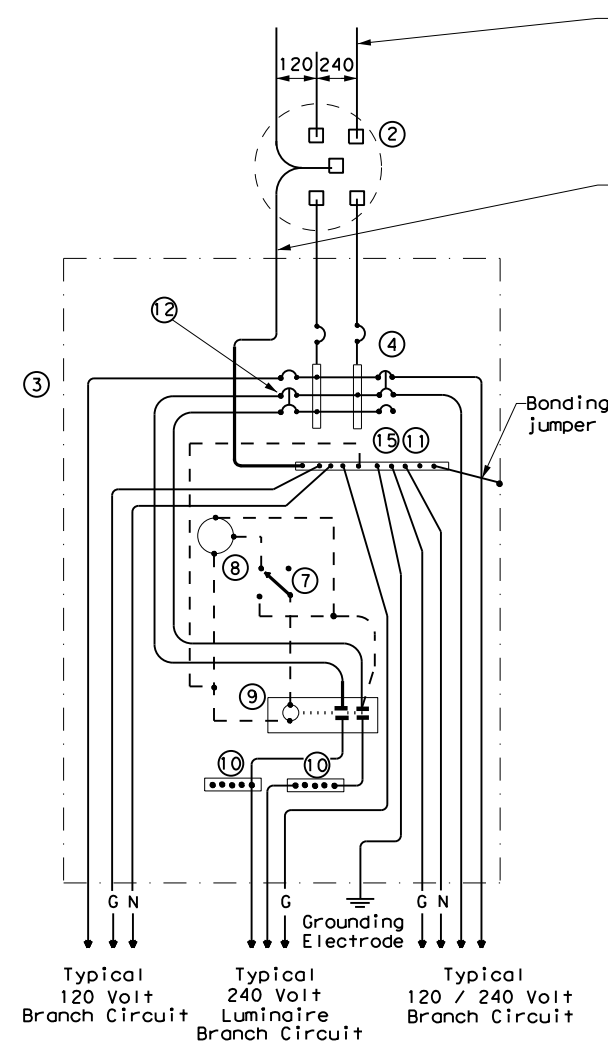
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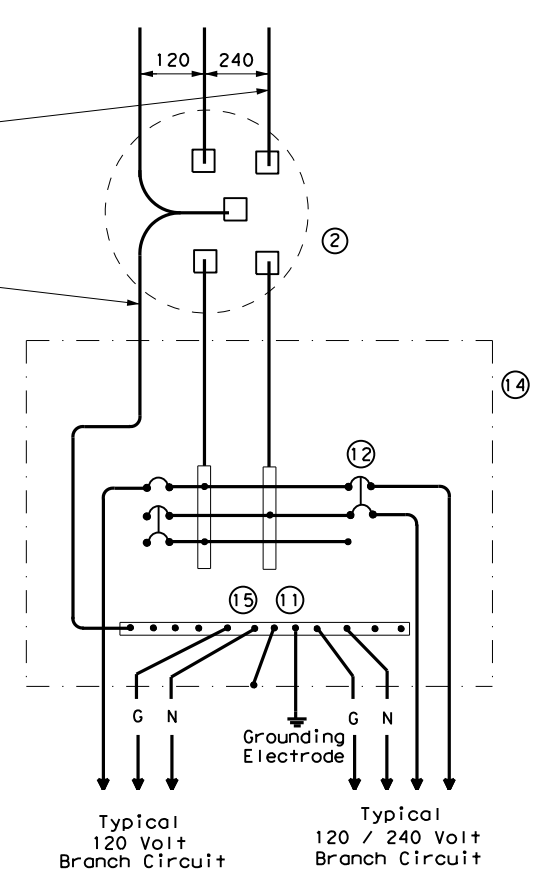
**SCHEMATIC TYPE A  
THREE WIRE**



**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

		Traffic Operations Division Standard	
<b>ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES</b>			
<b>ED(6) - 14</b>			
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**SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)**

- 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.
- 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.
- 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.
- 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.
- Furnish and install rigid metallic ellis in all steel pole and steel frame foundations for all conduits entering the service from underground.
- Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.
- 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.
- If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.
- 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.
- Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.
- Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

White insulation or color code 6" of neutral conductor's insulation with white tape where conductor exits weatherhead.

Red insulation or color code 6" length of Line 1 or Line 2 conductor's insulation with red tape where conductor exits the weatherhead. Conductor slack length, 12" min., 18" max.

2" to 6" 4" (typ.)

RMC

Service Enclosure

Inset A

Channel bracket or other arrangement approved by the Engineer. (Kindorf, Unistrut, B-line or equal.)

Inset A

Inset B

60" TYP.

2"

18" Min.

Class "C" concrete

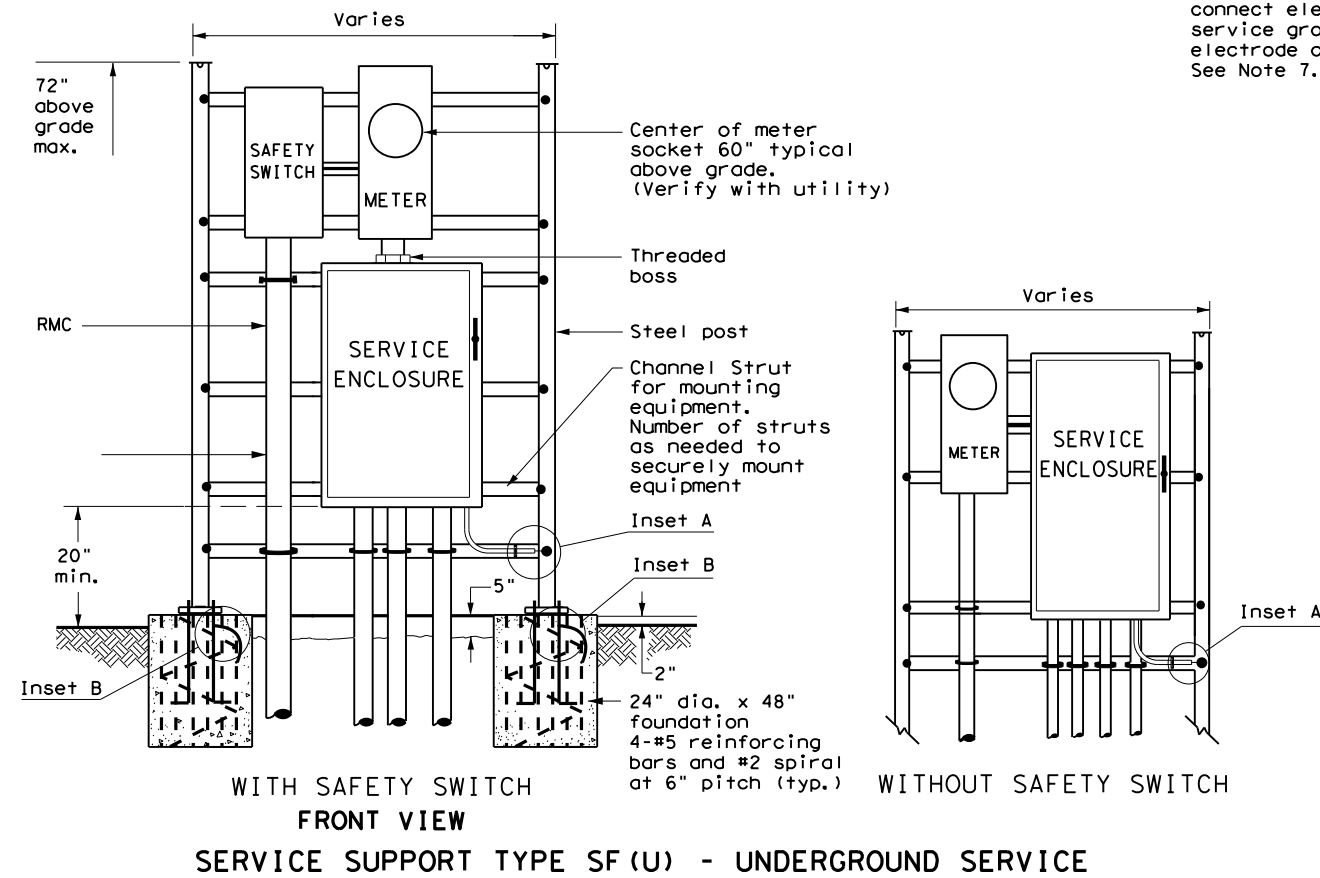
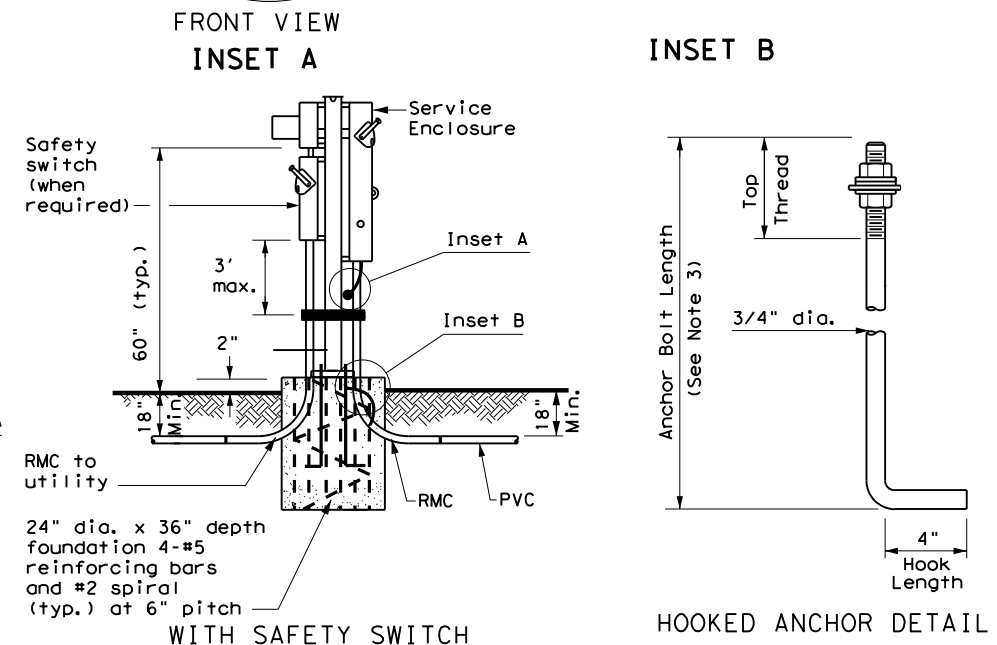
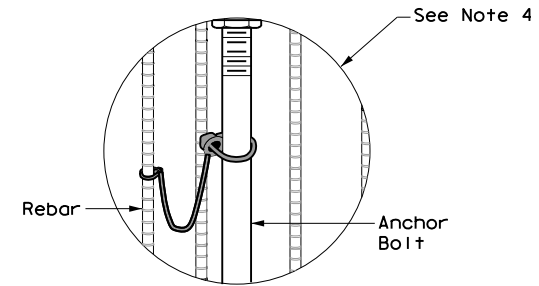
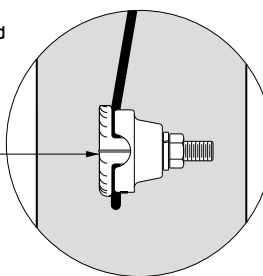
RMC

PVC

24 Dia. x 60" depth foundation 4-#5 reinforcing bars and #2 spiral (typ.) at 6" pitch

WITH SAFETY SWITCH  
WITHOUT SAFETY SWITCH  
**SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE**

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



White insulation or color code 6" of neutral conductor's insulation with white tape where conductor exits weatherhead.

Red insulation or color code 6" length of Line 1 or Line 2 conductor's insulation with red tape where conductor exits the weatherhead. Conductor slack length, 12" min., 18" max.

2" to 6" 4" (typ.)

RMC

Service Enclosure

Inset A

Channel bracket or other arrangement approved by the Engineer. (Kindorf, Unistrut, B-line or equal.)

Inset A

Inset B

60" TYP.

2"

18" Min.

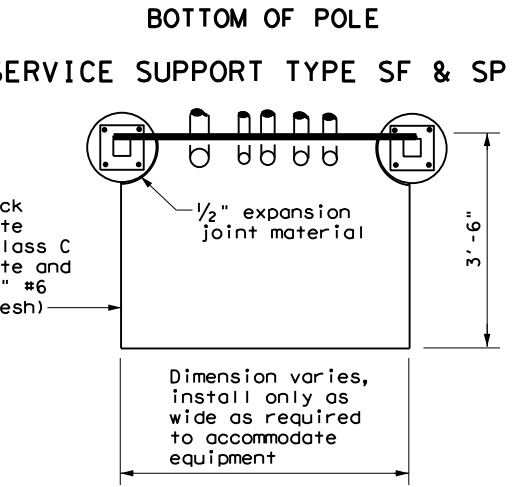
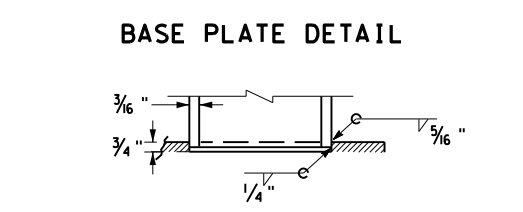
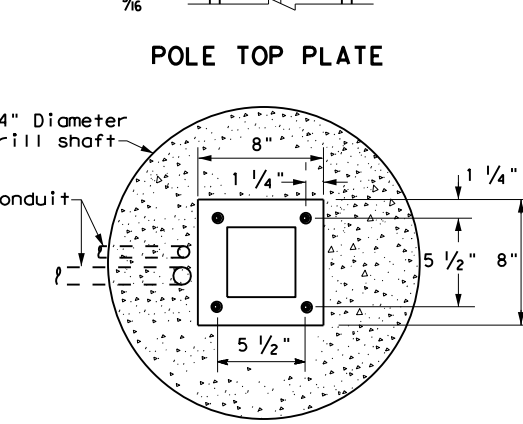
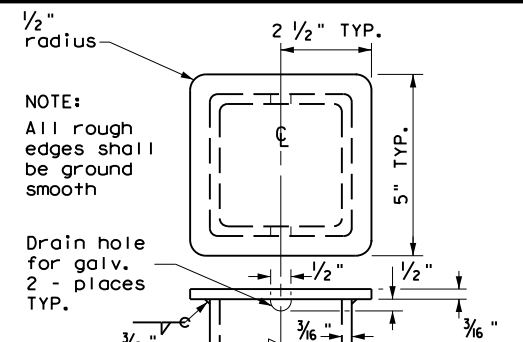
Class "C" concrete

RMC

PVC

24 Dia. x 60" depth foundation 4-#5 reinforcing bars and #2 spiral (typ.) at 6" pitch

WITH SAFETY SWITCH  
WITHOUT SAFETY SWITCH  
**SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE**



**SERVICE SUPPORT TYPE SF (O) & SF (U)**

		Traffic Operations Division Standard	
<b>ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF &amp; SP ED(7)-14</b>			
FILE: ed7-14.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT
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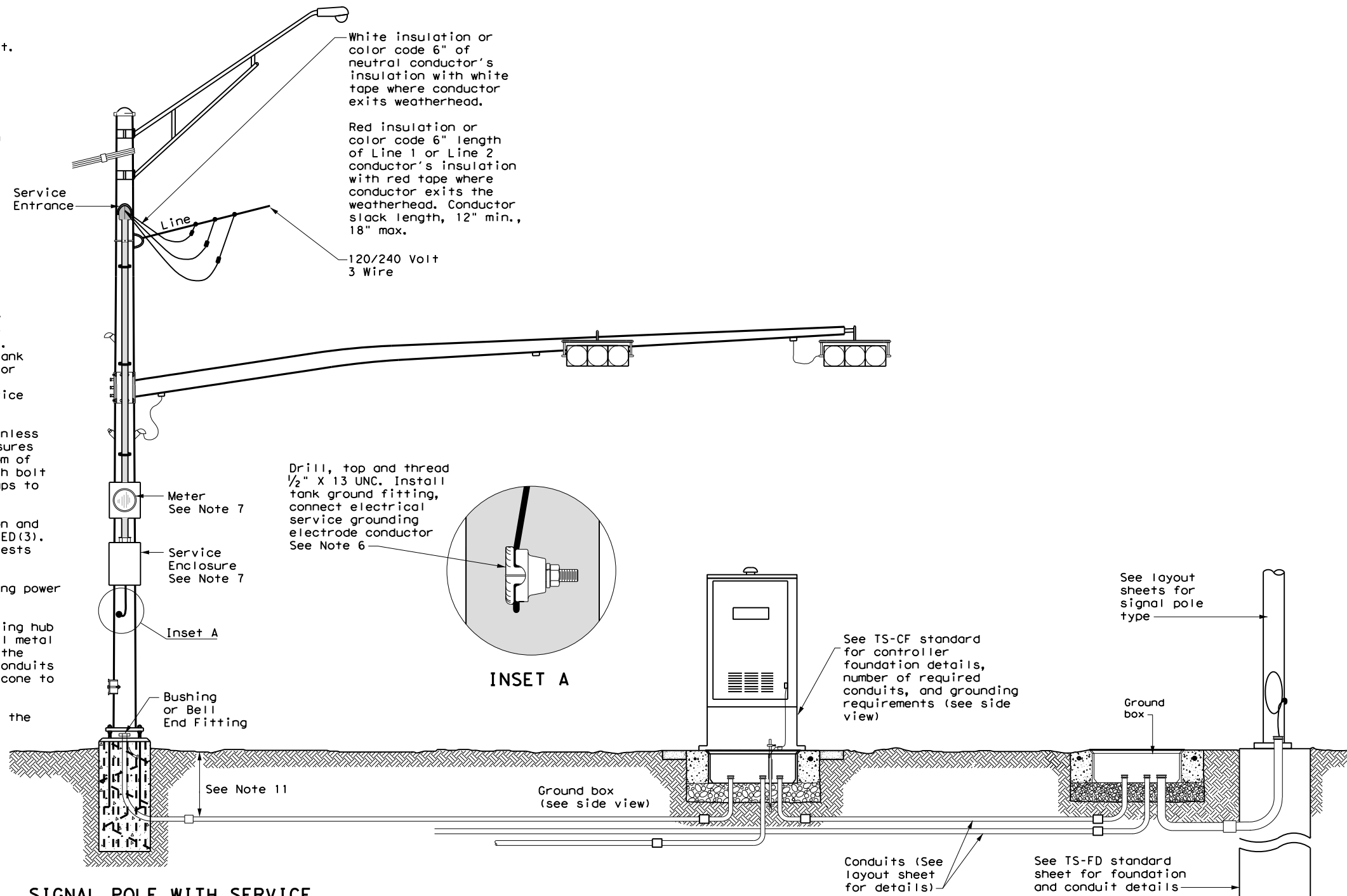


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**TRAFFIC SIGNAL NOTES**

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".

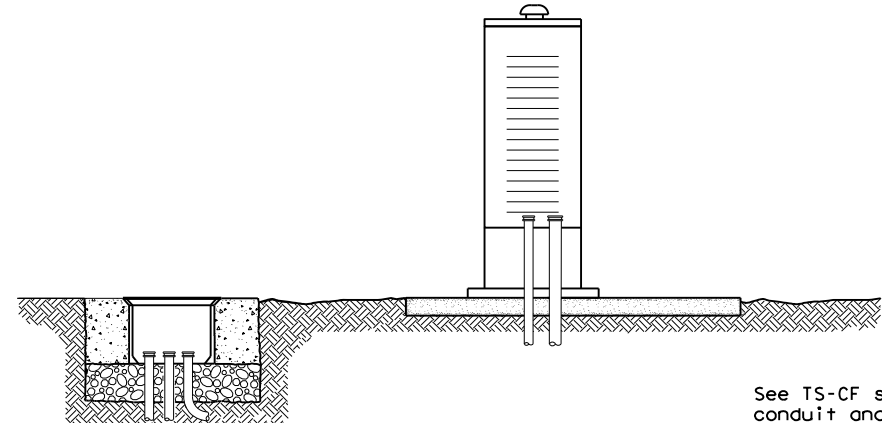


**SIGNAL POLE WITH SERVICE**

Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

**SIGNAL CONTROLLER FRONT VIEW**

**SIGNAL POLE**



**SIGNAL CONTROLLER SIDE VIEW**

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

**ELECTRICAL DETAILS  
 TYPICAL TRAFFIC SIGNAL  
 SYSTEM DETAILS  
 ED(8) - 14**

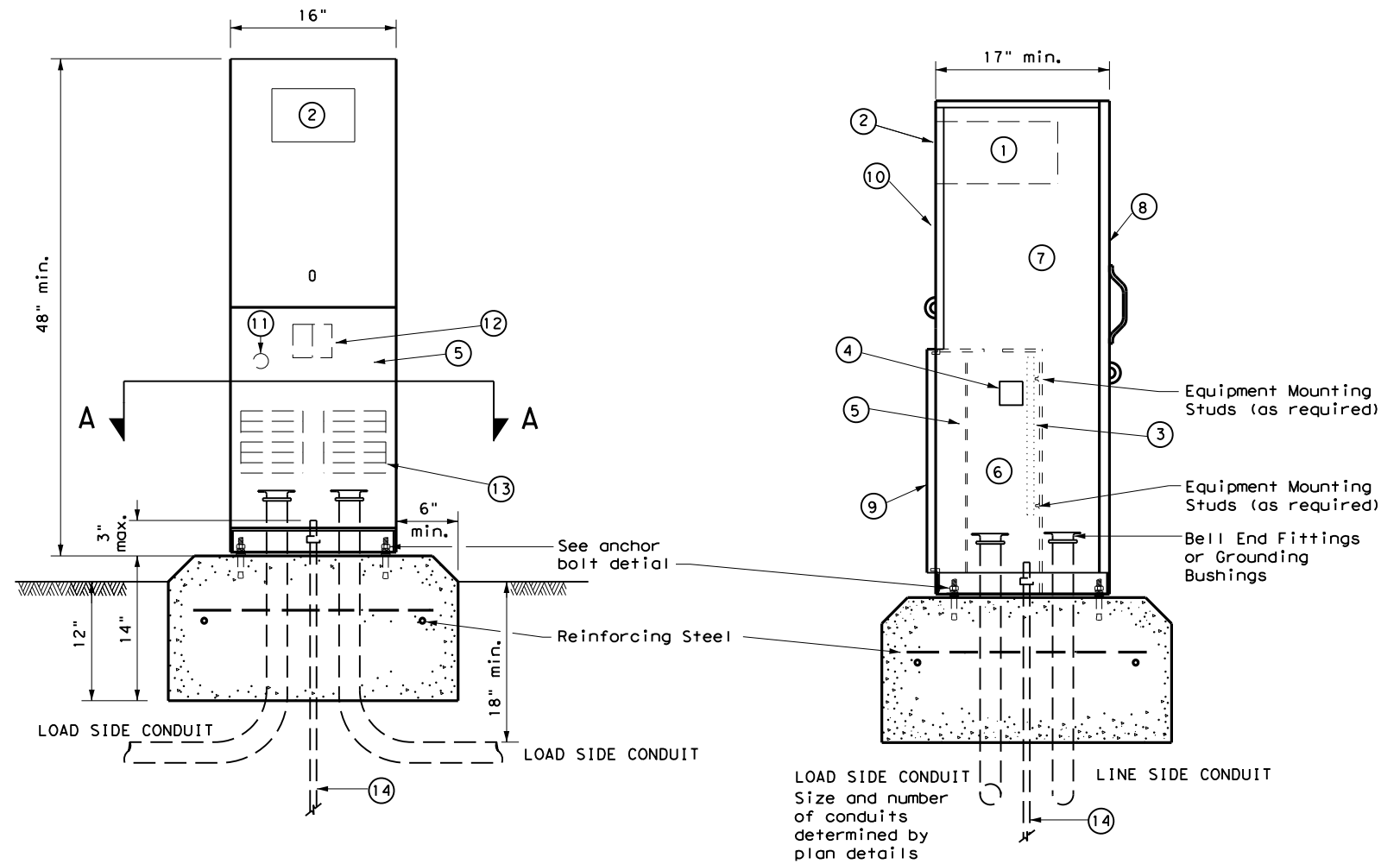
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© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
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### PEDESTAL SERVICE NOTES

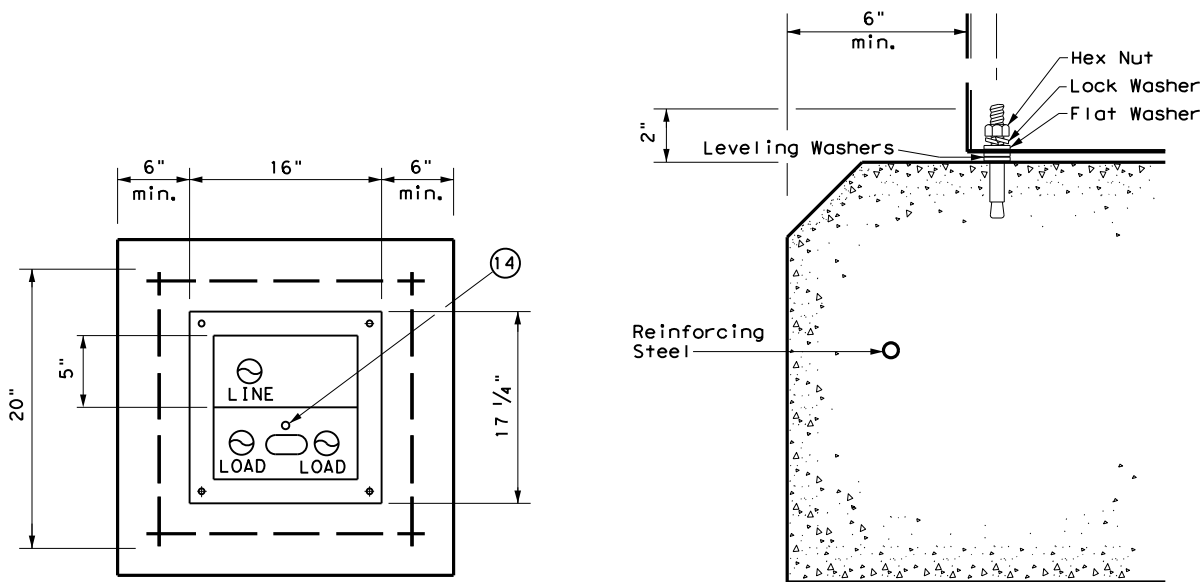
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS) 11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services." Provide pedestal electrical services as listed on the Material Producers List (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.
2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.
3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."
5. Install 1/2 in. X 2 1/16 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a 1/2 in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than 1/8 in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of 1/8 in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within 1/4 in. Repair rocking or movement of the service enclosure at no additional cost to the department.
7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.
8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.



FRONT VIEW

SIDE VIEW

TYPE C shown, TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SECTION A-A

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'

		Traffic Operations Division Standard	
<b>ELECTRICAL DETAILS          ELECTRICAL SERVICE SUPPORT          PEDESTAL SERVICE TYPE PS</b>			
<b>ED(9) - 14</b>			
FILE: ed9-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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REVISIONS	0087	02	059, ETC. SH 359, ETC.
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CRP	JIM WELLS, ETC.	109	

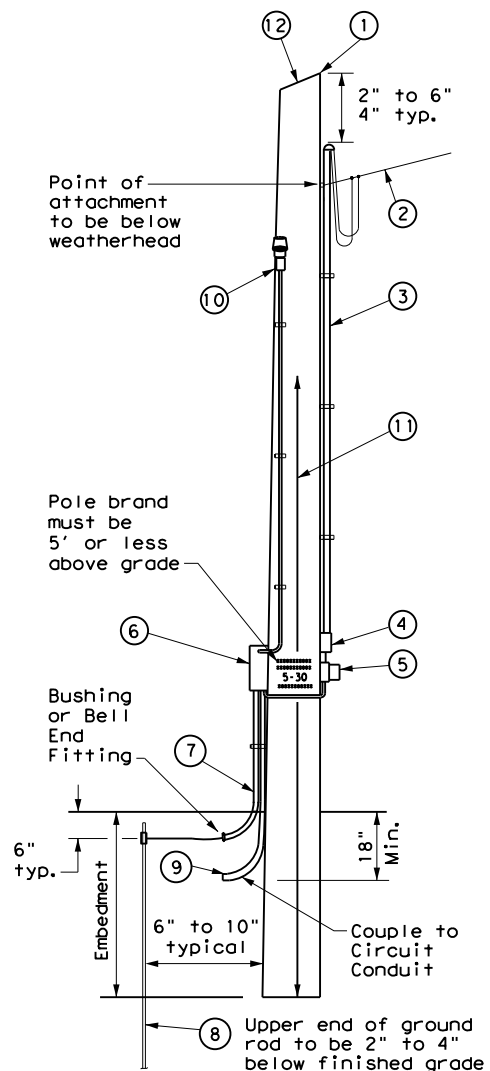
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**TIMBER POLE (TP) SERVICE SUPPORT NOTES**

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 3/8 in. max. depth and 1 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 3/4 in. maximum depth, and 1 1/2 in. to 1 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, 1/4 in. minimum diameter by 1 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 1/2 in. PVC to ground rod - extend 1/2 in. PVC 6 in. underground.
- 8 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.

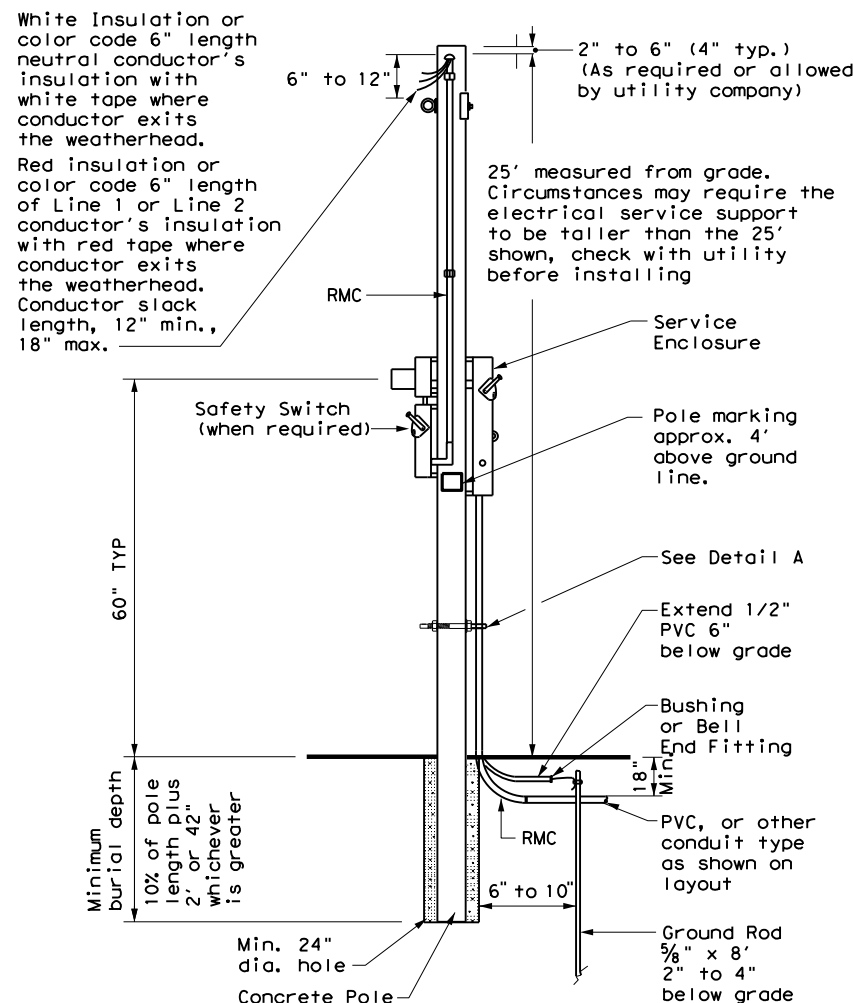


**SERVICE SUPPORT TYPE TP (O)**

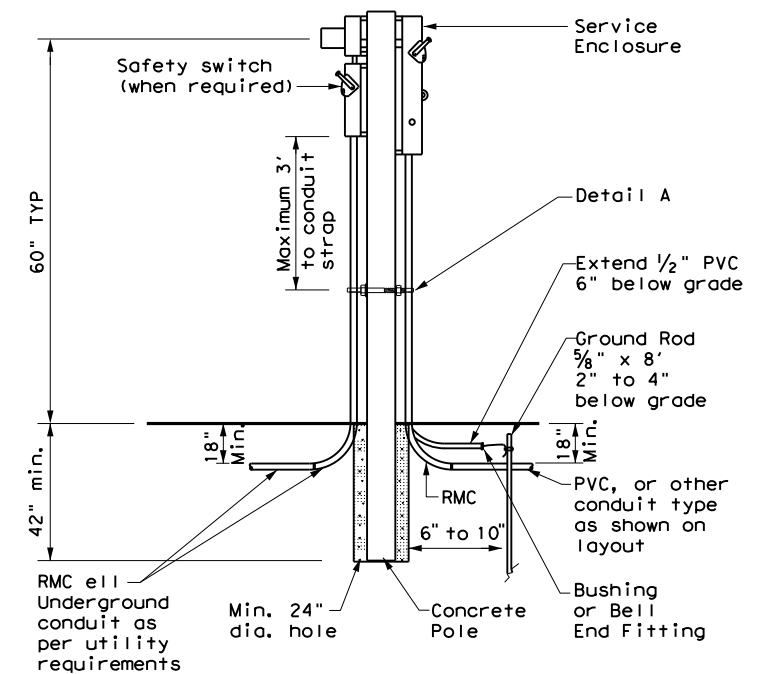
**GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES**

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

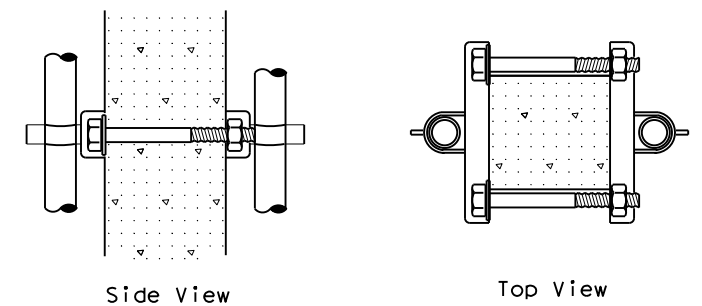
1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' 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 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 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**

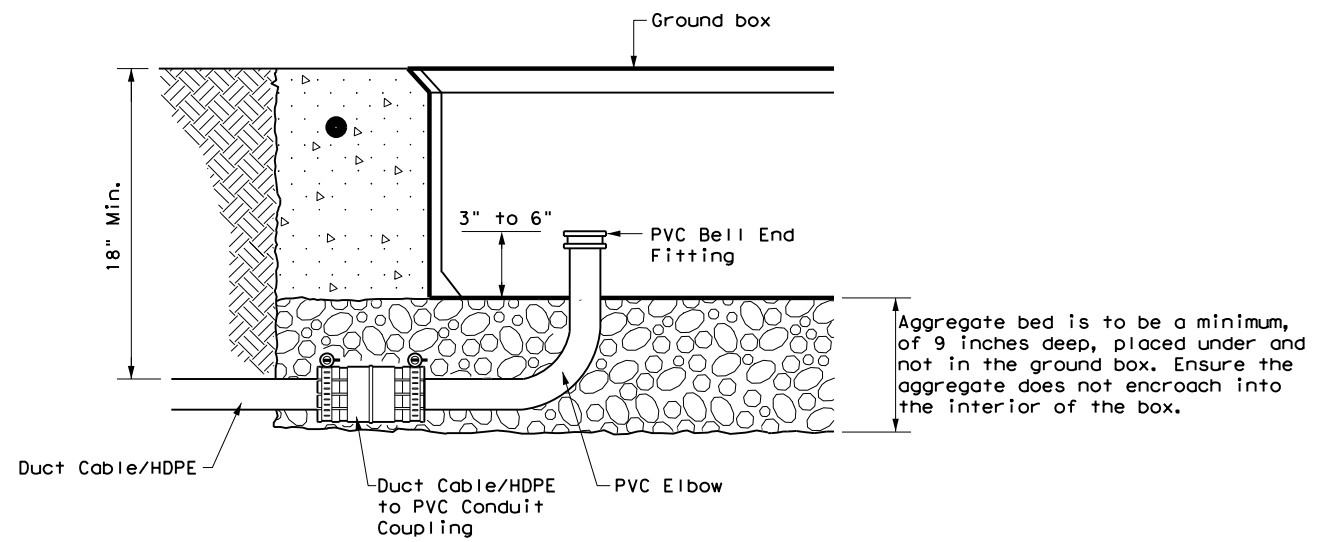
See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

		<b>Traffic Operations Division Standard</b>	
<b>ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, &amp; TP</b>			
<b>ED(10)-14</b>			
FILE: ed10-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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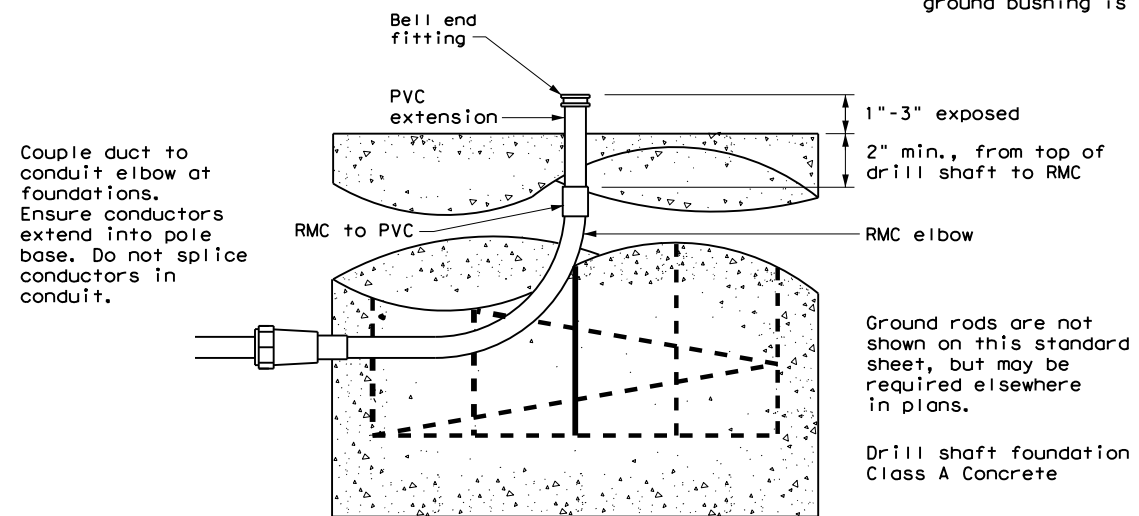
**DUCT CABLE & HDPE CONDUIT NOTES**

1. Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.
2. Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.
3. Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.
4. Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."
6. When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.
7. Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.
8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.
9. Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.

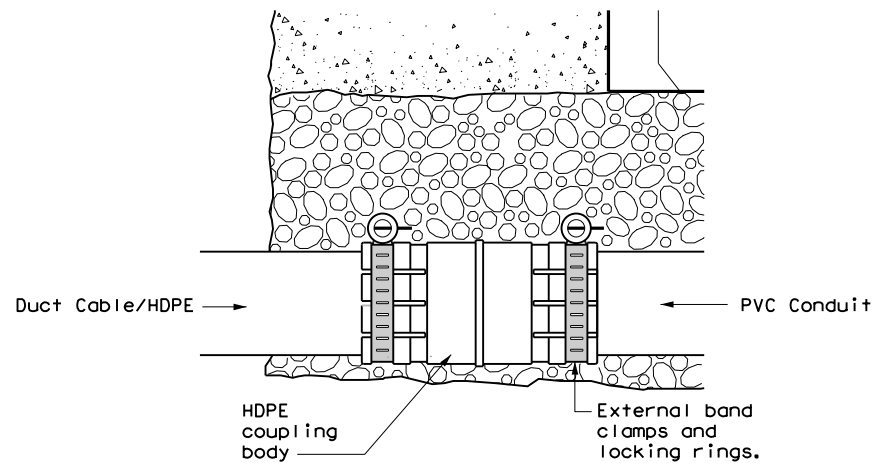


**DUCT CABLE/HDPE AT GROUND BOX**

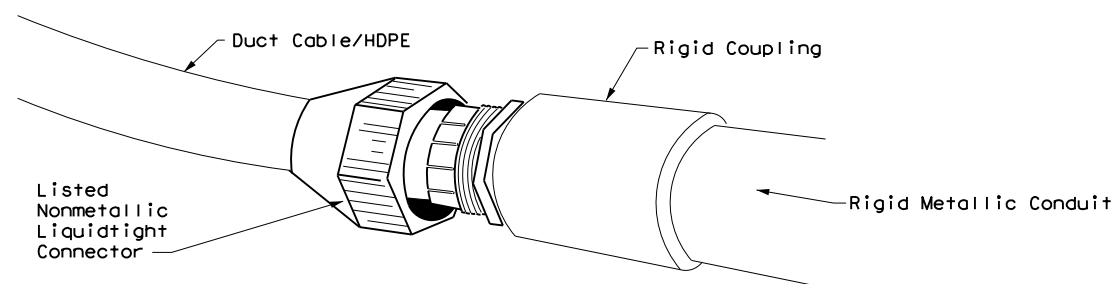
When the upper end of an RMC Ell does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



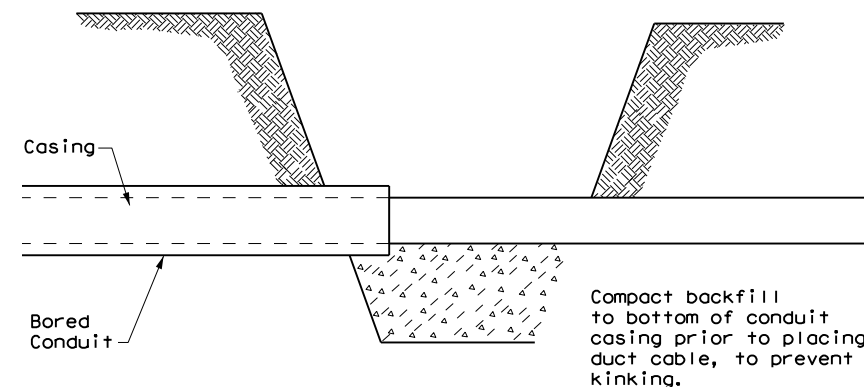
**DUCT CABLE / HDPE AT FOUNDATION**



**DUCT CABLE/HDPE TO PVC**



**DUCT CABLE/HDPE TO RMC**



**BORE PIT DETAIL**

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				<b>Traffic Operations Division Standard</b>	
<p><b>ELECTRICAL DETAILS</b></p> <p><b>DUCT CABLE / HDPE CONDUIT</b></p> <p><b>ED(11)-14</b></p>					
FILE:	ed11-14.dgn	DN:	TxDOT	CK:	TxDOT
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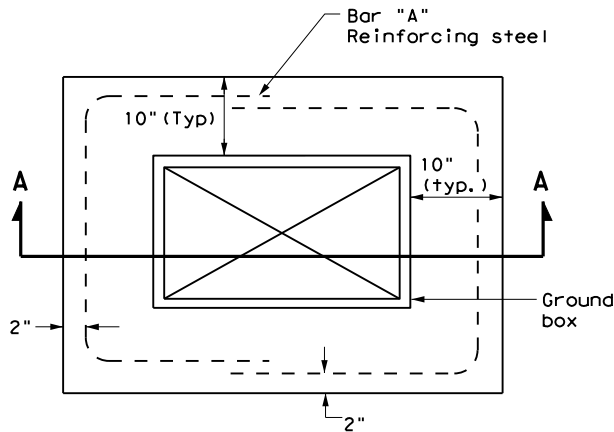
### BATTERY BOX GROUND BOXES NOTES

#### A. MATERIALS

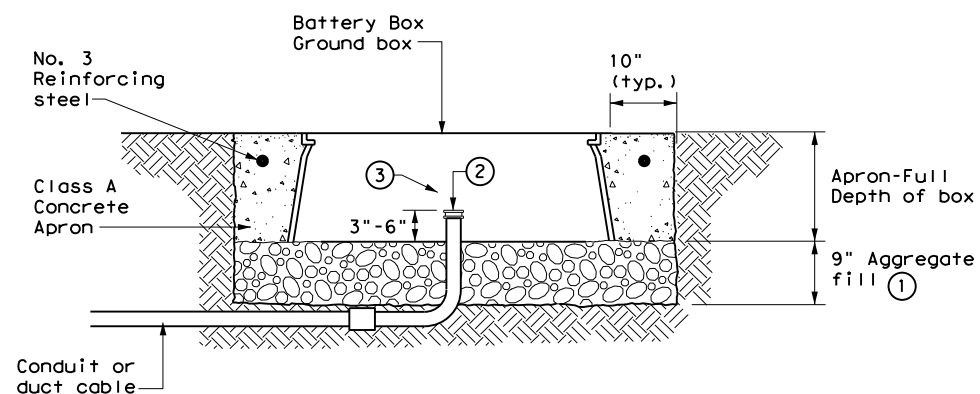
1. Provide polymer concrete or fiberglass reinforced plastic (FRP) battery box ground box and cover in accordance with Departmental Material Specification (DMS) 11071 "Battery Box Ground Boxes." Battery box will accommodate up to 4 batteries, each measuring 8 in. x 13.5 in. x 10 in. (W x L x D). Label battery box ground box cover in accordance with DMS 11071.
2. Supply a marine grade batteries with covers. Secure the marine grade batteries with covers to the stainless steel rack in the bottom of the ground box with tie down straps.

#### B. CONSTRUCTION METHODS

1. Ensure conduit entry will not interfere with placement of the batteries in the battery box ground box.
2. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting battery box ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure the aggregate bed is in place and is a minimum of 9 in. deep prior to setting the box. Install battery box ground box on top of aggregate.
3. Cast battery 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. Battery box ground box aprons, including concrete and reinforcing steel, are subsidiary to battery box ground boxes when called for by descriptive code.
4. Bolt covers down when not working in battery box ground boxes. Keep bolt holes in the box clear of dirt.



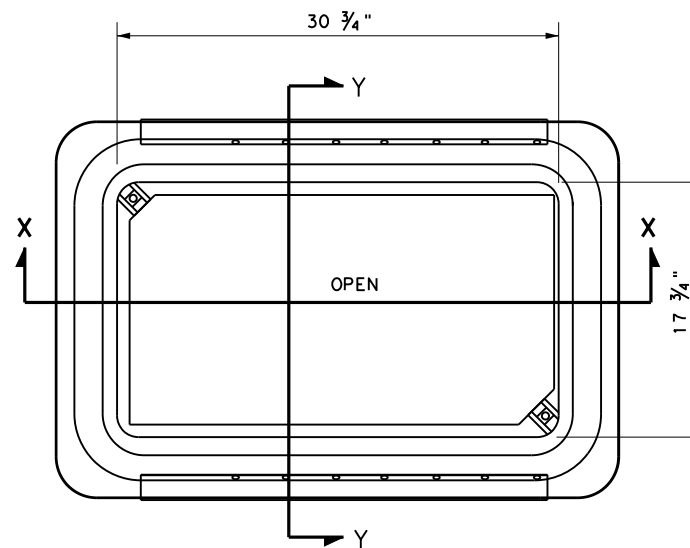
PLAN VIEW



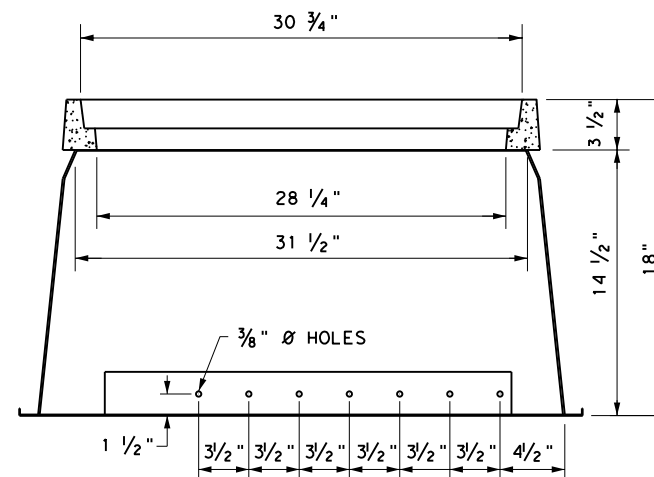
SECTION A - A

#### APRON FOR BATTERY BOX GROUND BOXES

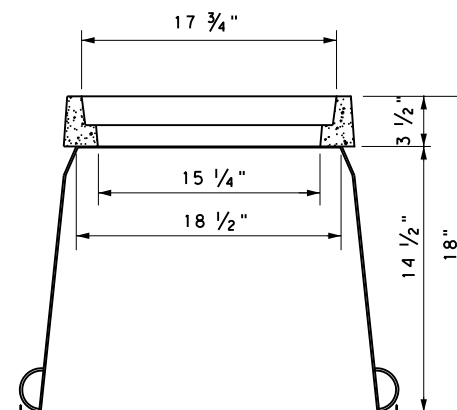
- ① Place aggregate under the box and not in the box. Aggregate should not encroach on the interior volume of the box.
- ② Install bushing or bell end fitting on the upper end of allells.
- ③ Install all conduits in a neat and workmanlike manner.



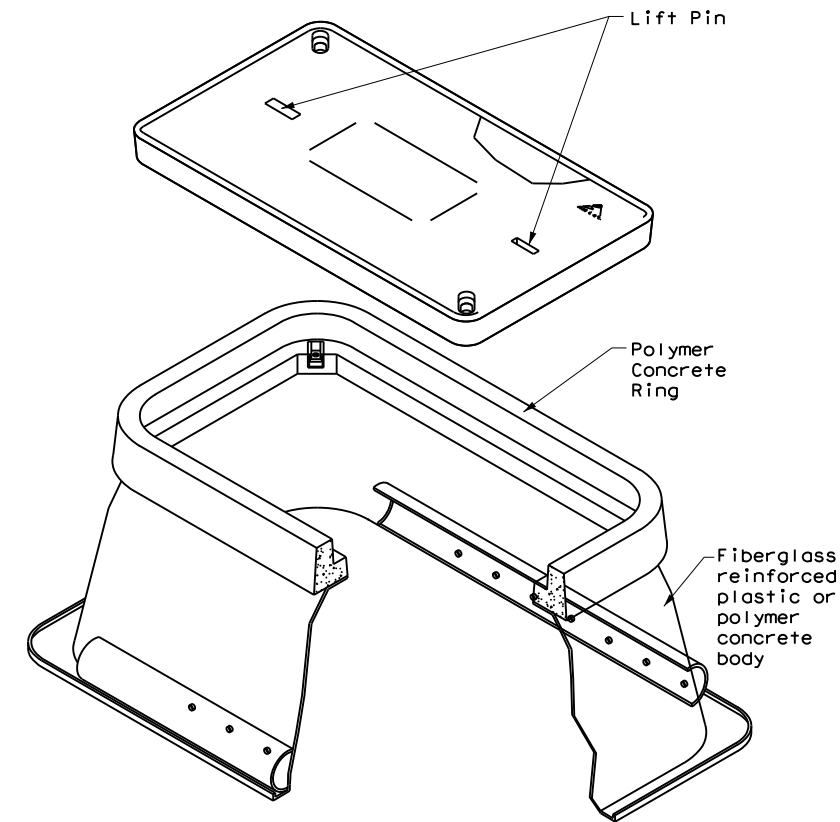
BATTERY BOX TOP VIEW



SECTION X-X

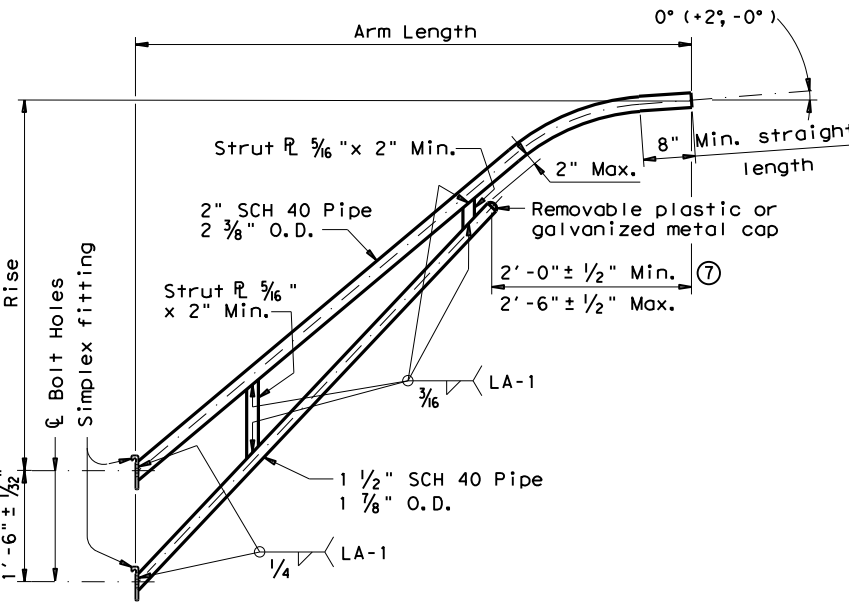


SECTION Y-Y



		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS</h2> <h3>BATTERY BOX GROUND BOXES</h3> <h3>ED(12)-14</h3>			
FILE: ed12-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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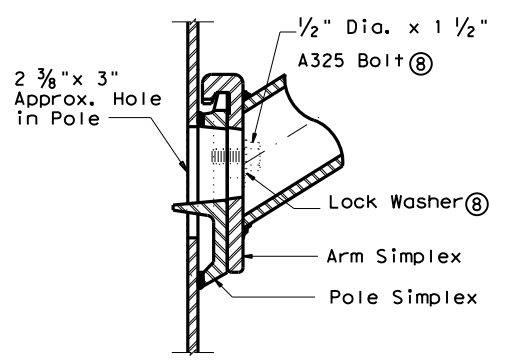
**LUMINAIRE ARM**

**LUMINAIRE ARM DIMENSIONS**

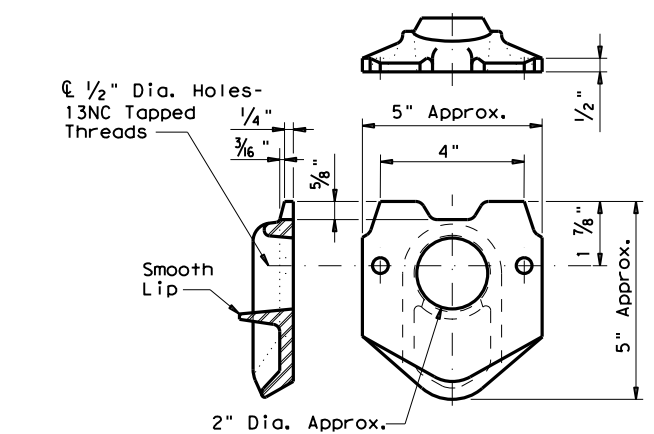
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

**ARM ASSEMBLY FABRICATION TOLERANCES TABLE**

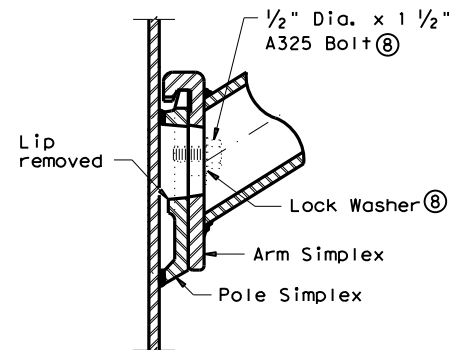
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"



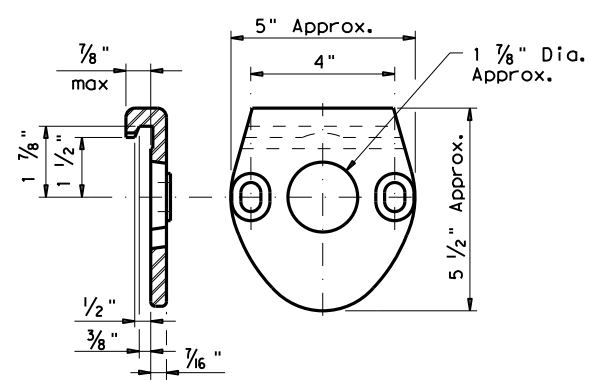
**UPPER SIMPLEX FITTING**  
(Gusset not shown for clarity)



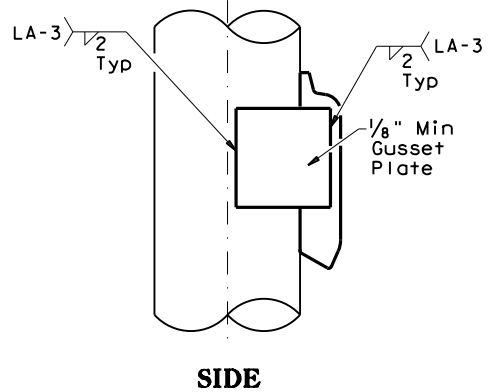
**POLE SIMPLEX DETAIL**



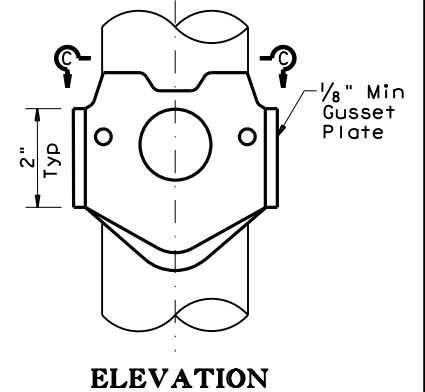
**LOWER SIMPLEX FITTING**  
(Gusset not shown for clarity)



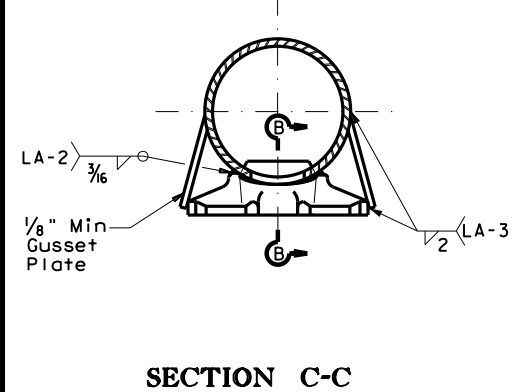
**ARM SIMPLEX DETAIL**



**SIDE**

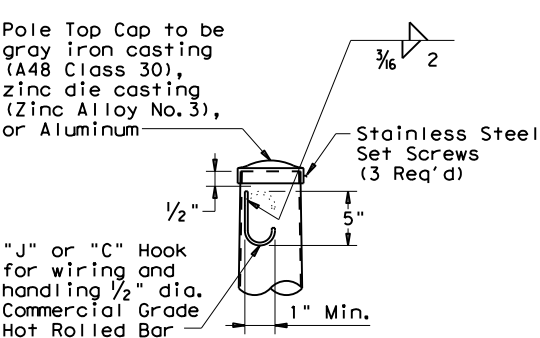


**ELEVATION**

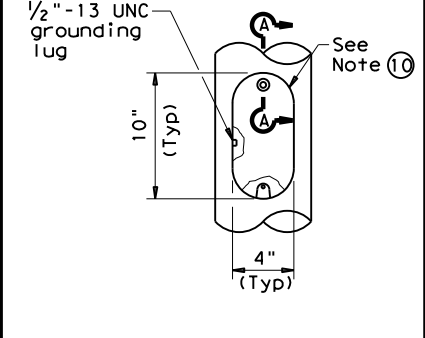


**SECTION C-C**

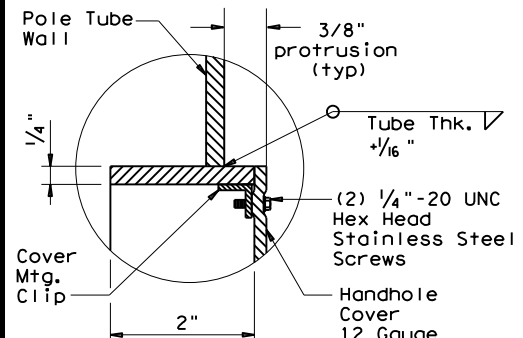
**SIMPLEX ATTACHMENT DETAIL**



**POLE TOP**



**ELEVATION**



**SECTION A-A**

**HANDHOLE**

**NOTES:**

- ④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- ⑤ 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.
- ⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.
- ⑦ 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.
- ⑧ Each pole simplex fitting shall be supplied with 2 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.
- ⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.
- ⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

**MATERIALS**

Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted

**ROADWAY ILLUMINATION POLES**  
**RIP (3) - 19**

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
© TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0087	02	059, ETC.	SH 359, ETC.
7-17	DIST	COUNTY	SHEET NO.	
12-19	CRP	JIM WELLS, ETC.	113	

**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

**1.0 SITE/PROJECT DESCRIPTION**

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**  
0087-02-059

**1.2 PROJECT LIMITS:**

From: 1,000 FT West of Wendt Street

To: 600 FT West of Wendt Street

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 27.9482004, (Long) -97.9426862

END: (Lat) 27.9563591, (Long) -97.9370663

**1.4 TOTAL PROJECT AREA (Acres):** 7.988

**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 7.988

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

Install PHB (Hawk System), refresh pavement markings and signs relative to the Hawk System and install sidewalks, ramps, and concrete medians

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description
Clareville Loam, 0 to 1% Slopes	78.2%, Well drained, low rate of runoff
Lattas Clay, 0 to 1% Slopes	21.8%, Somewhat poorly drained, high rate of runoff

**1.8 PROJECT SPECIFIC LOCATIONS (PSLs):**

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s
N/A	

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

**1.9 CONSTRUCTION ACTIVITIES:**

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- Mobilization
- Install sediment and erosion controls
- Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
- Grading operations, excavation, and embankment
- Excavate and prepare subgrade for proposed pavement widening
- Remove existing culverts, safety end treatments (SETs)
- Remove existing metal beam guard fence (MBGF), bridge rail
- Install proposed pavement per plans
- Install culverts, culvert extensions, SETs
- Install mow strip, MBGF, bridge rail
- Place flex base
- Rework slopes, grade ditches
- Blade windrowed material back across slopes
- Revegetation of unpaved areas
- Achieve site stabilization and remove sediment and erosion control measures
- Other: Install HAWK System Pedestrian Crosswalk, Construct Concrete Median & Sidewalks, install RCP
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.10 POTENTIAL POLLUTANTS AND SOURCES:**

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
- Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- \_\_\_\_\_

Other: \_\_\_\_\_

Other: \_\_\_\_\_

Other: \_\_\_\_\_

**1.11 RECEIVING WATERS:**

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
N/A	

\* Add (\*) for impaired waterbodies with pollutant in ( ).

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

- Development of plans and specifications
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: \_\_\_\_\_

Other: \_\_\_\_\_

Other: \_\_\_\_\_

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

- Day To Day Operational Control
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years

Other: \_\_\_\_\_

Other: \_\_\_\_\_

Other: \_\_\_\_\_

**1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:**

MS4 Entity
N/A



*Jorge A. Perez*  
04/07/2024

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

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Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			114
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	JIM WELLS, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0087	02	059, ETC.	SH 359, ETC.



**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

**2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE**

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

**2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:**

**T / P**

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: Presentation of Natural Resources
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.2 SEDIMENT CONTROL BMPs:**

**T / P**

- Biodegradable Erosion Control Logs
- Dewatering Controls
- Inlet Protection
- Rock Filter Dams/ Rock Check Dams
- Sandbag Berms
- Sediment Control Fence
- Stabilized Construction Exit
- Floating Turbidity Barrier
- Vegetated Buffer Zones
- Vegetated Filter Strips
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

**T / P**

- Sediment Trap
  - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
  - Not required (<10 acres disturbed)
  - Required (>10 acres) and implemented.
    - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - 3,600 cubic feet of storage per acre drained
  - Required (>10 acres), but not feasible due to:
    - Available area/Site geometry
    - Site slope/Drainage patterns
    - Site soils/Geotechnical factors
    - Public safety
    - Other: \_\_\_\_\_

**2.3 PERMANENT CONTROLS:**

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.4 OFFSITE VEHICLE TRACKING CONTROLS:**

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Daily street sweeping
- Other: Stabalized construction entrance

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.5 POLLUTION PREVENTION MEASURES:**

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: \_\_\_\_\_

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.6 VEGETATED BUFFER ZONES:**

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.7 ALLOWABLE NON-STORMWATER DISCHARGES:**

- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

**2.8 DEWATERING:**

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

**2.9 INSPECTIONS:**

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

**2.10 MAINTENANCE:**

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.



*Jorge A. Perez*  
04/07/2024

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

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Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			115
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	JIM WELLS, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0087	02	059, ETC.	SH 359, ETC.

**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

**1.0 SITE/PROJECT DESCRIPTION**

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**  
1052-03-032

**1.2 PROJECT LIMITS:**

From: 1,000 FT West of Lamar Street  
To: 0.56 MI East of Lamar Street

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 28.0873046, (Long) -97.8189510  
END: (Lat) 28.0800193, (Long) -97.8092035

**1.4 TOTAL PROJECT AREA (Acres):** 9.430

**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 9.430

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

Install PHB (Hawk System), refresh pavement markings and signs relative to the Hawk System and install sidewalks, ramps, and concrete medians

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description
Calallen Sandy Clay Loam, 0 to 1% Slopes	24.6%, Well drained, negligible rate of runoff
Victoria Clay, 0 to 1% Slopes	55.3%, Well drained, medium rate of runoff
Willacy Fine Sandy Loam, 0 to 1% Slopes	20%, Well drained, negligible rate of runoff

**1.8 PROJECT SPECIFIC LOCATIONS (PSLs):**

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s
N/A	

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

**1.9 CONSTRUCTION ACTIVITIES:**

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- Mobilization
- Install sediment and erosion controls
- Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
- Grading operations, excavation, and embankment
- Excavate and prepare subgrade for proposed pavement widening
- Remove existing culverts, safety end treatments (SETs)
- Remove existing metal beam guard fence (MBGF), bridge rail
- Install proposed pavement per plans
- Install culverts, culvert extensions, SETs
- Install mow strip, MBGF, bridge rail
- Place flex base
- Rework slopes, grade ditches
- Blade windrowed material back across slopes
- Revegetation of unpaved areas
- Achieve site stabilization and remove sediment and erosion control measures
- Other: Install HAWK System Pedestrian Crosswalk, Construct Concrete Median & Sidewalks, install RCP

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.10 POTENTIAL POLLUTANTS AND SOURCES:**

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
- Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- \_\_\_\_\_

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.11 RECEIVING WATERS:**

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
N/A	

\* Add (\*) for impaired waterbodies with pollutant in ( ).

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

- Development of plans and specifications
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

- Day To Day Operational Control
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:**

MS4 Entity
N/A



*Jorge A. Perez*  
04/07/2024

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

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Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			116
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	JIM WELLS, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0087	02	059, ETC.	SH 359, ETC.



**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

**2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE**

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

**2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:**

**T / P**

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: Presentation of Natural Resources
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.2 SEDIMENT CONTROL BMPs:**

**T / P**

- Biodegradable Erosion Control Logs
- Dewatering Controls
- Inlet Protection
- Rock Filter Dams/ Rock Check Dams
- Sandbag Berms
- Sediment Control Fence
- Stabilized Construction Exit
- Floating Turbidity Barrier
- Vegetated Buffer Zones
- Vegetated Filter Strips
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

**T / P**

- Sediment Trap
  - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
  - Not required (<10 acres disturbed)
  - Required (>10 acres) and implemented.
    - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - 3,600 cubic feet of storage per acre drained
  - Required (>10 acres), but not feasible due to:
    - Available area/Site geometry
    - Site slope/Drainage patterns
    - Site soils/Geotechnical factors
    - Public safety
    - Other: \_\_\_\_\_

**2.3 PERMANENT CONTROLS:**

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.4 OFFSITE VEHICLE TRACKING CONTROLS:**

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Daily street sweeping
- Other: Stabilized construction entrance
- \_\_\_\_\_
- Other: \_\_\_\_\_
- \_\_\_\_\_
- Other: \_\_\_\_\_
- \_\_\_\_\_
- Other: \_\_\_\_\_
- \_\_\_\_\_

**2.5 POLLUTION PREVENTION MEASURES:**

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: \_\_\_\_\_
- \_\_\_\_\_
- Other: \_\_\_\_\_
- \_\_\_\_\_
- Other: \_\_\_\_\_
- \_\_\_\_\_
- Other: \_\_\_\_\_
- \_\_\_\_\_

**2.6 VEGETATED BUFFER ZONES:**

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.7 ALLOWABLE NON-STORMWATER DISCHARGES:**

- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

**2.8 DEWATERING:**

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

**2.9 INSPECTIONS:**

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

**2.10 MAINTENANCE:**

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.



*Jorge A. Perez*  
04/07/2024

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

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Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			117
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	JIM WELLS, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0087	02	059, ETC.	SH 359, ETC.

DATE: 4/6/2024  
 FILE: p:\t\tdot.projectwiseonline.com\txdot4\Documents\16 - CRP\Design Projects\008702059\4 - Design\Plan Set\9. Environmental\epic.dgn  
 DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

**I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402**

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

- 
- No Action Required     Required Action

Action No.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

**II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404**

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# \_\_\_\_\_

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

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The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

**Best Management Practices:**

Erosion	Sedimentation	Post-Construction TSS
<input type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

**III. CULTURAL RESOURCES**

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

- No Action Required     Required Action

Action No.

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**IV. VEGETATION RESOURCES**

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

- No Action Required     Required Action

Action No.

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**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.**

- No Action Required     Required Action

Action No.

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If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

**LIST OF ABBREVIATIONS**

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- \* Dead or distressed vegetation (not identified as normal)
- \* Trash piles, drums, canister, barrels, etc.
- \* Undesirable smells or odors
- \* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

- Yes     No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

- Yes     No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

- No Action Required     Required Action

Action No.

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**VII. OTHER ENVIRONMENTAL ISSUES**

(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required     Required Action

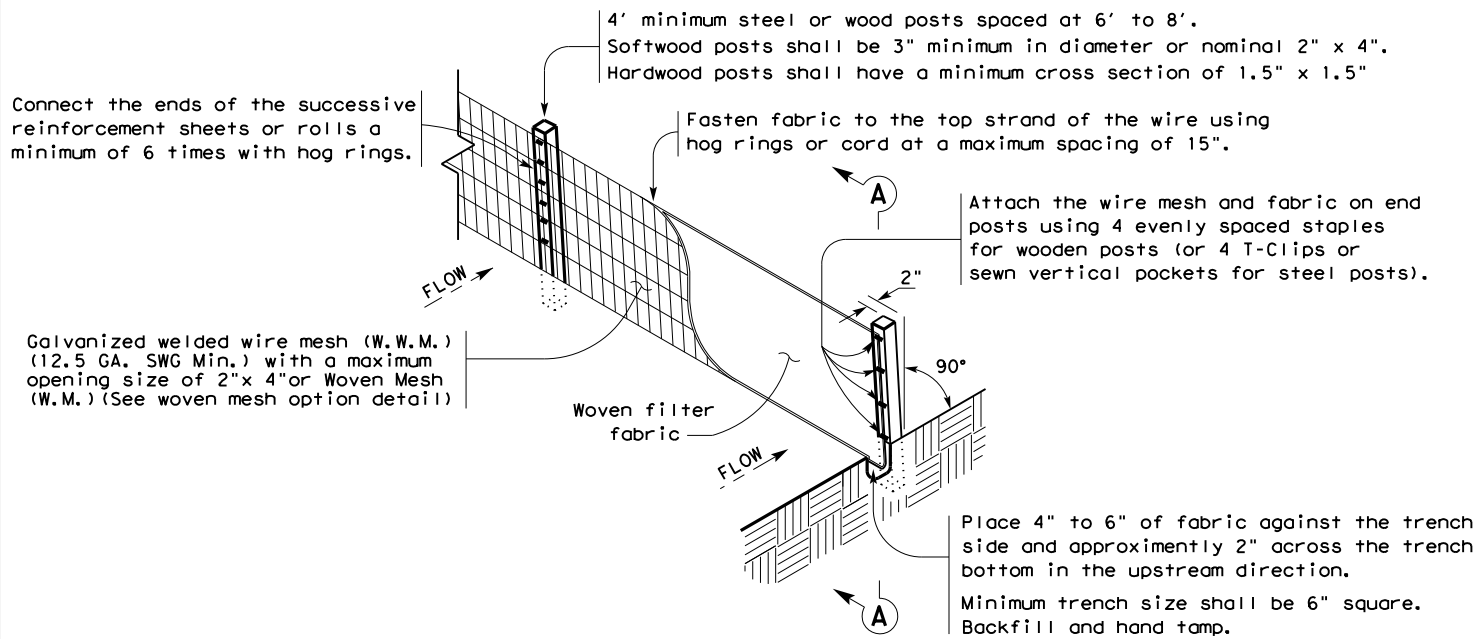
Action No.

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 <b>Texas Department of Transportation</b>		<b>Design Division Standard</b>			
<h2 style="margin: 0;">ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</h2> <h1 style="margin: 0;">EPIC</h1>					
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015		CONT	SECT	JOB	HIGHWAY
12-12-2011 (DS) REVISIONS		0087	02	059, ETC.	SH 359, ETC.
05-07-14 ADDED NOTE SECTION IV.		DIST	COUNTY	SHEET NO.	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.		CRP	JIM WELLS, ETC.	118	

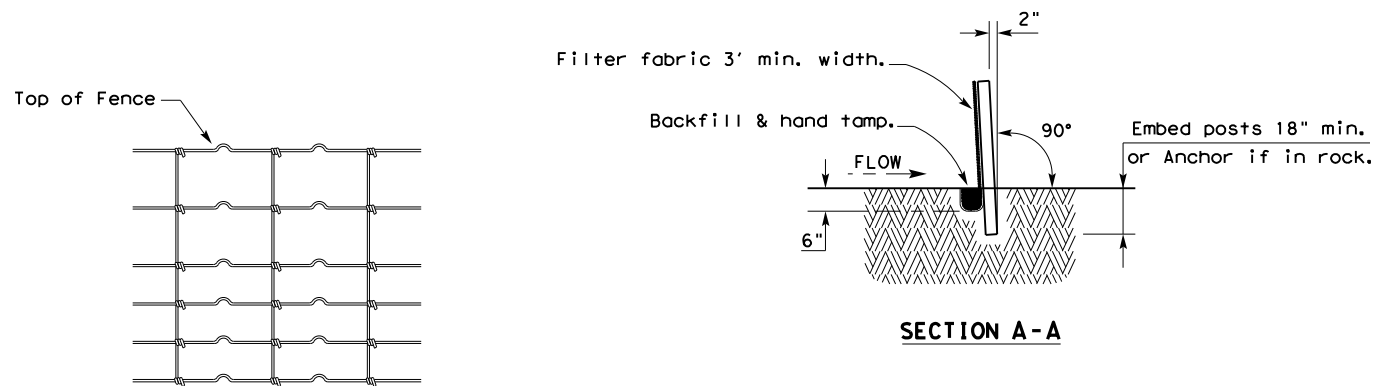


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**TEMPORARY SEDIMENT CONTROL FENCE**

SCF



**HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL**

Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

**SEDIMENT CONTROL FENCE USAGE GUIDELINES**

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

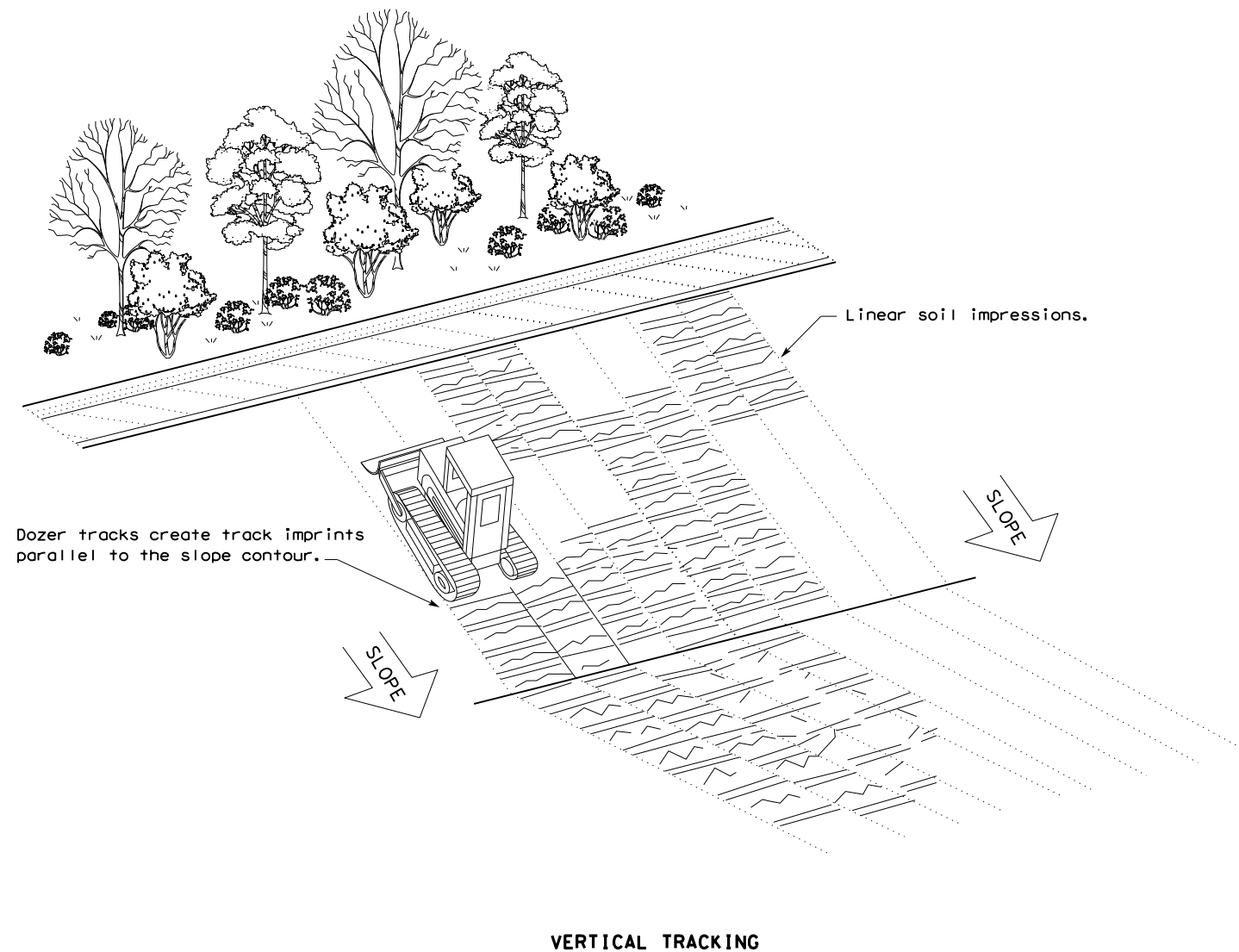
**LEGEND**

Sediment Control Fence

SCF

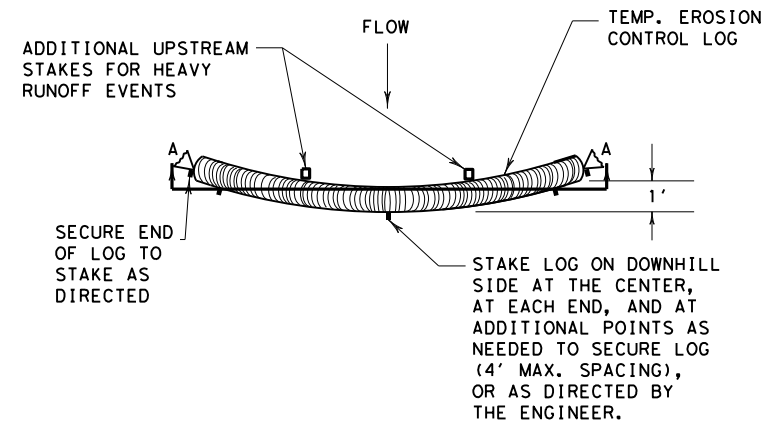
**GENERAL NOTES**

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.

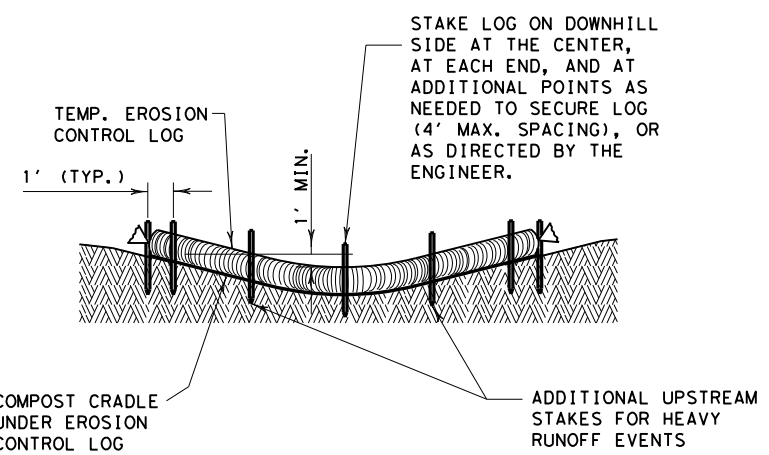


			Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE &amp; VERTICAL TRACKING</b> <b>EC(1) - 16</b>				
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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REVISIONS		0087 02	059, ETC. SH 359, ETC.	
DIST	COUNTY	SHEET NO.		
CRP	JIM WELLS, ETC.	119		

DATE: 4/6/2024  
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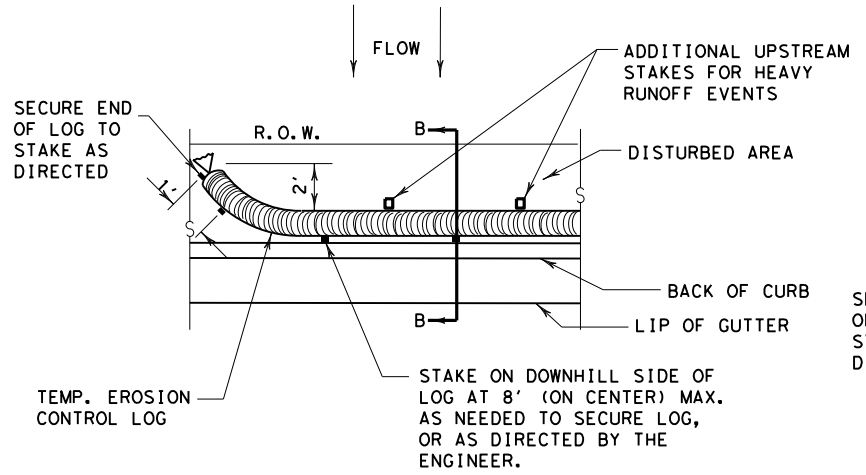


PLAN VIEW

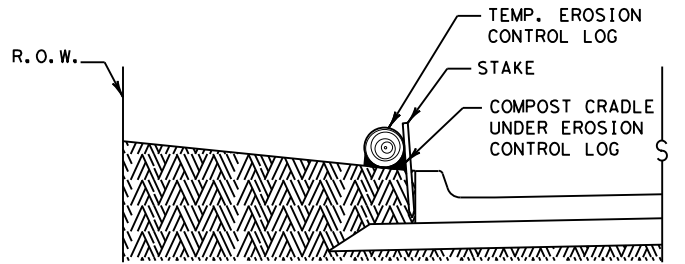


SECTION A-A  
EROSION CONTROL LOG DAM

CL-D

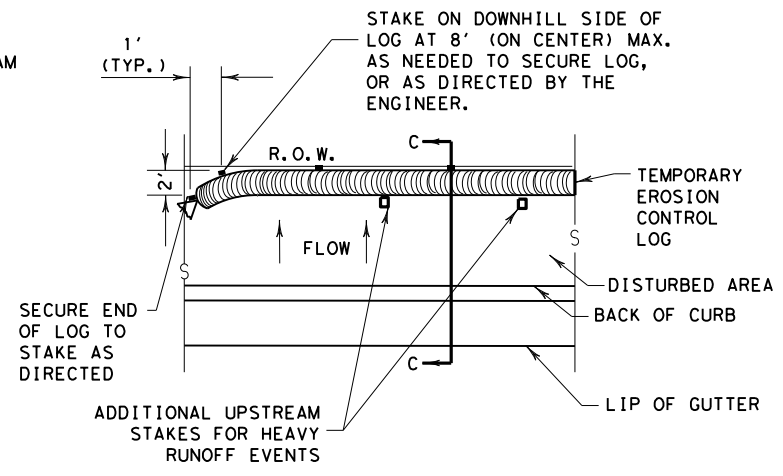


PLAN VIEW

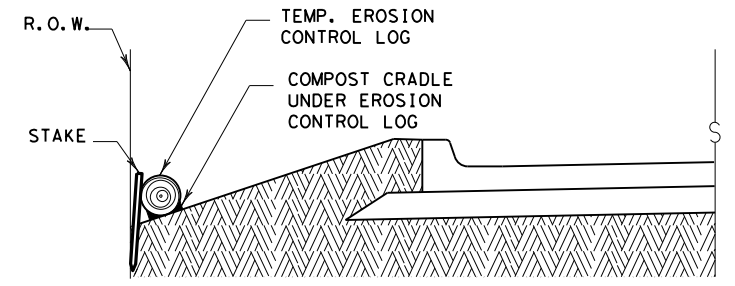


SECTION B-B  
EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



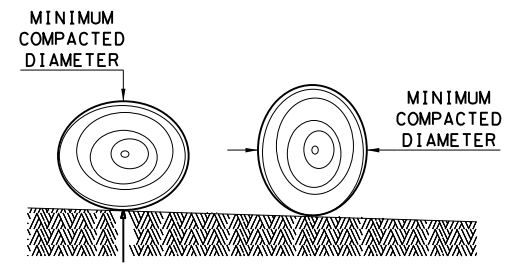
PLAN VIEW



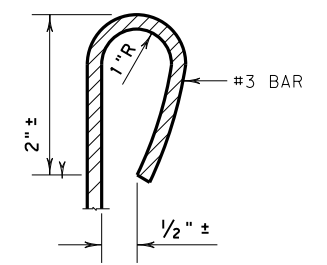
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS



REBAR STAKE DETAIL

**SEDIMENT BASIN & TRAP USAGE GUIDELINES**

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

**Log Traps:** The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

- GENERAL NOTES:**
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
  2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
  3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
  4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
  5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
  6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
  7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
  8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
  9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
  10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

- LEGEND**
- CL-D EROSION CONTROL LOG DAM
  - CL-BOC EROSION CONTROL LOG AT BACK OF CURB
  - CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
  - CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
  - CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
  - CL-DI EROSION CONTROL LOG AT DROP INLET
  - CL-CI EROSION CONTROL LOG AT CURB INLET
  - CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET

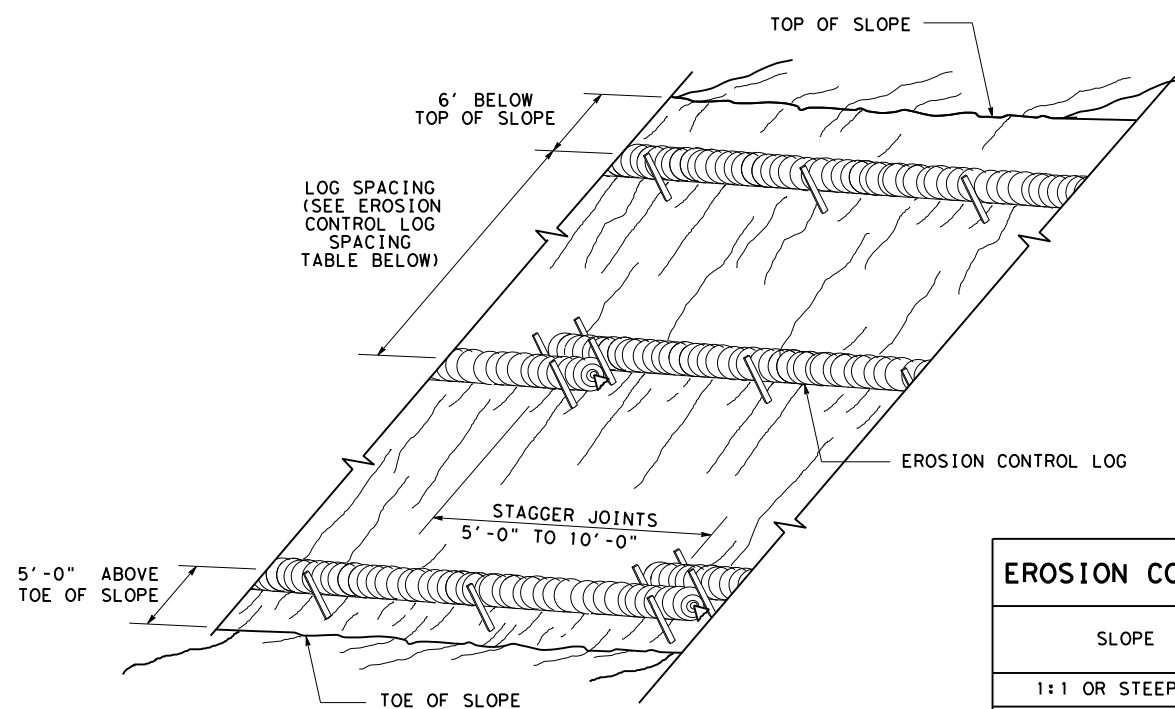
SHEET 1 OF 3

Design Division Standard

**TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES**  
**EROSION CONTROL LOG**  
**EC (9) - 16**

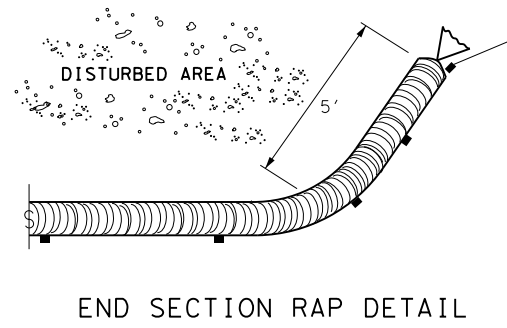
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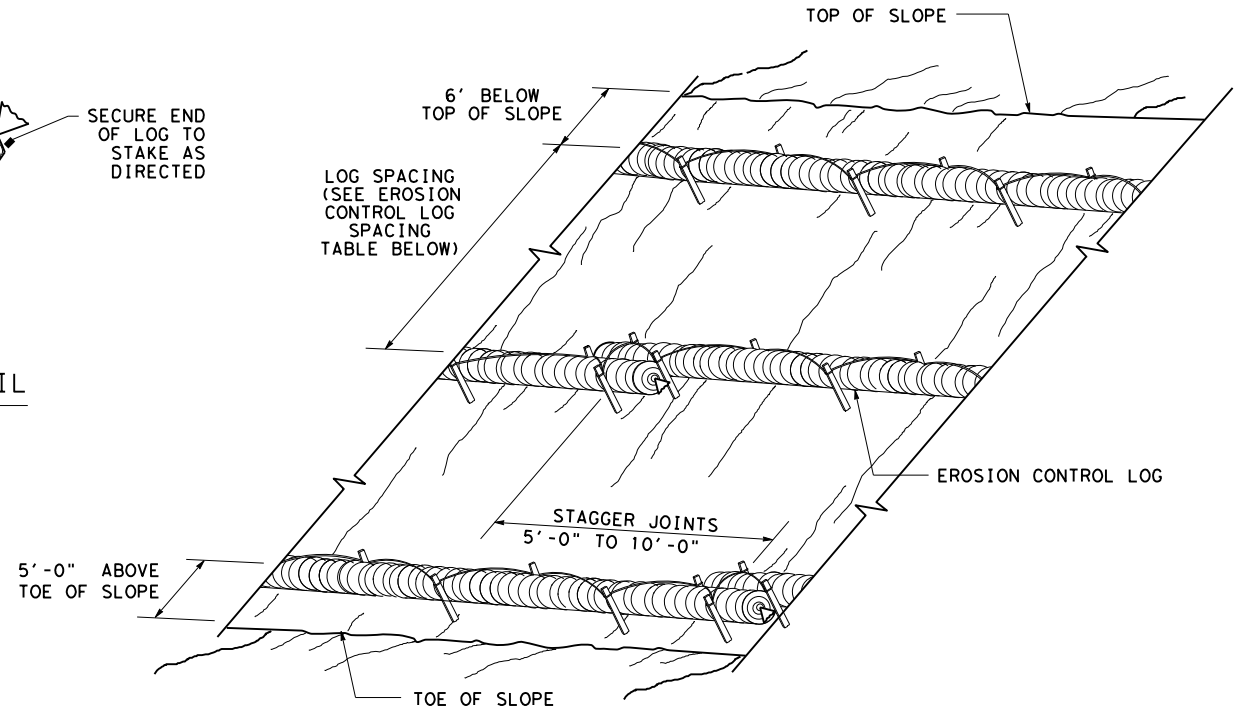
**EROSION CONTROL LOGS ON SLOPES  
STAKE AND TRENCHING ANCHORING**

CL-SST



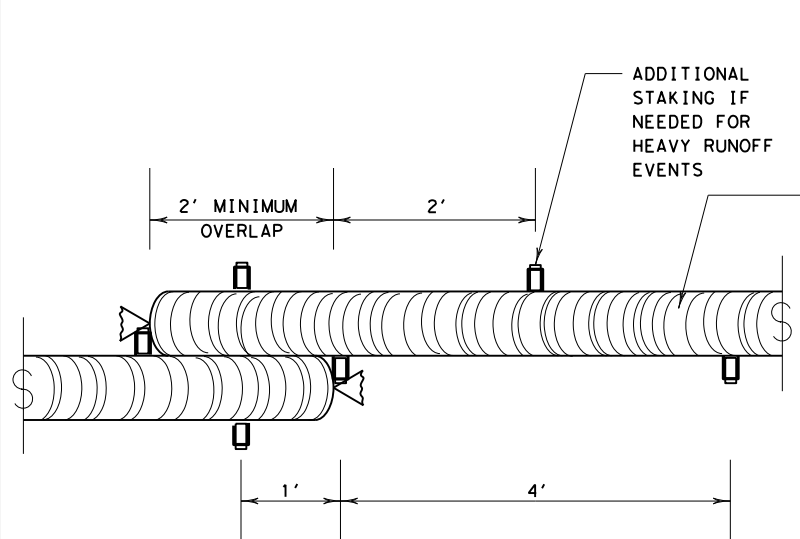
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

\* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:  
 SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;  
 HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



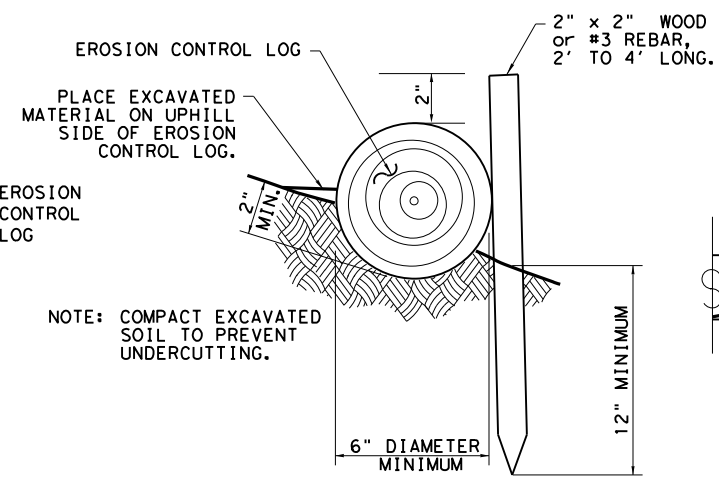
**EROSION CONTROL LOGS ON SLOPES  
STAKE AND LASHING ANCHORING**

CL-SSL



**STAKE AND TRENCHING ANCHORING DETAIL**

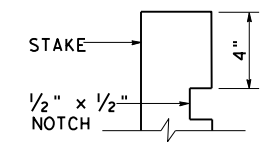
CL-SST



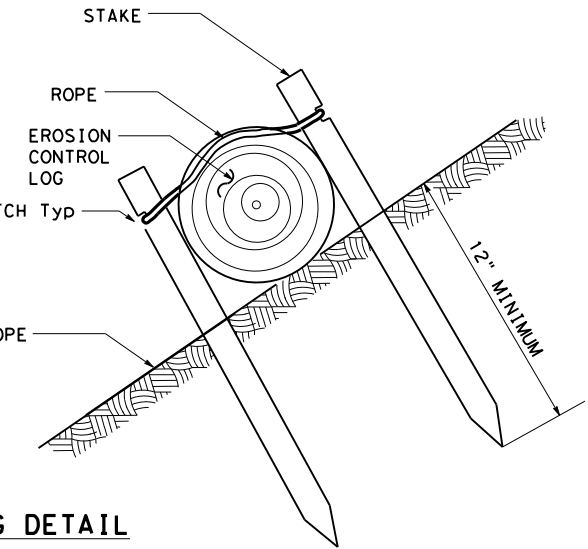
**STAKE AND LASHING ANCHORING DETAIL**

CL-SSL

LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"



**STAKE NOTCH DETAIL**



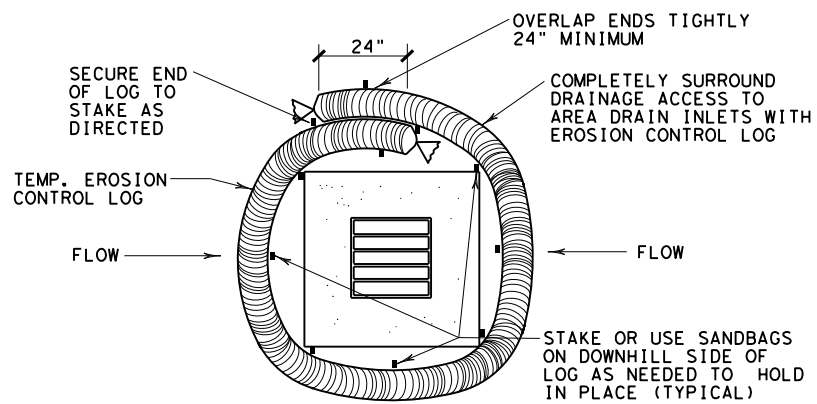
SHEET 2 OF 3

		Design Division Standard	
<b>TEMPORARY EROSION,          SEDIMENT AND WATER          POLLUTION CONTROL MEASURES          EROSION CONTROL LOG          EC (9) - 16</b>			
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT
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CRP	JIM WELLS, ETC.	121	



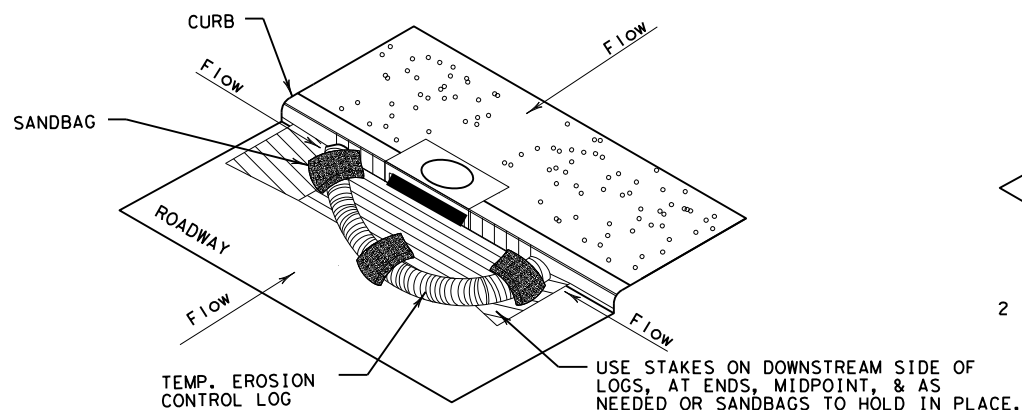
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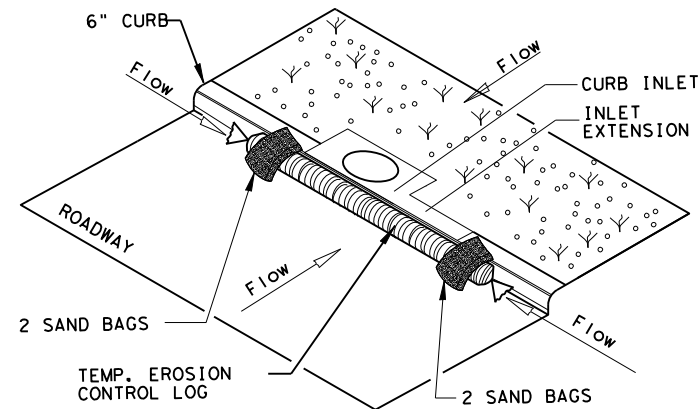
**EROSION CONTROL LOG AT DROP INLET**

CL-DI



**EROSION CONTROL LOG AT CURB INLET**

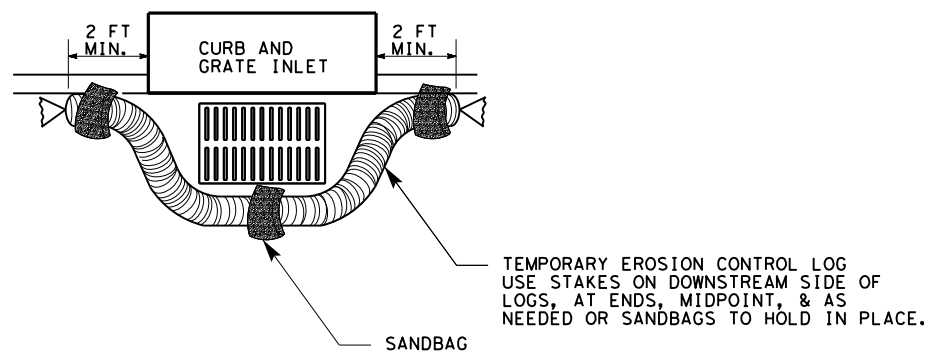
CL-CI



**EROSION CONTROL LOG AT CURB INLET**

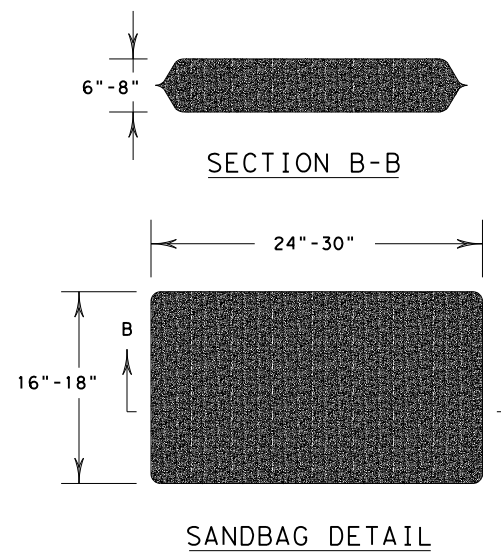
CL-CI

NOTE:  
 EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



**EROSION CONTROL LOG AT CURB & GRADE INLET**

CL-GI



SHEET 3 OF 3



**TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES**  
**EROSION CONTROL LOG**  
**EC (9) - 16**

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
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CRP	JIM WELLS, ETC.		122	

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## PART 1 - GENERAL

### 1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

### 1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

### 1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

## PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

## PART 3 - CONSTRUCTION

### 3.01 GENERAL

- A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.
- B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.
- C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.
- D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.
- E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.
- F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.
- G. All permanent clearances shall be verified before project closing.

### 3.02 RAILROAD OPERATIONS

- A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.
- B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. Railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.
- C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:
  1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.
  2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

### 3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

- A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.
- B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.
- C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.
- D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
  1. Exactly what the work entails.
  2. The days and hours that work will be performed.
  3. The exact location of work, and proximity to the tracks.
  4. The type of window requested and the amount of time requested.
  5. The designated contact person.Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.
- E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

### 3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

### 3.05 RAILROAD SAFETY ORIENTATION

- A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."
- B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

### 3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

### 3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES


Abide by the following minimum temporary clearances during the course of construction:  
A. 15' - 0" (BNSF) (UPRR) and 14' - 0" (KCS) horizontal from centerline of track  
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

### 3.08 APPROVAL OF REDUCED CLEARANCES

- A. Maintain minimum track clearances during construction as specified in Section 3.07.
- B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.
- C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

SHEET 1 OF 2

 Texas Department of Transportation		Rail Division		
<b>RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS</b>				
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0087	02	059, ETC.	SH 359, ETC.
	DIST	COUNTY	SHEET NO.	
CRP	JIM WELLS, ETC.		123	

DATE: 4/6/2024 6:01:25 PM  
 FILE: //txdot.projectwiseonline.com:TXDOT4/Documents/16 - CRP/Design Projects/008702059/4 - Design/Plan Set/13. Railroad/Non Bridge-Projects (2) standard sheets.dgn

**3.09 MAINTENANCE OF RAILROAD FACILITIES**

- A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.
- B. Perform all such maintenance and repair of damages due to the Contractor's operations at Contractor's expense.
- C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

**3.10 SITE INSPECTIONS BY RAILROAD'S DESIGNATED REPRESENTATIVE**

- A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
  1. Pre-construction meetings.
  2. Pile driving/drilling of caissons or drilled shafts.
  3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
  4. Erection of precast concrete or steel bridge superstructure.
  5. Placement of waterproofing (prior to placing ballast on bridge deck).
  6. Completion of the bridge structure.
- B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.
- C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

**3.11 RAILROAD REPRESENTATIVES**

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

- A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.
- B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.
- C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.
- D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.
- E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

**3.12 COMMUNICATIONS AND SIGNAL LINES**

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

**3.13 TRAFFIC CONTROL**

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

**3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK**

- A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".
- B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

UPRR 1-800-336-9193  
 7:00 AM to 9:00 PM CST Monday-Friday except holidays,  
 staffed 24 hrs/day for emergencies  
 48 hrs notice required

BNSF 1-800-533-2891  
 24 hour number  
 5 working days notice required

KCS 1-800-344-8377  
 Texas One Call, a 24 hour number  
 48 hrs notice required, excluding weekends and holidays

If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.


- C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

**3.15 RAILROAD FLAGGING**

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

**3.16 CLEANING OF RIGHT-OF-WAY**

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

 Texas Department of Transportation		Rail Division		
RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS				
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS		0087 02	059, ETC. SH 359, ETC.	
March 2020		DIST	COUNTY	SHEET NO.
CRP		JIM WELLS, ETC.		124

**DISCLAIMER:**  
 The use of this standard is governed by the "Texas Engineering Practice Act." No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

**I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)**

This project is adjacent or parallel work, not within RR ROW:  
 DOT No.: 435583S  
 Crossing Type: at grade on Lamar St (cross street)  
 RR Company Operating Track at Crossing: Union Pacific Railroad Company  
 RR Company Owning Track at Crossing: Union Pacific Railroad Company  
 RR MP: 114.050  
 RR Subdivision: Corpus Christi  
 City: Mathis  
 County: San Patricio  
 CSJ at this Crossing: 1052-03-032  
 Latitude: 28.0877235  
 Longitude: -97.8145458

Scope of Work, including any TCP, to be performed by State Contractor:

The State's Contractor will be refreshing pavement markings and installing signs, sidewalks, ramps, medians and a pedestrian hybrid beacon system on FM 666, which runs parallel to the railroad tracks at a distance of 1,027 feet from this crossing. Advanced traffic control signs will be placed at approximately 907 feet from these railroad tracks on Lamar St (the cross street to FM 666). No traffic control or TCP channelizers will be implemented through RR ROW.

Scope of Work to be performed by Railroad Company:

None

**II. FLAGGING & INSPECTION**

No. of Days of Railroad Flagging Expected: 1  
 On this project, night or weekend flagging is:  
 Expected  
 Not Expected

Flagging services will be provided by:

Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.  
 Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

**UPRR** UP.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
 UP.request@nrssinc.net  
 Call Center 877-984-6777

**BNSF** BNSFinfo@railprosfs.com  
 Call Center 877-315-0513, Select #1 for flagging

**CPKCR** KCS.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
 Bottom Line On-Track Safety Services  
 bottomline076@aol.com, 903-767-7630

OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

Not Required  
 Required. Contact Information for Construction Inspection:

**III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD**

Required.  
 Not Required  
 Railroad Point of Contact: \_\_\_\_\_

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

**IV. RAILROAD INSURANCE REQUIREMENTS**

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits	
Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	\$500,000 / \$500,000 / \$500,000
Commercial General Liability	\$2,000,000 / \$4,000,000
Business Automobile	\$2,000,000

Railroad Protective Liability Limits	
<input checked="" type="checkbox"/> Not Required	
<input type="checkbox"/> Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	\$2,000,000 / \$6,000,000
<input type="checkbox"/> Bridge Structure Projects. Includes new construction or replacement of overpass/underpass structures	\$5,000,000 / \$10,000,000
<input type="checkbox"/> Other:	_____

**V. CONTRACTOR'S RIGHT OF ENTRY (CROE)**

Not Required  
 Required: UPRR Maintenance Consent Letter. TxDOT to assist  
 Required: TxDOT to assist in obtaining the UPRR CROE  
 Required: Contractor to obtain
 

- BNSF: \_\_\_\_\_  
https://bnsf.railpermitting.com
- CPKCR  
https://jllrpg.360works.com/fmi/webd/rpo\_web\_kcs.fmp12
- Other Railroads: \_\_\_\_\_

To view previously approved CROE templates agreed upon between the State and Railroad, see: <https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html>

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

**VI. RAILROAD COORDINATION MEETING**

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

**VII. RAILROAD SAFETY ORIENTATION**

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

**VIII. SUBCONTRACTORS**

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

**IX. EMERGENCY NOTIFICATION**

**In Case of Railroad Emergency**  
 Call: Union Pacific Railroad Company  
 Railroad Emergency Line at: 800-848-8715  
 Location: DOT 435583S  
 RR Milepost: 114.050  
 Subdivision: Corpus Christi

**RRD Review Only**  
 Initials: [Signature]  
 Date: 03/19/2024

**Rail Division**

## RAILROAD SCOPE OF WORK

### PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf	DN: TxDOT	CK:	DW:	CK:
© TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
6/2023	0087	02	059, ETC.	SH 359, ETC.
	DIST	COUNTY		SHEET NO.
	CRP	JIM WELLS, ETC.		125